

GENERAL CATALOG, UNIVERSITY OF CALIFORNIA, DAVIS, CALIFORNIA

**UC/DAVIS 1972-73**

# **GENERAL CATALOG**

**Davis**

**Fall, Winter, and Spring Quarters  
1972-73**

**UNIVERSITY OF CALIFORNIA · DAVIS**

# UC / DAVIS

PUBLISHED AT DAVIS, CALIFORNIA

Volume 12 • May, 1972 • Number 4

A series of administrative publications  
of the University of California, Davis 95616.

Second-class postage paid at Davis,  
California, and at additional offices.

Ten issues a year—one in February, one in March, one in May,  
three in June, one in July, one in August, one in September, and one in December.

Information herein is subject to revision.

Price \$1.00

It is the responsibility of the individual student to familiarize himself with the announcements and regulations of the University printed in this catalog, the *Class Schedule*, and on official notices posted on bulletin boards.

# Contents

GENERAL . . . . .	9
University Calendar, 6. The University of California, Davis, 9. History of the Campus, 9. Present State of the Campus, 10. Student-Faculty-Staff Cooperation, 11. The Davis Community, 11. Transportation, 12. Research Facilities on the Campus, 13. University Library, 13. Summer Sessions, 14. University Extension, 14.	
ADMISSION AND REGISTRATION . . . . .	16
Admission to Freshman Standing, 16. Special Requirements for Nonresident Applicants, 18. High School Preparatory Subjects, 19. Admission to Advanced Undergraduate Standing, 19. Admission of Applicants from Other Countries, 20. Special Admission Categories, 21. Educational Opportunity Program, 22. Requirements for Admission to Graduate Standing, 22. Application Procedures, 22. General Registration Procedures, 25. Adding or Dropping Courses, 26. Changes of Major, College or School, 26. Change of Name, 26. Withdrawals, 26. Readmission after an Absence, 28. Rules Governing Residence, 28.	
SCHOLASTIC REQUIREMENTS . . . . .	30
Evaluations, 30. Scholastic Deficiencies, 31. Transcripts of Record, 32. Mid-Term Grade Standing, 32. Final Examinations, 32. Degree Requirements, 33. Honors and Prizes, 35.	
STUDENT EXPENSES, HOUSING, AND FINANCIAL AID . . . . .	36
Financial Aid Program, 36. Expenses, 36. Application Procedure, 37. Types of Aid Available through the Financial Aid Office, 37. Student Aid Funds Not Handled by Financial Aid Office, 42. Living Accommodations, 43.	
STUDENT SERVICES AND ACTIVITIES . . . . .	46
Student Health Program, 46. Career Planning and Placement Services, 47. Counseling Center, 48. Educational Opportunity Program Counseling, 48. Peer-Advising Center, 48. Work-Learn Programs, 49. Selective Service and Draft Help, 49. International Student Services, 50. Education Abroad, 50. Student Conduct and Discipline, 51. The Associated Students and Student Activities, 53. Recreational Facilities, 54.	
REQUIREMENTS AND CURRICULA . . . . .	56
College of Agricultural and Environmental Sciences, 57	School of Medicine, 158
College of Engineering, 105	School of Veterinary Medicine, 161
College of Letters and Science, 139	Professional School Requirements and Preparation, 160
School of Law, 154	Graduate Division, 172
COURSES OF INSTRUCTION . . . . .	178
Explanatory Note, 178. Symbols, 181.	
OFFICERS OF ADMINISTRATION . . . . .	449



## COURSE OFFERINGS BY COLLEGE, SCHOOL, GRADUATE GROUP, AND DIVISION

### College of Agricultural and Environmental Sciences

Agricultural Economics . . . . .	183	Genetics . . . . .	307
Agricultural Education . . . . .	186	Home Economics Education . . . . .	332
Agricultural Engineering . . . . .	187	Home Management . . . . .	332
Agricultural Practices . . . . .	188	Human Development . . . . .	332
Agricultural Science and Management . . . . .	188	Institution Management . . . . .	334
Agronomy and Range Science . . . . .	189	International Agricultural Development . . . . .	335
Animal Science . . . . .	194	Native American Studies . . . . .	374
Applied Behavioral Sciences . . . . .	201	Nematology . . . . .	375
Asian American Studies . . . . .	207	Nutrition . . . . .	376
Atmospheric Science . . . . .	208	Physiology . . . . .	396
Avian Sciences . . . . .	210	Plant Pathology . . . . .	398
Biochemistry and Biophysics . . . . .	213	Plant Science . . . . .	399
Biological Sciences . . . . .	215	Pomology . . . . .	409
Consumer Economics . . . . .	237	Range Management . . . . .	414
Consumer Science . . . . .	238	Resource Sciences . . . . .	415
Design . . . . .	239	Soil Science . . . . .	428
Entomology . . . . .	288	Soil and Water Science . . . . .	429
Environmental Horticulture . . . . .	290	Textiles and Clothing . . . . .	434
Environmental Planning and Management . . . . .	291	Vegetable Crops . . . . .	435
Environmental Toxicology . . . . .	295	Viticulture and Enology . . . . .	438
Food Science and Technology . . . . .	298	Water Science . . . . .	439
Foods . . . . .	301	Wildlife and Fisheries Biology . . . . .	441
		Work-Learn . . . . .	442

### College of Engineering

Engineering ( <i>Core Courses</i> ) . . . . .	254	Engineering: Civil . . . . .	264
Engineering: Agricultural . . . . .	256	Engineering: Electrical . . . . .	269
Engineering: Applied Science . . . . .	258	Engineering: Mechanical . . . . .	274
Engineering: Chemical . . . . .	262		

### College of Letters and Science

Afro-American (Black) Studies ( <i>a Program</i> ) . . . . .	182	Dramatic Art . . . . .	240
American Studies ( <i>a Program</i> ) . . . . .	190	East Asian Studies ( <i>a Committee</i> ) . . . . .	244
Anthropology . . . . .	196	Economics . . . . .	245
Art . . . . .	203	Education . . . . .	250
Astronomy . . . . .	390	English . . . . .	278
Bacteriology . . . . .	211	Foreign Literature in Translation . . . . .	302
Biological Sciences . . . . .	215	French . . . . .	303
Botany . . . . .	217	Geography . . . . .	309
Cantonese . . . . .	379	Geology . . . . .	313
Chemistry . . . . .	221	German . . . . .	317
Chinese . . . . .	380	Greek . . . . .	226
Classics . . . . .	226	History . . . . .	323
Comparative Literature ( <i>a Program</i> ) . . . . .	235	Integrated Studies ( <i>a Group</i> ) . . . . .	334

International Relations ( <i>a Committee</i> ) . . . . .	335	Political Science . . . . .	400
Italian . . . . .	336	Portuguese . . . . .	430
Japanese . . . . .	379	Psychology . . . . .	410
Latin . . . . .	226	Religious Studies . . . . .	415
Liberal Arts ( <i>a Committee</i> ) . . . . .	344	Rhetoric . . . . .	416
Linguistics ( <i>a Committee</i> ) . . . . .	345	Russian . . . . .	418
Mathematics . . . . .	347	Russian Literature and History ( <i>a Committee</i> ) . . . . .	422
Mandarin . . . . .	379	Sociology . . . . .	422
Military Science . . . . .	369	Spanish . . . . .	430
Music . . . . .	371	Subject A . . . . .	434
Oriental Languages . . . . .	379	Swedish . . . . .	434
Philosophy . . . . .	382	Zoology . . . . .	443
Physical Education . . . . .	385		
Physical Sciences ( <i>a Committee</i> ) . . . . .	389		
Physics . . . . .	389		
Physiology . . . . .	444		
<b>School of Law</b>			
Law . . . . .			338
<b>School of Medicine</b>			
Anesthesiology . . . . .	357	Medical Education . . . . .	363
Behavioral Biology . . . . .	357	Medical Microbiology . . . . .	363
Biological Chemistry . . . . .	358	Neuro-Surgery . . . . .	364
Community Health . . . . .	358	Pathology . . . . .	364
Family Practice . . . . .	359	Pediatrics . . . . .	365
Hematology ( <i>Internal Medicine</i> ) . . . . .	362	Pharmacology . . . . .	365
Human Anatomy . . . . .	360	Physical Medicine and Rehabilitation . . . . .	367
Human Physiology . . . . .	361	Psychiatry . . . . .	367
Infectious Diseases ( <i>Internal Medicine</i> ) . . . . .	363	Radiology . . . . .	368
Internal Medicine . . . . .	362		
<b>School of Veterinary Medicine</b>			
Anatomy . . . . .	192	Pathology . . . . .	380
Clinical Pathology . . . . .	228	Physiological Sciences . . . . .	394
Clinical Sciences . . . . .	229	Veterinary Microbiology . . . . .	436
Epidemiology and Preventive Medicine . . . . .	296		
<b>Graduate Groups</b>			
Agricultural Chemistry . . . . .	182	Microbiology . . . . .	369
Biochemistry . . . . .	213	Plant Physiology . . . . .	399
Ecology . . . . .	244		
<b>Intercollege Divisions</b>			
Biological Sciences . . . . .			215
Environmental Studies . . . . .			292
<b>Index</b> . . . . .			455

# UNIVERSITY CALENDAR

## 1972-73

### Davis Campus

	Fall 1972	Winter 1973	Spring 1973	(Fall 1973)
Pick up registration and course enrollment materials from Registrar's Office (all continuing students).	May 22- Aug. 24, Monday- Thursday	Nov. 15-17, Wednesday- Friday† (1972)	Feb. 14-16, Wednesday- Friday†	
Advisers available to all continuing students.	May 24-26, Wednesday- Friday	Nov. 16-17, Thursday- Friday† (1972)	Feb. 15-16, Thursday- Friday†	
Turn in course enrollment materials (all continuing students).	Aug. 1-24, Tuesday- Thursday	Nov. 20-21, Monday- Tuesday† (1972)	Feb. 20-21, Tuesday- Wednesday†	
Turn in Registration Packets and Fee Payments (all continuing students).	Aug. 1- Sept. 5, Tuesday- Tuesday	Nov. 20- Dec. 8, Monday- Friday (1972)	Feb. 20- Mar. 8, Tuesday- Thursday	
Late registration for continuing students.	Sept. 6- Oct. 6, Wednesday- Friday	Dec. 9- Jan. 17, Saturday- Wednesday (1972)	Mar. 9- Apr. 13, Friday- Friday	
Quarter begins.	Sept. 18, Monday	Jan. 2, Tuesday	Mar. 29, Thursday	Sept. 17, Monday
Orientation and testing.	Sept. 18-22, Monday- Friday	Jan. 2-3, Tuesday- Wednesday	Mar. 29-30, Thursday- Friday	
Registration and payment of fees, in person.	Sept. 20, Wednesday	Jan. 2, Tuesday	Mar. 29, Thursday	
Instruction begins.	Sept. 25, Monday	Jan. 4, Thursday	Apr. 2, Monday	
File study lists by mail (continuing students only).	Sept. 25- Oct. 4, Monday- Wednesday	Jan. 4-15, Thursday- Monday	Apr. 2-11, Monday- Wednesday	
File study lists in person.	Oct. 5-6, Thursday- Friday	Jan. 16-17, Tuesday- Wednesday	Apr. 12-13, Thursday- Friday	
Last day of late registration.	Oct. 6, Friday	Jan. 17, Wednesday	Apr. 13, Friday	
Final date to file petitions with the Registrar to add courses to study list.	Oct. 6, Friday	Jan. 17, Wednesday	Apr. 13, Friday	
Final date to file petition to drop courses. Thereafter permission may be granted by the dean of school or college only under exceptional circumstances.	Oct. 27, Friday	Feb. 7, Wednesday	May 4, Friday	

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

	Fall 1972	Winter 1973	Spring 1973	(Fall 1973)
Final date to file petitions to take courses on a Passed/No Record basis with students' school or college. Exceptions rarely approved.	Oct. 27, Friday	Feb. 7, Wednesday	May 4, Friday	
Final date for graduate students to file petitions with the Dean of the Graduate Division to take courses on a Satisfactory/Unsatisfactory basis.	Oct. 27, Friday	Feb. 7, Wednesday	May 4, Friday	
Final date to file Independent Study Program project proposal form (available in the dean's office) either with the student's college dean or directly with Independent Studies Board.	Feb. 11, Friday	Aug. 4, Friday (1972)	Nov. 8, Wednesday (1972)	
Applications for admission to undergraduate standing, including applications for intercampus transfer, must be filed with complete credentials with the Office of Admissions on or before this date.	Nov. 30, Tuesday (1971)	July 31, Monday (1972)	Oct. 31, Tuesday (1972)	Nov. 30, Thursday (1972)
Credentials and applications for admission to graduate standing must be filed with the Dean of the Graduate Division on or before this date.	June 1, Thursday	Oct. 2, Monday (1972)	Jan. 2, Tuesday	June 1, Friday
Applications for admission to the School of Medicine for 1973-74 must be filed with the School before this date.				Dec. 31, Sunday (1972)
Applications for admission to the School of Veterinary Medicine for 1973-74 must be filed with the Office of Admissions on or before this date.				Nov. 1, Wednesday (1972)
Applications for admission to the School of Law for 1973-74 must be filed with the School on or before this date.				Mar. 1, Thursday (1973)
Applications for readmission to graduate status must be filed with the Registrar on or before this date.	Aug. 14, Monday (1972)	Nov. 28, Tuesday (1972)	Feb. 21, Wednesday	Aug. 15, Wednesday
Applications for readmission to undergraduate status must be filed with the Registrar on or before this date.	Aug. 21, Monday	Dec. 4, Monday (1972)	Mar. 5, Monday	Aug. 20, Monday
Candidates who expect to complete work for A.B. and B.S. degrees must file an announcement of candidacy with the Registrar on or before this date.	Oct. 6, Friday	Jan. 17, Wednesday	Apr. 13, Friday	
Candidates who expect to complete work for masters' degrees must file applications for candidacy with the Dean of the Graduate Division on or before this date.	Sept. 29, Friday	Jan. 12, Friday	Apr. 11, Wednesday	June 29, Friday (for Sept. 1973)
Theses for masters' degrees must be filed with the committees in charge on or before this date.	Nov. 17, Friday	Feb. 21, Wednesday	May 18, Friday	Aug. 10, Friday (for Sept. 1973)
Theses for masters' degrees must be filed with the Dean of the Graduate Division on or before this date.	Dec. 15, Friday	Mar. 21, Wednesday	June 15, Friday	Sept. 7, Friday (for Sept. 1973)

	Fall 1972	Winter 1973	Spring 1973	(Fall 1973)
Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering must file applications for candidacy with the Dean of the Graduate Division on or before this date.	Aug. 23, Wednesday	Dec. 1, Friday (1972)	Mar. 1, Thursday	June 1, Friday (for Sept. 1973) Aug. 31, Friday (for Dec. 1973)
Theses for the degrees of Doctor of Philosophy and Doctor of Engineering must be filed with the committees in charge on or before this date.	Oct. 6, Friday	Jan. 5, Friday	Apr. 6, Friday	June 29, Friday (for Sept. 1973)
Theses for the degrees of Doctor of Philosophy and Doctor of Engineering must be filed with the Dean of the Graduate Division on or before this date.	Dec. 1, Friday	Mar. 1, Thursday	June 1, Friday	Aug. 17, Friday (for Sept. 1973)
Applications for fellowships and graduate scholarships for 1973-74 must be filed on or before this date.	Jan. 15, Monday (1973)			
Applications for 1973-74 undergraduate scholarships must be filed on or before this date.	Jan. 15, Monday (1973)			
Instruction ends.	Dec. 7, <u>Thursday</u>	Mar. 13, Tuesday	June 7, Thursday	
Final examinations.	Dec. 9-15, Saturday- Friday	Mar. 15-21, Thursday- Wednesday	June 9-15, Saturday- Friday	
Quarter ends.	Dec. 15, <u>Friday</u>	Mar. 21, Wednesday	June 15, Friday	
Academic and administrative holidays.	Nov. 23-24, Thursday & Friday	Feb. 19, Monday	May 28, Monday	
	Dec. 22-25, Friday & Monday	—	—	
	Dec. 29- Jan. 1, Friday & Monday	—	—	
Commencement Week	—	—	Mid June	

# THE UNIVERSITY OF CALIFORNIA, DAVIS

In 1868 Governor Henry H. Haight signed the Organic Act, which created the University of California. The following year the University opened its doors on the Oakland campus of the College of California, which had offered its buildings and land to the state in 1867 on condition that a "complete University" be created. In 1873 the University moved to Berkeley when the first buildings were completed.

Today the University has nine campuses to serve the State of California: Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. Each campus has its own distinct atmosphere and special features, but all share the same high standards and adhere to the same admission regulations.

Each campus is headed by a chancellor, and the principal Universitywide officer is the president. The government of the University is entrusted to a corporation called The Regents of the University of California. There are twenty-four Regents: sixteen are appointed by the Governor; the others, including the President of the University, serve *ex officio*. An Academic Senate governs the academic activities of the University; it is composed of the president, chancellors, vice-chancellors, vice presidents, deans, directors, registrars, librarians, and all professors and instructors responsible for courses.

The Davis Division of the Academic Senate determines for the Davis campus the conditions for certificates and degrees (subject to the approval of The Regents) and authorizes and supervises all courses of instruction in the academic colleges and professional schools.

## THE HISTORY OF THE CAMPUS

A spirit of service and an atmosphere of closeness and friendliness accompany the commitment to academic excellence on the Davis campus. Originally known as the University Farm, the campus was acquired to serve the rural population of California, offering three years of instruction in the principles and practice of managing soils, crops, and animals. The need for such training had been anticipated by the late Judge Peter J. Shields, who helped write the legislative Act of 1905 establishing the Farm, and who is known as "the Father of the Davis Campus."

The need for greater educational opportunities in the state increased rapidly, and in 1922, in conjunction with the 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. In 1946 the School of Veterinary Medicine was established. Meanwhile, from its beginnings as an institution which had offered only a few basic, practical courses emphasizing agriculture, a full-fledged University campus was beginning to emerge.

The period of most rapid change and expansion began in 1951 when the College of Letters and Science was founded, and more degree programs became available. Although Davis had long offered courses in the humanities and social

sciences, the faculty in these disciplines now joined with the natural sciences faculty to offer fully developed University curricula. By 1961 graduate programs were so extensive and so numerous that a Graduate Division was established as a separate academic unit. The College of Engineering was formed in the following year, owing much to the foundation already provided by the curriculum in agricultural engineering which had been offered on the campus for many years. 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 PRESENT STATE OF THE CAMPUS

The University of California, Davis, has now been a general campus for twenty years. With an enrollment of 14,000 students, more than 3,700 of whom are graduate students; a faculty of some 1,700; and a staff of almost 5,000, we are encountering, in common with all other university campuses in the nation, problems which our own rapid growth, complicated by changes in society, have forced upon us, and which the founders of the "University Farm" could not have foreseen.

At Davis we are attempting to develop the means to address ourselves to these urgent problems from within and without the University. We are asking ourselves, as a campus, what the purpose of the University is and what role Davis is to play in the overall mission of the University. The faculty, students, and staff are reexamining the entire learning process and the environment of the student. We are working toward a formalized structure for decision-making on matters of common concern to the entire community—some sort of community council representing the organized groups on campus: the Academic Senate, the Associated Students, the Academic Staff Organization, and the University Staff Assembly.

We feel that we have many advantages to bring to this attempt to solve our problems. Our location permits us to be somewhat insulated from the immediate thrust of society's urban problems. The spirit of friendliness and openness, maintained in the face of rapid growth, makes possible good communication between all segments of the campus. The fact that interdisciplinary groups have been present from the beginnings of this campus makes mutual respect and cooperation between departments, colleges, and schools the accepted rather than the extraordinary thing. The movement of the administration toward decentralization of decision making, involvement in the decision-making process of individuals affected by the decisions, and provision of administrative procedures for effecting responsible change should insure that our advantages are utilized.

We are moving ahead: strengthening our two young professional schools; expanding our established colleges to meet our share of the projected undergraduate enrollment; developing new interdisciplinary programs to respond to verifiable changes in student needs. Unafraid of change we yet require that change be made in a responsible fashion—cooperatively, deliberately, and with confidence that our strength and our willingness to listen to each other will carry us on.

## **STUDENT-FACULTY-STAFF COOPERATION**

### **Faculty Advisers**

The spirit of student-faculty cooperation on the campus is especially evidenced by the willingness of the faculty advisers to furnish academic counsel when needed. Every student has access to faculty counsel and is encouraged to contact his departmental or area adviser during orientation week and preregistration periods to seek advice on course selection and information about college or university requirements. The various academic deans are also available at all times to furnish assistance with any academic problem.

### **Administrative Advisory Committee System**

The Administrative Advisory Committee system of the University of California, Davis, provides the Chancellor with a means of seeking and obtaining policy recommendations and advice on a wide range of topics from members of the student body, faculty, and staff. A developing campus presents many opportunities for innovative approaches to insure the best use of the resources available. By appointing interested members of the campus community who have talents in solving problems of the various aspects of the campus, the Chancellor can bring many viewpoints to bear on an assessment of the widely varying needs of the campus population.

### **The Honor Spirit**

A long-time tradition on the Davis campus, the Honor Spirit is most evident at examination time when there are no proctors in the classrooms and students are relied on to do their own work.

But the Honor Spirit is not limited to student behavior during examinations. According to its code, the responsibility for good conduct rests with the individual student; this attitude pervades all student activities. It is largely responsible for the atmosphere of mutual respect and confidence that exists between students, faculty, and staff, as well as among the students themselves.

## **THE DAVIS COMMUNITY**

Davis is a rapidly growing residential community of 27,700. Its population 20 years ago was 3,500 and the projection for 20 years from now in the Davis urban area is 90,000. It is located in the Sacramento Valley, 15 miles west of Sacramento, 72 miles northeast of San Francisco, and connected to each by a major freeway, Interstate 80. It is a junction of the Southern Pacific Railroad, has a Greyhound bus depot, and is 20 minutes from the Sacramento Airport. Its climate is temperate. There is no snow in winter and the minimum average temperature is 36°. Summers are dry and warm with a maximum average temperature of 95°.

Davis is ideally situated for access to outdoor recreation areas. In less than an hour, going west, one arrives at Lake Berryessa or, going east, at Folsom Lake, both of which are recreation areas featuring boating, picnicking, and swimming. An hour's drive brings one to Clear Lake and the famed Napa Valley to the west



or the historic Mother Lode country to the east. Two hours away to the west are the coastal areas, Mendocino in the north and Santa Cruz in the south. Lake Tahoe and the Sierra Nevada mountains, with excellent ski areas such as Squaw Valley, lie two hours to the east.

The community offers many facilities. Twenty-two churches serve the area. There are six elementary schools, two junior highs, and one senior high in the district. Students rank very high in comparative achievement tests. Excellent facilities are provided for the needs of special children and school services are wide-ranging. A favorable pupil-teacher ratio is maintained.

A great variety of planned programs is offered, for all ages, in performing and fine arts, athletics, and special group recreation. Instructional programs are given on a year-round basis in aquatic and other sports, and facilities for swimming, tennis, and other sports are provided in the community's central and neighborhood parks and at the 18-hole municipal golf course.

Cultural opportunities are outstanding for a small community. In addition to the University's Professional Resident Theatre and full schedule of professional concerts, lectures, and exhibits, the Davis Art Center provides directed workshops and classes in fine arts, music, dance, and language and a permanent gallery featuring the work of local artists and offering rental services. Many of the classes perform for the public. There are two movie houses in town, one showing popular features and one specializing in art films. A new branch of the Yolo County Free Library, housing 40,000 volumes, was completed in 1968. There are two local newspapers, and home delivery of the Sacramento and San Francisco papers is available.

Professional services offered in town include those of physicians and surgeons, dentists, optometrists, attorneys, architects, and engineers. Davis has two convalescent hospitals and a 50-bed general hospital; there are several large private hospitals and a Kaiser facility hospital, as well as the UCD School of Medicine affiliated Sacramento Medical Center, in nearby Sacramento. There are banks, restaurants, clothing stores, travel agencies, and many other facilities in the downtown business area and three shopping centers in the peripheral areas.

## **TRANSPORTATION**

The central campus is closed to vehicular traffic. Parking permits are required for all campus lots. Permit fees in 1971-72 ranged from \$8 for motorcycles through \$20 for Residence Hall lots and \$30 for perimeter lots open to students to \$40 for central campus lots open only to faculty and staff. A small number of metered and daily permit spaces are open for visitors. Most members of the campus community ride bicycles. Bicycle and pedestrian lanes are clearly marked on campus and bicycle parking is available near all major buildings. The City of Davis has bicycle lanes (which are closed to vehicular traffic) on the major arteries. Bicycles must be registered with the city and riders are subject to traffic regulations and citations for rule infractions.

There is no public transportation in the city, but the Associated Students (ASUCD) operate Unitrans, a service of five buslines to North, West, and

East Davis (the University campus is adjacent to the southern end of town). These buses run on a schedule convenient to class times and visits to labs or the libraries. Schedules and ride tickets are available at the beginning of every quarter.

## **RESEARCH FACILITIES ON THE CAMPUS**

A number of centers, institutes, and laboratories supplement the extensive departmental research facilities on the campus: the Agricultural History Center, the Center for Administration of Criminal Justice, the Computer Center, the Food Protection and Toxicology Center, and the National Center for Primate Biology; the Institute of Ecology, the Institute of Governmental Affairs, the Institute of Marine Resources, and the International Agricultural Institute; the Bodega Marine Laboratory, the Crocker Nuclear Laboratory, the Laboratory for Research in Fine Arts and Museology, and the Radiobiology Laboratory; the Arboretum, the Facility for Advanced Instrumentation, and the Kearney Research Foundation. The diversity of the areas of research illustrates the breadth of interests pursued on the Davis campus.

## **UNIVERSITY LIBRARY**

The library on the Davis campus contains about one million volumes and annually receives 27,000 current periodicals and serials including government publications. Its holdings in the natural sciences and agriculture are outstanding; strong collections in the humanities, social sciences, fine arts, and engineering are available; and materials in law and medicine are rapidly being acquired. In addition to the main stack collection there are a number of special collections including a bibliographic center collection; 650,000 items on various forms of microcopy; some 30,000 maps; more than 400,000 pamphlets; a number of speech and music phonorecords; about 300,000 items in the F. Hal Higgins Library of Agricultural Technology; and a rare book collection of 17,000 volumes.

To accommodate the rapidly growing collection and satisfy the need for additional reading space, wings were added to the main library in 1964 and 1967, more than doubling the space available for books and readers. In addition to the main library there are branch libraries for health sciences, physical sciences, and agricultural economics; a law library; and several specialized departmental collections.

The Reference Department of the main library provides orientation and assistance in using the collections which are operated on an open stack principle, permitting access to shelved volumes. The Educational Services program offers tours and lectures on the uses and resources of the library and a non-credit course, "Introduction to Library Research," is given each quarter. An information leaflet is available at the loan desk, the reference desk, and on counters near the card catalogue.

The Government Documents Department provides service for readers requiring use of government publications. The Library is an official depository for

United States government publications and for all publications of the State of California. The Atomic Energy Commission reports and the National Aeronautics and Space Administration unpublished research reports are located in the Physical Sciences Library.

The Reserve Book Service makes available for short-term loan periods a collection of several thousand volumes that are heavily used because of assigned class reading.

The Periodicals Room houses 5,450 currently received, unbound titles of periodicals in a closed stack area. They are available for use only in the Library. A coin-operated copying machine in the Periodicals stack area can supply facsimiles of articles for \$.05 per exposure.

The Department of Special Collections provides readers with assistance in the use of rare books, University Archives, and the F. Hal Higgins Library of Agricultural Technology. Other special facilities include a browsing collection for recreational reading, headphones for music listening, audio-visual equipment, a typing room, an outdoor reading area, and a copying service that provides facsimiles of printed materials at a nominal cost.

## **SUMMER SESSIONS**

In 1972 there will be two regular six-week Summer Sessions running from June 19 to July 28 and July 31 to September 8. The Summer Sessions will offer a number of lower division, upper division, and graduate courses of interest to students who may wish to maintain or accelerate progress toward their degree objectives. (Students attending both sessions may accomplish a quarter's work. See residence requirements, page 34). A substantial offering of upper division and graduate courses of interest to teachers and teacher candidates will also be provided, including courses for teacher candidates who have been admitted to internship programs and for other qualified graduate students who may wish to complete requirements for teaching credentials or degrees. In addition, variable unit courses in the 98-99, 198-199, and 298-299 series—group study, advanced special study, and research—will be available for qualified students in many departments.

Summer Sessions will also be conducted on the Berkeley, Irvine, Los Angeles, Riverside, Santa Barbara, Santa Cruz, and San Diego campuses. Information about these Summer Sessions is available in the Summer Sessions bulletin, which may be obtained from the Office of Summer Sessions on the respective campuses.

Announcements concerning Summer Sessions in 1973 will be issued by the Registrar and the Office of Summer Sessions.

## **UNIVERSITY EXTENSION**

University Extension fills a unique role in the University system. Its primary function is to link the University—its scholars, research, and resources—with the people and communities of the State through programs of continuing education.

University Extension programs on the Davis campus provide:

- opportunities to continue the pursuit of intellectual and cultural interests
- education for professional and career advancement
- education in public responsibility
- educational services for government and voluntary agencies.

Although many are designed for those who have attended college, most programs are open to any adult who can benefit from university level study. Credit earned in classes offered through both the Concurrent Course Program and the Equivalent Course Program can be applied directly towards a degree, when and if participants become enrolled as regular students in the University.

Programs vary in length and format, from one-day conferences and short lecture series to courses of two or more quarters and certificate programs requiring up to several years. Instructors are drawn from the University faculty, nearby university and college faculties, and from the ranks of professionals in various fields of instruction. Guest speakers of national and international reputation participate in courses built around lecture series.

Credit and non-credit programs are offered in communities throughout the twenty-nine Northern California counties that UCD Extension serves. Information regarding current courses and programs may be obtained by writing University of California Extension, University of California, Davis 95616, or by telephoning (916) 752-0880.

# Admission and Registration

The University's undergraduate admission requirements, which are the same on all campuses, are based on two principles. Simply stated, they are: first that the best predictor of success in the University is high scholarship in

previous work, and second that the study of certain subjects in high school gives a student good preparation for University work and reasonable freedom in choosing an area for specialized study.

## ADMISSION TO FRESHMAN STANDING

Each campus of the University has enrollment quotas which limit the number of new freshman students which may be admitted for each term.

The University defines a "freshman applicant" as a student who has graduated from high school but who has not enrolled since then in a regular session in any collegiate-level institution. To be eligible for admission to the University as a freshman, applicants must meet the Subject Requirements, the Scholarship Requirements, and the Examination Requirements, which are described below. Special requirements for nonresident applicants will be found on page 18.

## Subject Requirements

Courses offered in satisfaction of the following requirements must appear on a list certified by the applicant's high school principal as meeting the subject requirements and be approved by the Director of Admissions of the University of California.

### a. History, 1 unit\*

This consists of 1 unit of United States history, or  $\frac{1}{2}$  unit of United States history and  $\frac{1}{2}$  unit of civics or American government.

### b. English, 3 units

These consist of 6 semesters of English composition, literature, or oral expression.

### c. Mathematics, 2 units

These consist of 2 units of subjects such as elementary algebra, geometry, trigonometry, calculus, elementary functions, matrix algebra, probability, statistics, or courses combining these topics. Arithmetic and such nonacademic subjects as shop mathematics and business mathematics are excluded.

### d. Laboratory Science, 1 unit

This consists of a tenth-, eleventh- or twelfth-grade year course in one laboratory science. Both semesters must be in the same subject field.

### e. Foreign Language, 2 units

These must be in one language. Any foreign language with a written literature is acceptable.

\* A year course in high school is equivalent to one unit.

**f. Advanced course, 1 (or 2) units**

This is to be chosen from the following:

Mathematics, a total of 1 unit of second-year algebra, solid geometry, trigonometry, or other certified advanced courses.

Foreign Language, either 1 additional unit in the same foreign language offered under *e* above or 2 units of another foreign language.

Science, 1 unit of a laboratory science completed subsequent to the laboratory science used for *d* above. Both semesters must be in the same subject field.

**g. Electives**

Additional elective units to complete the minimum of 15 standard high school entrance units are also required.

**Scholarship Requirements**

At least a B average is required in courses taken after the ninth year and used to meet the subject requirements. Grades received in elective courses or in courses taken in the ninth year or earlier are not used in computing this average. Subject requirements are satisfied by courses in which a grade of C or higher has been earned. Grades are considered on a semester basis except from schools that give only year grades. Grades, including those earned in accelerated and advanced courses, are accepted as they appear on the transcript.

In determining the B average, a grade of A in one course will be used to balance a C in another, but an A may not be used to compensate for D, I, or F grades. Courses taken in the ninth year or earlier in which a grade of D or lower is received may be repeated to establish subject credit.

Courses taken after the ninth year in which a grade of D or F is received may be repeated to establish subject credit and to improve scholarship. Courses may be repeated in an amount not to exceed a total of 1 unit of the *a-f* pattern. Grades earned in such repetitions will not be counted higher than a C in determining scholarship average.

**Examination Requirements**

As a requirement for admission, all freshman applicants (and advanced standing applicants who have earned less than twelve units of college credit subsequent to high school graduation) must submit scores from the following examinations.

- 1) College Entrance Examination Board Scholastic Aptitude Test
- 2) Three CEEB Achievement Tests, which must include:
  - a. English composition,
  - b. social science or foreign language,
  - c. mathematics or science.

Applicants whose scholarship average in the required high school subjects is 3.00 to 3.09 inclusive must achieve a minimum total score of 2500 on the examinations. Applicants whose scholarship average is 3.1 or above are not held

for a minimum test score but must submit the required test pattern. The test results of all applicants will be used for the purposes of counseling, guidance, placement, and, when possible, in satisfaction of the Subject A requirement.

### **Examination Arrangements**

Applicants for the fall quarter are urged to take the required examinations as early as possible. Those taking the examinations any later than January will delay the processing of their applications.

Arrangements to take the tests should be made with the Educational Testing Service, P.O. Box 1025, Berkeley, California 94701, or P.O. Box 592, Princeton, New Jersey 08540. The fees are to be paid to the Educational Testing Service. Scores will be regarded as official only if they are received by the Office of Admissions directly from the Educational Testing Service. Admissions applications cannot be processed until scores from the CEEB tests have been received by the Admissions Office.

### **Admission by Examination Alone**

A high school graduate who has not satisfied the entrance requirements as a result of his high school record and who has not attempted college work subsequent to high school (except during summer session immediately following high school graduation) may qualify for admission if he achieves the prescribed minimum scores in the required examinations taken after the first half of the eleventh grade. See Examination Requirements above.

For admission by examination alone the total score on the Scholastic Aptitude Test must be at least 1100; the scores on the three Achievement Tests must total 1650, and the score on any one Achievement Test must not be less than 500.

## **SPECIAL REQUIREMENTS FOR NONRESIDENT APPLICANTS**

### **Graduation From High School**

The acceptability of records from high schools outside California will be determined by the Office of Admissions.

### **Subject Requirements**

The subject pattern required is the same as that required for a California resident (see page 16).

### **Scholarship Requirements**

The scholarship requirements for a nonresident applicant are the same as those for a resident except that the scholarship average must be 3.4 or higher in the required high school subjects taken in tenth, eleventh, and twelfth years.

### **Examination Requirements**

A nonresident applicant must take the same College Entrance Examination Board tests as those required of a resident applicant (see page 17). The test scores submitted will be used for the purposes of counseling, guidance, placement, and, when possible, in satisfaction of the Subject A requirement.

### Admission by Examination Alone

A nonresident applicant who is ineligible for admission to freshman standing and who has not attempted college work subsequent to high school (except during the summer session immediately following high school graduation) may qualify for admission on the basis of examination alone. The tests required of a nonresident applicant are the same as those required of a resident but the scores on the three Achievement tests must total at least 1725.

### HIGH SCHOOL PREPARATORY SUBJECTS

In addition to the high school subjects required for admission to the University, certain preparatory subjects are recommended for many University curricula to give the student an adequate background for his chosen field of study. Lack of a recommended high school course may delay graduation from the University. Details of these recommendations will be found in the bulletin *Prerequisites and Recommended Subjects*, which is ordinarily in the hands of high school and junior college counselors.

A student needing additional preparation is advised to attend one of the many excellent California junior colleges. There he can take courses applicable toward the requirements of the college or school of the University in which he wishes to enroll.

### ADMISSION TO ADVANCED UNDERGRADUATE STANDING

Each campus of the University has enrollment quotas which limit the number of new advanced-standing students which may be admitted each term.

Applicants who have registered since high school graduation in any collegiate institution—including community colleges, summer school, or extension courses—must apply for admission to advanced standing. An applicant may *not* disregard his previous college record and apply as a freshman. However, an advanced standing applicant who has earned less than twelve units of college credit subsequent to high school graduation must satisfy the examination requirement for freshman applicants as described on page 17. The examination requirement may be disregarded in determining eligibility for freshman standing if the applicant has earned more than 12 units of college credit subsequent to high school graduation.

Regulations applying to admission to advanced standing are as follows:

1. Those eligible for admission from high school, but who attended another collegiate institution, must present from that institution a statement of good standing and a grade-point average of 2.0 (2.8 for nonresidents).

2. Those *ineligible* for admission from high school because of subject omissions may establish eligibility by completing, at an accredited college, the required courses with at least C grades, and by maintaining an average of 2.0 (2.8 for nonresidents).

3. Those *ineligible* for admission from high school because of grade-point deficiency may establish eligibility by completing, at an accredited college, a minimum of 56 acceptable semester units (or 84 quarter units), with an average of 2.4 or better (2.8 for nonresidents).



4. Subject deficiencies of not more than 2 units may be waived for those who present the 56 or more semester units (or 84 quarter units) and the 2.4 grade-point average mentioned above (2.8 for nonresidents). Deficiencies in excess of 2 units must be satisfied.

The University grants credit for courses consistent with its curriculum that have been completed in accredited colleges and universities. The University accepts approved transfer courses completed with satisfactory grades in the public junior colleges of the state. Frequently, students who intend to complete their advanced studies at the University will find it to their advantage to complete the first two years of the college work in a California public junior college. However, not more than 105 quarter units in a junior college (70 semester units) are acceptable toward a University degree, although subject credit may still be earned. Entering transfer students earning credit by this means will not be penalized for changes that occur in University graduation requirements while they are attending junior colleges.

The acceptability of extension courses taken at an institution other than the University is decided by the Office of Admissions. The faculty of the particular school or college in which the student plans to enroll, however, decides upon the applicability of such course work in satisfaction of degree requirements. Under the Advanced Placement Program of the College Entrance Examination Board, entering freshmen may receive advanced standing credit for Advanced Placement Examinations completed with scores of at least 3, 4, or 5 on both essay and objective sections of the tests.

## ADMISSION OF APPLICANTS FROM OTHER COUNTRIES

Applicants from other countries will be admitted in accordance with the general regulations governing admissions. An application, official certificates, and detailed transcripts of record should be submitted to the Office of Admissions early in the appropriate filing period (see page 23). Early filing will allow time for exchange of necessary correspondence and, if the applicant is admitted, will help him in obtaining the necessary passport visa.

An applicant from another country whose native language is not English may be admitted only after demonstrating that his command of English will permit him to profit by instruction in the University. An applicant's knowledge of English is tested by an examination given by the University. Admission of an applicant who fails to pass this examination will be deferred until he has acquired the necessary proficiency in the use of English.

Foreign students whose schooling has not been in English are urged to take the Test of English as a Foreign Language (TOEFL). Arrangements to take the test may be made in writing directly to TOEFL, Educational Testing Service, P. O. Box 592, Princeton, New Jersey 08540, U.S.A. Results of the test should be forwarded to the Office of Admissions, University of California, Davis, California 95616.

A student from a non-English speaking country is given college credit in his own language and literature only for courses completed in his country at institu-

tions of college level, or for upper division or graduate courses taken in the University of California or in another English-speaking institution of approved standing.

*Undergraduate Financial Aid.* Effective July 1, 1970, there will be no grants or loans awarded by the University of California, Davis to undergraduate international students during their first year of study. There is no guarantee of financial help from the University following the first year.

## SPECIAL ADMISSION CATEGORIES

In the case of a student who is technically ineligible for admission to the University, the Admissions Officer has authority and responsibility to consider other evidence of ability to pursue University work.

Conditions for admission to *special* or *limited status* are determined by the Admissions Officer and are subject to the approval of the dean of the college or school in which the applicant plans to study. Admission is for a specified time only, and a prescribed scholarship average must be maintained. No degree can be granted to students in special or limited status. Applicants must submit transcripts of record from all schools attended beyond the eighth grade. They may also be required to take the examination in Subject A.

### Special Status

Students admitted to special status are those twenty-one years of age or older who have not fulfilled the University admission requirements but whose special attainments may qualify them for certain courses in the University toward a definite and limited objective.

No applicant will be admitted directly from high school, and only cases of unusual merit will be considered. A personal interview is usually required before final action can be taken.

A special status student will be admitted to courses for which, in the judgment of the instructor, he has satisfactory preparation. Students in this category will seldom be able to undertake the work of engineering and professional colleges or schools.

An applicant will not be admitted to special status for the purpose of making up requirements for admission to the University as a regular student.

### Limited Status

Students in limited status are those with a bachelor's degree who are not candidates for an advanced degree, or those without a bachelor's degree who have completed a substantial amount of college work with a satisfactory scholarship average and whose special attainments may qualify them for certain courses in the University toward a definite and limited objective.

An applicant will not be admitted to limited status for the purpose of raising a low scholarship average.

(Enrollment pressures have necessitated closing this status to applicants de-

siring admission to the College of Letters and Science. Under extraordinary circumstances, by the permission of the Dean of the College, students may be admitted in limited status to the Colleges of Agricultural and Environmental Sciences and Engineering.)

### **Applicants for a Second Bachelor's Degree**

The second bachelor's degree is granted only to students who have completely changed their objective. Those admitted to pursue this degree must indicate very strong probability of academic success.

Admission is subject to the approval of the Admissions Officer and of the dean of the school or college in which the applicant plans to enroll.

(Enrollment pressures have necessitated closing this status to applicants desiring admission to the College of Letters and Science.)

### **EDUCATIONAL OPPORTUNITY PROGRAM**

The Educational Opportunity Program provides entrance to the University for students from racial minority groups and/or low income groups who may or may not have had adequate high school preparation. Under this program EOP recruits Blacks, Asians, Native Americans, Chicanos, and Others. The "Others" group includes white applicants and persons not wishing to be identified in one of the preceding ethnic categories who have a history of low income during the primary and secondary school years.

The Educational Opportunity Program accepts and considers all applications from eligible students. The program is limited, however, by admission spaces and funds. Interested applicants are encouraged to apply to the other Educational Opportunity Programs throughout the state, as well as to the program on the Davis campus.

An application for admission to the Educational Opportunity Program at the Davis campus may be obtained by writing to the Educational Opportunity Program, Admissions, 175 Mrak Hall, University of California, Davis, California 95616.

### **REQUIREMENTS FOR ADMISSION TO GRADUATE STANDING**

See page 174 or the *Announcement of the Graduate Division*.

### **APPLICATION PROCEDURES**

Applicants are expected to study the admission requirements (starting on page 16) to determine as closely as possible their eligibility before following the steps outlined below. Undergraduate application should be directed to only one campus of the University.

Admission to the University is not an assurance of financial aid nor does it guarantee assignment to University housing. Separate applications are required of applicants desiring financial aid or University housing.

## For Freshman Standing

### 1. Application Form

An application for admission is obtained by writing the Office of Admissions, University of California, Davis, California 95616. Applications (and application fees) are to the University and not to a particular campus even though the applicant sends them to a campus of first choice. Consequently, the fee is not refundable if a particular campus cannot accommodate the applicant. The opening dates listed below are the dates on which application materials are first made available; however, they may be requested in advance. All campuses observe these dates for the beginning of application filing. Each campus will accept for consideration all applications filed during the first month of the filing period. After the first month the deadline will vary from campus to campus. Each campus has enrollment quotas that limit the number of new freshman and new advanced standing students that may be admitted. Once these quotas have been filled, additional applications cannot be accepted and will be redirected to another University campus where enrollments are still open. For this reason, applicants should give careful thought to the order in which alternate campus preferences are listed on the application form. Equally important, the completed application should be filed very close to the appropriate quarter opening date shown below.

	<i>Application Filing Period</i>
Winter Quarter 1973 (begins January 2)	July 1-31, 1972
Spring Quarter 1973 (begins March 29)	October 1-31, 1972
Fall Quarter 1973 (begins September 17)	November 1-30, 1972

### 2. Application Fee

The completed application form accompanied by a \$20 nonrefundable application fee should be returned to the Office of Admissions as promptly as possible. (The application fee should be in the form of a check or money order made out to The Regents of the University of California.) An application received without the fee will be returned to the applicant.

### 3. Transcript of Record

The applicant is responsible for arranging to have transcripts sent and for insuring their early arrival at the Office of Admissions, University of California, Davis.

Students still in high school should request the school to send directly to the Office of Admissions an official transcript of all work completed through the junior year and a list of courses in progress during the final two semesters. A complete and final transcript, including a statement of high school graduation, must be submitted for each applicant by the high school from which he graduated. Any additional schools attended after an application for admission has been filed are considered to be a part of the applicant's record and are to be reported to the Office of Admissions. Transcripts and other documents submitted become the property of the University and cannot be returned or forwarded in any form to another college or university.

#### **4. Notification of Eligibility**

Applicants will be notified of eligibility providing appropriate transcripts are on file. A delay will occur if required documents or fees have not been received. Applicants for the fall term will be notified of their eligibility status after their records have been evaluated, usually by late spring. Transfer students in semester-system schools will be notified after the fall grades and a list of spring courses in progress have been received. Transfer students in quarter-system schools will be notified after winter quarter grades and a list of spring courses in progress have been received. Notification will be in late spring.

#### **5. "Statement of Intention to Register" Form**

Admitted applicants will receive a "Statement of Intention to Register" form with their notification of eligibility. The form should be completed and returned along with a \$50 nonrefundable fee. This fee will be credited to the University registration fee if the student registers for the quarter in which he is accepted.

#### **6. Change of Campus**

If, after an applicant has filed for admission, his plans change and he prefers to register on a different campus, he must write to the Director of Admissions, University Hall, University of California, Berkeley, California 94720, indicating his reason for the change. His records will be transferred to the campus he wishes to attend provided facilities are available there. Such requests must be received before the end of the filing period.

#### **7. Reapplication**

An applicant who is not eligible for admission, or one who has been admitted but does not register in the quarter for which he applied and who later desires to attend the University, must submit a new application for admission with the \$20 fee. The new application will be acted upon in light of the current availability of facilities and current admission requirements.

#### **For Advanced Undergraduate Standing**

Applicants for admission to advanced undergraduate standing should follow all steps outlined above for freshman standing and in addition arrange with each college or university attended since graduation from high school to send directly to the Office of Admissions, University of California, Davis 95616, an official transcript of work completed or in progress.

#### **For Intercampus Transfer**

An undergraduate student who is registered on any campus of the University, or who was previously registered in a regular session of the University and has not since been registered in another institution may apply for transfer to another campus of the University by filing the proper forms *on the campus where he last registered*. The intercampus transfer application forms and application for transcript of record forms may be obtained from the Office of the Registrar and

must be filed with that office. There is a fee of \$20 at the time of filing. Dates for filing are the same as those listed for new applicants.

### **For Graduate Standing**

An application form and information are obtained by writing directly to the Office of the Graduate Division, Room 252, Mrak Hall, University of California, Davis 95616.

### **For Professional School Admission**

#### **School of Law**

The requirements for admission to the School of Law are described on page 154. More detailed information and the appropriate application form may be obtained by writing the School of Law, University of California, Davis 95616.

#### **School of Medicine**

The requirements for admission to the School of Medicine are described on page 158. More detailed information may be obtained by writing to the School of Medicine, University of California, Davis 95616.

#### **School of Veterinary Medicine**

The requirements for admission to the School of Veterinary Medicine are described on page 161. More detailed information and the appropriate application may be obtained by writing the School of Veterinary Medicine, University of California, Davis 95616.

## **GENERAL REGISTRATION PROCEDURE**

All students must complete registration requirements. These requirements include:

1. Obtaining registration materials from the Registrar at the designated time and place. (Detailed information may be found in the *Class Schedule* available from the UCD Bookstore and Room 129 Mrak Hall shortly before the opening of each quarter.)

*Late registration privileges will be granted through the tenth day of instruction.* A \$25 fee will be assessed to defray the extra clerical costs of late registration.

2. Preparing a study program of courses, and obtaining the adviser's approval and signature when required by filing instructions.

3. Enrolling in the Subject A course if the requirement has not already been satisfied (see page 33).

4. Taking a language placement test to determine the appropriate level of ability in the language which the student wishes to continue studying (see page 148).

5. Satisfying the American History and Institutions requirements (see page 33).

6. Satisfying the maximum and minimum unit load for which a student may enroll each term. These vary with each college or school. However, the University

considers 12 quarter units a minimum full-time load. All students participating in student and intercollegiate activities must carry this minimum number of units.

7. Paying the prescribed fees (see page 36).

For all nonimmigrant international students, the Associated Students Supplementary Health Insurance program is required (see page 46).

8. Passing a physical examination given by the University Medical Examiners (see page 46).

9. Submitting a Statement of Residence. This is required of all new and returning students, including new graduate students who may have been registered previously as Davis campus undergraduates, and those whose residency status has changed recently (see page 28).

10. Becoming familiar with the requirements of one's particular college or school.

11. Presenting completed registration forms and packets to the Registrar by the prescribed times (see the *Class Schedule*).

## **ADDING OR DROPPING COURSES**

Adding or dropping courses after the registration materials have been submitted to the Registrar requires the filling out of the appropriate petition (with approval from the student's adviser, the department offering the course, and the dean of his college, when required, according to instructions on the petition) which is subsequently presented to the Registrar. Since this entails a considerable amount of work for everyone, students are encouraged to keep these requests to a minimum by determining from the instructor as early as possible the nature of the course requirements such as the number of term papers required, examinations, reading lists, etc. The student's appreciation of this problem will be of great help.

## **CHANGES OF MAJOR, COLLEGE, OR SCHOOL**

With the approval of the appropriate dean or deans, a student in good standing can transfer from one area of study to another. Petition forms for this purpose may be obtained from the Registrar.

## **CHANGE OF NAME**

Petition forms for this purpose may be obtained from the Registrar. Changes for reasons other than marriage must be accompanied by evidence of the legality of the change.

## **WITHDRAWALS**

Withdrawals may be granted by the University for *emergency* reasons or for *good cause*. Unauthorized withdrawals may jeopardize the student's registration privileges and result in failing grades. Forms for this purpose must be obtained from the Registrar's Office.

It is also important that students who have been receiving veterans' benefits or who have been deferred by Selective Service because of registration in the University report immediately, in person or by mail, to the Office of Selective Service and Veterans Affairs.

### **Planned Educational Leave Program**

Planned Educational Leave is defined as a planned interruption or pause in a student's regular, full-time education in which he temporarily ceases his formal studies at Davis while pursuing other activities that may assist in clarifying his educational goals, provide job opportunities and practical experiences away from the campus, allow time for the solution of personal problems, and enhance the prospect of successful completion of his academic program. The intent of the Program is to make it possible for a student to suspend his academic work, leave the campus, and later resume his studies with a minimum of procedural difficulty.

Any registered student at the Davis campus, undergraduate or graduate, is eligible to enroll in the Planned Educational Leave Program. Freshmen, who have been admitted but have not yet registered, are also eligible, the intent being to provide an opportunity for beginning students to pause between high school and college. Professional schools will establish special guidelines for the participation of their students in this Program.

Each applicant for enrollment in the Program is required to file an application form, including a brief explanation of his reasons for leaving the Davis campus, and must state in writing when he intends to resume his academic work. The appropriate Dean must approve the application. The minimum Planned Educational Leave is one full quarter; the normal maximum is one full academic year. A student may request an extension of his Leave. For purposes of this Program, leave of one full quarter is defined as a leave commencing no later than the second week of instruction in a quarter.

It is expected that students enrolled in the Program will devote their leave period primarily to non-classroom activities. Students on Planned Educational Leave are not eligible to enroll in concurrent courses on the Davis campus and shall not earn academic credit at Davis during the period of the Leave.

At the end of his Planned Educational Leave, a student is guaranteed readmission if he resumes his regular academic work at the agreed upon date. Students who do not return at the prearranged time and do not extend their leave, will be considered to have withdrawn.

A fee of \$20 is charged, payable when a student enrolls in the Program. There are no additional charges upon his return. In total amount, this fee is identical to that paid by a student who withdraws and is required to pay a readmission fee when he returns. (The readmission fee is collected in advance). A student is not eligible to receive normal University services during the period of his planned leave. Certain limited services, such as Placement Services, Counseling Services, faculty advising, and Draft Counseling are available however. Male students are urged to consult the Draft Counseling Office before they depart. 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 a student to re-negotiate loan payment schedules and to insure the availability of financial aids upon his return.

For applications and specific information about the Planned Educational Leave Program, students should consult the appropriate Dean's Office, the Registrar, the First Resort, the Student Development Office, or their faculty advisers.

## READMISSION AFTER AN ABSENCE

All former students who wish to re-enter the University of California, Davis, must file an application for readmission with the Registrar and submit the non-transferable, nonrefundable fee of \$20. (Former students are those who have interrupted the completion of consecutive *quarters* of enrollment on the Davis campus.) Official transcripts of all work attempted in the interim must be submitted. Final dates for filing for readmission are listed on page 7.

## RULES GOVERNING RESIDENCE

Students who have not been legal residents of California for more than one year immediately prior to the opening day of the quarter in which they register are charged, along with other fees, a tuition fee (\$500) for the quarter (see page 36). Legal residence is the combination of *physical presence* in California and the *intention* of making it one's permanent home, coupled with the relinquishment of legal residence in any other state. The student who is within the state primarily for educational purposes does not gain the status of legal residence regardless of the length of his stay in California. In general, the unmarried minor (any person under 18 years of age) derives legal residence from his father; or from his mother if the father is deceased; or, in the case of divorced parents, from the parent awarded legal custody by the court. The married woman derives legal residence from her husband from the date of marriage. (Government Code Section 244 and Education Code Sections 23054, 23055, 23057, 23058, 23059, and 23060.)

The attention of the following students is directed to the fact that presence in California for more than one year does not, in itself, entitle them to resident classification: 1) those under 19 whose parents are not California residents; 2) servicemen stationed in California who were not California residents at the time of entry into the military service; 3) alien students who first must qualify for permanent residence status according to the applicable laws of the United States.

Exemption from payment of the nonresident tuition fee is available to the unmarried minor whose natural or adoptive parent is in the active military service of the United States and is stationed in California on the opening day of the quarter for which he registers, or is stationed outside the United States immediately after having been stationed on active duty in California. This waiver is also available to the spouse of a member of the military service of the United States with an active duty station as described above.

New and returning students are required to fill out a Statement of Legal Residence, a form that is issued at the time of registration. Their status is determined by the Attorney in Residence Matters deputy, who is located in the Registrar's Office. Inquiries from prospective students regarding residence requirements for tuition purposes can be made by writing to the Attorney in Residence Matters, 590 University Hall, University of California, Berkeley, California 94720. *No other University personnel are authorized to supply information relative to residence classification.*

Those classified incorrectly as residents are subject to reclassification as non-residents. If incorrect classification results from false or concealed facts, the student is subject to University discipline and is required to pay all back fees he would have been charged as a nonresident. Resident students who become nonresidents must immediately notify the Attorney in Residence Matters or his deputy. Application for a change in classification with respect to a previous quarter cannot be accepted.

# Scholastic Requirements

## EVALUATIONS

Every instructor is required to assign a letter grade for each student registered in his course. The QUALITY of a student's work will be reported in one of the following grades:

Passing work: A, excellent; B, good; C, fair; D, barely passing.

Failing work: F, work so poor that it must be repeated to receive recognition.

Undetermined: I, work is satisfactory but incomplete for good cause.

Passed (P) or No Record grading option. Subject to regulation by the faculties of the various colleges and schools, a student in good standing is authorized to petition to undertake one course each term on a Passed or No Record basis and is allowed to accumulate this option when it is not used. Units thus earned will be counted in satisfaction of degree requirements, but such courses will be disregarded in determining the student's grade-point average. In the event that a student does not pass a course under this option, no entry is made on his transcript. Students wishing to exercise this option should familiarize themselves with the requirements of their particular college or school. This option may not be used when a course is to be graded on the Passed/Not Passed or Satisfactory/Unsatisfactory *only* basis.

Passed (P) or Not Passed (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 may assign *only* Passed or Not Passed grading. A student electing such a course may do so in addition to using his Passed or No Record options.

Satisfactory (S) or Unsatisfactory (U). Graduate students, under certain circumstances, may be assigned grades of S or U, but in calculating the grade-point average, units gained in this way will not be counted.

In Progress (IP) grading. Evaluation of the student's performance may be deferred in certain sequential courses (those that carry the designation *deferred grading only, pending completion of the sequence* in course descriptions). In order to gain credit toward graduation, a student must successfully complete the entire sequence in successive quarters. Such courses may not be taken by students on probation, nor may the student take such a course using the Passed/No Record or Satisfactory/Unsatisfactory grading option.

Quality points (grade points) will be assigned each grade as follows:

A+ = 4.0, A = 4.0, A- = 3.7

B+ = 3.3, B = 3.0, B- = 2.7

C+ = 2.3, C = 2.0, C- = 1.7

D+ = 1.3, D = 1.0, D- = 0.7

F = 0.0

I = 0.0

All grades except I are final when filed by an instructor in his end-of-term course report. No final grade except I may be revised by reexamination. The student may replace an I grade with a passing grade and receive unit credit, and grade points if the instructor assigns a letter grade, provided he completes the

course work in a way authorized by the instructor. Courses for which an I grade has been assigned may not be repeated except on an audit basis. A student whose record shows more than 16 units of I grades will be subject to probation or disqualification. While I grades do not count in the grade-point average for or against the student's record during his enrollment, they could weigh negatively at the time of his graduation. In determining whether a bachelor's degree candidate has achieved the 2.0 grade-point average, an I grade is counted as though it were an F. Hence, it is recommended that students do not delay the clearance of incomplete grades as graduation may well be jeopardized.

A student may repeat only those courses taken on the Davis campus in which he has received a grade of D, F, Not Passed, or No Record. In computing the grade-point average of an undergraduate who repeats courses in the University in which he received a D or F, only the most recently earned grades and grade points shall be used for the first 16 units repeated. Thereafter the student will receive the grade assigned and the corresponding grade points earned for each time he takes the class. However, when a course is repeated, the units completed will be credited towards a degree only once.

The QUANTITY of work attempted by the student is measured in quarter units (see page 178) which are assigned by the faculty for each individual course. To convert these units to semester units multiply by 2/3; from semester to quarter units by 3/2.

The student's course work is recorded in terms of units, grades, and grade points. The ratio of grade points over units attempted determines the grade-point average. The student is expected to maintain a C (2.0 grade-point average) or better on all work undertaken in the University. If he falls below a C average, he will be scholastically deficient.

## SCHOLASTIC DEFICIENCIES

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

*Probation.* A student shall be placed on probation if at the end of any term his grade-point average for that term, or his cumulative grade-point average, is less than C (2.0) computed on the total of all courses undertaken at the University of California.

To be removed from probationary status, a student must achieve an overall grade-point average of at least C (2.0) on all work attempted in the University of California.

*Disqualification.* A student shall be subject to disqualification from the University if:

1. his grade-point average falls below 1.5 for any term, or
2. after two consecutive terms on probation he has not achieved an overall grade-point average of at least C (2.0) on all work attempted in the University of California, or

3. he has accumulated more than 16 units of I (Incomplete).

The student subject to disqualification is subject to such action as the faculty of his college or school may determine. The faculty may:

1. disqualify such a student from the University, or
2. suspend his disqualification, continuing him on probation.

The faculty of his school or college is also the body which may authorize the return on probation of a disqualified student.

To transfer from one campus of the University to another, or from one college or school to another on the same campus, a student who has been disqualified or is on probation must obtain the approval of the dean whose jurisdiction he is seeking. After making the transfer, the student is subject to supervision by the faculty of the new college, school or campus.

*Graduate and professional students* with scholarship deficiencies are subject to action at the discretion of their respective deans.

## TRANSCRIPTS OF RECORD

Upon written request to the Office of the Registrar, a student will be provided with an official transcript of work he has completed at the Davis campus of the University of California. Transcripts of work completed at any other University campus or any other institution must be requested directly from the school concerned.

A fee of \$1 per copy of each graduate and each undergraduate record should accompany each request. Graduate and undergraduate transcripts are individual records and must be requested separately.

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

## MID-TERM GRADE STANDING

Students wishing to know their cumulative grade at the mid-quarter may inquire from their instructor. Those who have deficient grades (D, F, or Not Passed) should confer with their adviser. Counselors in the Office of Student Affairs may also be of assistance.

## FINAL EXAMINATIONS

The *Class Schedule* 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 students can avoid final examination conflicts.

Final examinations are mandatory in all undergraduate courses except independent study courses, courses which consist of laboratory work only, and courses for which the final examination has been waived by the Academic Senate. On courses which have the final examination waived, the course description will include the statement, "no final examination."

Wherever practicable, final examinations are written and must be completed within a previously announced time limit. Examinations in non-laboratory courses may not exceed two hours.

Under certain prescribed conditions a student may receive Credit by Examination without formal enrollment in a course. The rules governing such examinations may be obtained from the Registrar.

*Final grade notices* will be sent to the student if, before the end of the term, he has deposited with the Registrar a self-addressed, stamped envelope.

## DEGREE REQUIREMENTS

Three groups of requirements must be satisfied before the student can become eligible for candidacy for the bachelor's degree. They are: 1) college or school requirements; 2) individual departmental requirements, which are all specific and vary as to particulars; and 3) the University requirements, which are general and apply to all schools and colleges. For information on college, school, or departmental requirements see the appropriate section of this catalog.

The University requirements are as follows:

### Subject A: English Composition

Every entering student should satisfy the Subject A requirement. This requirement is designed to assure a level of competence in written English essential to satisfactory progress as a University student. The requirement can be met:

1. By achieving a grade of 5, 4, or 3 in the College Entrance Examination Board (CEEB) Advanced Placement Examination in English, *or*

2. By achieving a score of 550 or higher in the CEEB Achievement Test in English Composition, *or*

3. 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.

Satisfaction of the Subject A requirement is determined by the Office of Admissions. Students not meeting the requirement in one of the ways described above must enroll in the non-credit course in Subject A during their first quarter of residence in the University. A fee of \$45 is charged for the course.

International students whose native language is not English can meet the Subject A requirement by passing a special examination in English composition and, if necessary, completing English 26 with a minimum grade of C.

### American History and Institutions

Every student must demonstrate a knowledge of American History and Institutions. Every graduating student should 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.

He may meet this requirement in any of the following ways:

1. One high school unit in American history, or  $\frac{1}{2}$  high school unit in American history and  $\frac{1}{2}$  high school unit in civics or American government, with a grade of C in each course.

2. By completing any one of the following courses: History 17A, 17B, 21A,

21B, 27A, 27B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 183A, 183B (upper division courses may be taken only with the consent of the instructor); Political Science 5, 5D, 100, 101, 102, 103, 104, 105, 106, 109A, 109B, 113, 128, 129, 160, 163; Economics 111; Sociology 30A, 30B, 30C. Students taking these courses are subject to the rules that apply for prerequisites and majors.

3. By presenting evidence that the requirement has been satisfied at another collegiate institution through courses in the area of American History and Institutions whose credits are acceptable for transfer to the Davis campus of the University of California.

4. By successful completion of the Advanced Placement Examination in American History.

International students studying at the University on F class (student) or J class (exchange visitor) visas should call at the American History and Institutions office to secure exemption from the requirement. They should bring their passports, visas, and registration cards with them.

Further information may be obtained from the Supervisor of the American History and Institutions Requirement, 227 Voorhies Hall.

### **Residence Requirement**

The minimum residence requirement for a bachelor's degree at the University of California is one academic year. 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 in residence in the college or school of the University of California in which the degree is to be taken; no more than 18 of these 35 quarter units may be completed in summer session courses on the campus of residence.

Exceptions to this rule are candidates for the Juris Doctor degree, and those who have been in the military service. With the approval of the dean of his 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 award of the degree may be recommended for the degree after only one quarter of University residence in which he completes at least 16 units or passes a comprehensive examination in his major or field of concentration.

### **Scholarship Requirement**

To receive a bachelor's degree, a student must obtain twice as many grade points as units for all courses attempted by him in the University. An exception to this rule is authorized for honors students undertaking certain courses (see conditions for Credit by Examination, page 35).

### **Unit Requirement**

Every candidate will present a minimum of 180 quarter units as partial satisfaction of the requirements for the bachelor's degree.

## **Filing for Degree Candidacy**

Each candidate for a degree must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to receive it. The dates for filing are published in the calendar on page 7 of this catalog and in the *Class Schedule*.

## **HONORS AND PRIZES**

### **Deans' Honors List**

The names of all students in the College of Letters and Science who have completed a minimum of 12 units of work on the Davis campus exclusive of units taken on Passed or Not Passed (or No Record) basis and who have achieved a minimum grade-point average of 3.3 during the preceding term, and all other undergraduate students who have completed a minimum of 12 units of work and who have achieved a 3.2 cumulative grade-point average or better in all work undertaken in the University and in their college will be listed by the various deans and posted on the bulletin boards outside the offices of the respective colleges.

### **Credit by Examination**

Honors students may request credit by examination in courses without formally enrolling in them, or in subjects appropriate to their curriculum but not offered as courses in the University. Arrangements should be made with the dean, and his consent and that of the instructor appointed to give the examination are necessary before the examination can be given. Application forms for such examinations may be obtained from the Registrar.

### **Graduation Honors**

Graduating students may qualify for honors, high honors, or highest honors. An appropriate notation is made on diplomas and on permanent records in the Registrar's Office.

### **Prizes**

Prizes for student achievement and scholarship on the Davis campus consist of inscribed plaques and cash awards. The University Medal is the highest honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College Medal is given to the outstanding graduating senior of each of the colleges and professional schools.



# Student Expenses, Housing, and Financial Aid

## FINANCIAL AID PROGRAM

The primary purpose of the Financial Aid Program at Davis is to provide financial assistance and advice to students who would be unable to pursue their education at the University without such help.

In addition to budgetary advice and counsel, financial assistance consists of scholarships, grants, loans, and employment—offered singly or in various combinations—to meet the difference between the student's resources and the cost of attending the University.

The University expects parents to make a maximum effort to assist their sons and daughters with college expenses. The student's desire to be independent of his parents or his rejection of their support is not held to be a valid reason for granting financial aid. The University also expects that all students will provide a part of the total cost of attending the University from resources outside the University. The financial assistance given by the University should be viewed only as supplementary to the resources of the applicant and his family. These premises are assumed in determining the type and amount of assistance necessary to meet the student's financial deficit.

The following information will introduce you to the various types of financial assistance available on the Davis campus as well as to the procedures for making application for assistance. We invite you to make further inquiries about our Financial Aid Program and about the various ways in which a college education might be financed.

## EXPENSES

Legal residents of California are not required to pay tuition at the University. (Students classified as nonresidents must pay a tuition of \$500 per quarter.) Nevertheless, there are certain other expenses that have to be considered. Although each student must determine his own budget in keeping with his needs and resources, the following approximated costs per quarter are presented as a guide.

Registration:	<i>Undergraduates</i>	<i>Graduates</i>
University Registration fee .....	\$ 100.00	\$ 100.00
Memorial Union fee .....	3.50	3.50
Student body membership fee .....	7.00	...
Education fee .....	100.00	120.00
<b>Total for California residents .....</b>	<b>\$ 210.50</b>	<b>\$ 223.50</b>
Tuition for nonresidents .....	500.00	500.00
<b>Total for nonresidents .....</b>	<b>\$ 710.50</b>	<b>\$ 723.50</b>
<b>Additional approximated costs:</b>		
Room and board .....	\$ 350-500.00	
Books and supplies (costs may exceed \$75.00 in special cases, such as for students in medicine or veterinary medicine) .....	50- 75.00	
Miscellaneous (includes travel, health insurance*, laundry and clothing, recreation, medical and dental care, and toiletries) .....	150-250.00	

*The costs listed above are average costs. Fees are subject to revision.*

\* Mandatory for nonimmigrant international students (see page 46).

Students should have enough funds with them at the beginning of the fall quarter to cover registration fees, books, and the first month's room and board, as scholarship, grant, work-study, and loan checks will not be available until after registration.

Students may be subject to the following fees for optional services: parking, \$30 or \$20 for cars, depending on the type of permit desired, and \$8 for motorcycles; \$26 for health insurance; \$3 for changes in study lists after the announced deadlines; \$10 for late filing of study lists; \$25 for late registration; \$1 for each transcript requested; \$20 for applications for readmission or intercampus transfer. The \$50 undergraduate Acceptance of Admission Fee is nonrefundable and is applied toward the University Registration Fee at the first registration.

## APPLICATION PROCEDURE

Application forms may be obtained from the Office of Financial Aid, North Hall, University of California, Davis, California 95616. To facilitate the granting of monies to students, one application form has been developed to handle all of the undergraduate scholarships, loans, grants, and work-study jobs administered by the Davis campus.

The application, which consists of the student's personal and budgetary information and the Parents' Confidential Statement, is reviewed by the financial aid committee to determine eligibility for, and dollar amount of, a scholarship, loan, grant, employment under the Work-Study Program, or a combination of these.

A Parents' Confidential Statement must accompany the student's personal and budget information page in order for the application to be complete and to permit an evaluation of need. The Parents' Confidential Statement form may be obtained from the high school or college and must be sent to the College Scholarship Service, P.O. Box 1025, Berkeley, California 94701 for evaluation by December 15, one month before the University's financial aid application deadline.

**Application Deadline.** Applications are available in November of each year, and the deadline for applying for all financial aid is January 15 for the following academic year. Both the completed application and the Parents' Confidential Statement must be received by the Financial Aid Office before this date.

Applications received after this date will not be considered for scholarships and will be considered for other types of aid only if funds are available.

Notification of awards will be made to students by

April 30—for scholarships

July 1—for other types of financial aid (loans, jobs, grants).

## TYPES OF AID AVAILABLE THROUGH THE FINANCIAL AID OFFICE

### Undergraduate Scholarships

**Regents Scholarships.** These awards, granted by the President of the University and the Chancellor of the Davis campus, are among the highest honors that may be conferred upon an undergraduate student. Recipients are selected on the

basis of academic excellence and exceptional promise. Students are eligible for Regents Scholarships upon graduation from high school or upon completion of the sophomore year at the University, at one of California's public junior colleges, or at another accredited collegiate institution. All scholarship applicants who meet the qualifications are considered for these awards.

The amount of each scholarship is based on the student's financial need. Awards may be honorary in nature or may be accompanied by a stipend to cover the difference between family resources and the yearly standard cost of education at the University. *If you wish to be considered for a Regents Scholarship with honorarium only, you should so indicate, and you need not file a Parents' Confidential Statement.*

The term of appointment is four years for students entering from high school and two years for students appointed on completion of the sophomore year. Regents' scholars are expected to maintain at least a B average in course work undertaken at the University.

*President's Scholarships.* These one-year awards are made annually to entering and continuing students, including junior college transfers. They are granted by the President of the University and the Chancellor of the Davis campus. Again, all scholarship applicants are considered for these awards.

President's scholarships are awarded on the basis of scholastic attainment, financial need, and promise. The awards carry a maximum stipend of \$500. In cases where the established financial need exceeds this amount, the awards will be supplemented by additional scholarship funds, grants, loans, and/or part-time work under the College Work-Study Program.

*University, Alumni, Endowed, and Agency Scholarships.* These scholarships are made possible through funds provided by individual donors, private corporations and agencies, the alumni associations, and The Regents of the University. These awards vary considerably in amount but normally average between \$400 and \$500 per year.

Most scholarships are open to all undergraduate students on a competitive basis. Although some are restricted by the donors to recipients who meet given criteria, students need not apply for any specific scholarship, but should indicate on the application form all the listed qualifications which they can satisfy.

These scholarships, with the exception of some agency grants, are awarded by the Chancellor of the Davis campus on the advice of the faculty. They are granted on the basis of academic achievement, financial need, and promise.

Normally, scholarships are awarded for one year; financial assistance for succeeding years will depend upon the academic performance in the University and continued financial need. An average of B in the University is generally required for a recipient to be considered for awards after the first year. Where the established financial need exceeds the amount of the awards, the awards will be supplemented by additional scholarship funds, grants, loans and/or part-time work under the College Work-Study Program.

## **Graduate Aid**

There are various scholarships and fellowships available to graduate students through the Graduate Division. For information concerning application, see page 176. Graduate students are also eligible for most types of aid handled through the Financial Aid Office. Graduate students should follow the same procedure for applying for these funds as undergraduates (see application procedures in preceding section).

## **Educational Opportunity Grants**

Eligibility for Educational Opportunity Grants is limited to undergraduate students of exceptional financial need, as measured on a scale of parent contribution which has been established by the Federal Government. Upon receipt of the completed Financial Aid Application and the Parents' Confidential Statement, the Financial Aid Office determines the parents' contribution by using College Scholarship Need Analysis procedures. The amounts of the grants range from \$200 to \$1,000 per academic year. The amount of the grant may not exceed one half of the total financial aid award, as the grant must be matched on an equal basis with some other form of financial aid (i.e., a scholarship, grant, loan, or job from the University, or a scholarship, grant, loan, or job from outside sources).

## **UC Grants**

All full-time graduate or undergraduate students with an established need may apply for assistance under the University of California (UC) Grants Program. These grants are ordinarily given only to students with exceptional financial need and are usually given in conjunction with other aid.

## **EOP Grants**

The Educational Opportunity Program (EOP) grants are provided from University sources to assist students who are officially identified as participants in the Educational Opportunity Program.

## **College Work-Study Program**

The College Work-Study Program enables the University to offer employment to financially needy students during the school year and vacation periods. The program is designed to assist those students who are from low- or middle-income families, who need funds to continue their education, and who are enrolled or accepted for enrollment for a full-time course of study at the University. The on-campus and off-campus jobs are limited to an average of 15 hours per week for any one quarter. During scheduled holidays or vacations of at least one week in length, the student may work a 40-hour week without having these hours count as part of the 15-hour weekly average. Work-study jobs are primarily awarded to assist students in meeting their college expenses and secondarily to provide practical job experience in an area closely related to the student's academic endeavors. The number of working hours awarded to any one student will be dependent on his financial need. In other cases of demonstrated financial need, Work-Study jobs may be awarded during the summer on a full-time basis.

These jobs should not be confused with the employment offered by the Student Employment Center, as the jobs under the Work-Study Program are limited to those students demonstrating a definite financial need.

## Loans

*National Defense Education Act Loans (NDEA).* Regularly enrolled students, or applicants for admission to the University, who are United States citizens or permanent residents of the United States, are eligible for NDEA loans to meet their financial need.

The maximum loan that any *undergraduate* student may obtain for one academic year (three quarters) is \$1,000. A fraction thereof may be awarded for one or two quarters. The total amount which may be borrowed by undergraduate students under this program—including loans granted by other collegiate institutions—is \$5,000. For *graduate* students, the maximum for one academic year (three quarters), is \$2,500 or a fraction thereof for one or two quarters. The total that may be borrowed by graduate students under this program is \$10,000 (including loans granted as undergraduates and by other institutions of higher education). However, when demand exceeds the funds available, loans will be granted on a competitive basis and amounts restricted.

Repayment of NDEA loans begins nine months after graduation or withdrawal from the Davis campus and may be extended over a ten-year period at 3 percent interest on the unpaid balance. Members of the armed forces, members of the Peace Corps, members of VISTA, and students who transfer to other schools may defer payment and extend the repayment period.

Up to 50 percent of the loan may be canceled by active duty in the armed forces. Such cancellation applies only to loans made after April 13, 1970, the date of enactment of Public Law 91-230, for military service *performed after June 30, 1970*. Cancellation will be at the rate of 12½ percent per annum of the total amount of such a loan (plus interest) for each year of consecutive military service, not to exceed 50 percent of the total loan.

Up to 50 percent of the loan (and interest thereon) may be forgiven those entering the teaching profession, at the rate of 10 percent for each year of full-time teaching in public or nonprofit (1) elementary and/or secondary school or (2) institution of higher education. A cancellation of 15 percent is made for each year of service as a full-time teacher of handicapped children or a full-time teacher in public or other nonprofit elementary or secondary school which is in an area designated by the Commissioner of Education as a poverty area. Hence, the total amount of the loan may be canceled by teaching the handicapped or teaching in a deprived area for seven years.

*Regents' Loan Funds.* These funds are principally used to supplement stipends of scholarship and fellowship recipients but may also be granted to other qualified students. Regents' Loans, normally repayable in five years, bear an interest rate of 3 percent on the unpaid balance, beginning upon graduation or withdrawal from the University of California. Students who undertake graduate studies at the University of California may defer payment until they com-

plete or terminate such studies. Regents' loans are limited to \$1,500 a year or \$6,000 per student.

*Educational Fee Deferral Loan.* Regularly enrolled students who are residents of California may apply to defer payment of their Educational Fees until after they graduate or leave school. Deferral of fees is based on demonstrated financial need as determined by the student's application for aid.

To defer fees the student signs a promissory note requiring repayment of the fees commencing nine months after the student graduates or withdraws from the University. Interest on the unpaid balance accrues at the rate of 3 percent per year commencing nine months after termination of enrollment. Interest and installments may be postponed for a period not exceeding four years while the student is on active duty with the armed forces or with the Peace Corps or VISTA.

*University Short-Term Loans.* To be eligible for a short-term loan, a student ordinarily must have attended the University for at least one quarter. These funds, made possible by gifts to the University, are granted in small amounts, \$100 to \$500, to help students with educational expenses. Although repayment schedules are determined individually for each loan, these loans are usually repaid within the academic year or with earnings from employment the following summer.

*Emergency Loans.* These loans, not to exceed \$50, are available for emergency educational expenses. Repayment is normally made within 30 days. Interest at the rate of 1 percent per month is charged on the unpaid balance after the loan has been outstanding more than 30 days.

*Federally Insured Student Loans.* These are available through local banks, credit unions, and savings and loan associations for citizens and nationals of the United States or those in the country for other than a temporary purpose.

The maximum loan amount for any student is \$1,500 per academic year, with an aggregate maximum of \$7,500. The loan may be made only for meeting costs of the student's education while he is attending school and carrying at least one half of the normal full-time workload as determined by the school. It is the lender's option to make or deny the loan.

Applications may be obtained from the Financial Aid Office, eligible lenders, or the U.S. Office of Education in San Francisco. The student completes his portion of the application and then submits it to the Financial Aid Office for proper attestation of his status. When the application is returned the student presents it to an eligible lender. If the lender is willing to make the loan, the application is forwarded to the U. S. Office of Education in San Francisco where it is reviewed for compliance with governing regulations. If the student meets all requirements the lender is issued an insurance commitment. Upon receipt of the commitment the lender sends the check to the University for disbursement to the student.

Loan repayment may be deferred while the student is in the armed forces, Peace Corps, or VISTA.

## **Health Professions Student Assistance Program**

The Health Professions Student Loan Program and the Health Professions Scholarship Program are designed to assist students needing financial aid to pursue a course of study leading to the degree of Doctor of Medicine or Doctor Veterinary Medicine. Eligible students should contact the Schools of Medicine or Veterinary Medicine for applications.

Awards are made on the basis of financial need. The maximum loan in a 9-month academic year is \$2,500 and the maximum scholarship in a 12-month period is \$2,500. Interest at the rate of 3 percent per year accrues one year after the borrower ceases to pursue a full-time course of study, at which time the aggregate of loans is repayable over a 10-year period. There are various conditions of deferment and cancellation of the loan which may be discussed at the time of application.

## **Student Employment Center**

Many students who attend the University expect to earn part of their expenses. However, the undergraduate curricula are organized on the assumption that a student will give most of his time and attention to college studies. If possible, the student should avoid outside employment until he has become adjusted to his new environment, has established sound study habits, and is maintaining a good scholastic standing. By the end of the first quarter the student should know the demands of University life and his own capabilities well enough to plan a program combining studies and work.

The Student Employment Center helps students find part-time and summer employment. The office receives job listings from employers and refers qualified students to these openings. A board listing of jobs is maintained at the Financial Aid Office, and interested students are invited to come to the first floor, North Hall, for information and job referrals.

## **STUDENT AID FUNDS NOT HANDLED BY THE FINANCIAL AID OFFICE**

### **Graduate Scholarships and Fellowships**

Information about scholarships or fellowships, etc., for graduate students may be obtained from the Graduate Admission/Fellowship Office, Room 252 Mrak Hall. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division, University of California, Davis 95616, not later than January 15 prior to the academic year for which the award is sought.

### **Army ROTC Scholarship Program**

One-, two-, three-, and four-year ROTC scholarships, which provide \$50 a month plus payment of all tuition, fees, books, and school supplies, are available to selected students. Four-year scholarship applications must be filed by January 1. One-, two-, and three-year scholarships are limited to students enrolled in ROTC. Additional information and application blanks may be obtained from the Department of Military Science.

## **California State Scholarships**

Scholarship awards administered by the California State Scholarship and Loan Commission cover, in part, mandatory fees and are for a maximum of four years. To qualify for renewal as a California State Scholar in the University, a student must have continuing financial need and maintain at least a C average.

California State Scholars who elect to attend a public community college before enrolling in the University may have their scholarships held and activated upon entering the University. Information and application forms have been sent to all schools and colleges in the state, and may be obtained from local school counselors or by writing to the California State Scholarship and Loan Commission, 714 P Street, Suite 1640, Sacramento, California 95814.

## **Veterans Benefits**

Financial benefits are available to veterans and to certain veterans' dependents under Federal and State laws. If a student is eligible for these benefits, a Certificate of Eligibility must be filed with the Office for Selective Service and Veteran's Affairs at the time of registration.

If eligibility for these benefits has not previously been established, application should be made well in advance of enrollment. Information and forms for requesting benefits may be obtained from the above office which is located in Room 224, South Hall.

## **LIVING ACCOMMODATIONS**

### **Residence Halls**

The University provides housing for approximately 3,000 students in a variety of residence halls on campus. Some 28 residences are clustered around three dining commons and each of these areas has its own individual architecture and ambience. In addition there is space for approximately 1,000 single students in off-campus University Affiliated Residence Halls. Each of these halls is staffed with professional personnel who work in conjunction with the residents, striving to create and maintain an environment conducive to the achievement of educational goals.

The room and board rate, which included 20 meals per week, was \$1,175 for the academic year 1971-72. Rates are subject to change. All students planning to live in residence halls sign a contract for one academic year (with the option to cancel at the end of the winter quarter). Payment is usually made in installments according to a payment schedule. Rooms in the residence halls contain all of the necessary furniture and also include study lamps, linen, and blankets. Telephones and weekly laundering of linen are included in the room and board rate. Further information on how to apply for housing is sent as part of the University admissions procedure. Specific questions should be directed to



Housing Services, 111 South Hall, University of California, Davis 95616. Since accommodations are in great demand, early application is advised. An advance payment will be required when a signed contract is returned. If a student *sends written notice to Housing Services* before August 1 that he wishes to cancel his contract, a total refund will be made; after this date, only a partial refund will be possible.

### **Housing for Married Students**

There are 476 apartments for married students on the Davis campus. Some of these apartments have one bedroom, but most are two-bedroom units. Both furnished and unfurnished accommodations are available. Apartment rates for 1971-72 were: one bedroom, unfurnished, \$88; two bedrooms, unfurnished, \$100; two bedrooms, furnished, \$115. Rates include water, gas, trash collection, and electricity. Applications for these units can be obtained by writing Married Students Housing, 120 South Hall, University of California, Davis 95616.

### **Off-Campus Accommodations**

The members of the Housing Office staff believe that living in the community is an integral part of the university experience and a student's total educational growth. Our staff works closely with the members of the ASUCD Student Fair Housing Committee, the Fraternity Presidents' Council, and the Davis Apartment Owners and Managers Association, and is committed to a program of expanding our services to meet the ever-increasing housing needs of the University community.

One of the services of the Housing Office staff is to assist students, faculty, and other University personnel by maintaining lists of private rooms, apartments, duplexes, trailers, and houses available for rent in the Davis area. Since these listings change quite rapidly as the different units are rented, prepared lists are *not furnished* by mail. It is suggested that those who wish to find off-campus housing plan to make arrangements early by consulting the list of vacancies in the Housing Office. Also on file are lists of "Roommates Wanted." Students may advertise here for roommates or may use the file to contact others who have already obtained living accommodations.

Rental arrangements should be made in person with the manager or owner and a clear understanding reached on the conditions of occupancy. If a lease is required, we recommend the "Model Lease," a document written jointly by the ASUCD Student Fair Housing Committee and the Davis Apartment Owners and Managers Association.

The Student Fair Housing Committee publishes a viewpoint on housing which is a helpful guide to living in the community. Additional material is available at the Housing Office in South Hall.

For those who live off-campus without kitchen facilities, meal plans which allow students to eat in any one of the residence hall dining rooms or the Memorial Union are available.

## **Fraternities**

Twelve national fraternities are represented on the Davis campus, providing living quarters and meals for their more than 350 undergraduate members and pledges. The fraternities, under their system of self-government, provide social, recreational, and academic programs for their members as well as some experience with business activities. This unique "total" living experience gives fraternity members the opportunity to secure a progressive education both in and out of the classroom.

The size of fraternity live-in groups ranges from 20 to 50. The monthly cost of fraternity living at Davis varies from \$110 in some houses to \$130 in others.

Membership in fraternities is by invitation. Men who are interested in fraternities should write or call on the Independent Living Group Adviser in the Housing Office.

The national fraternities are—Alpha Gamma Rho, Chi Phi, Delta Sigma Phi, Farm House, Kappa Sigma, Phi Delta Theta, Sigma Alpha Epsilon, Sigma Nu, Sigma Phi Epsilon, Theta Chi, Theta Xi, Zeta Beta Tau.

## **Sororities**

There are no sororities on the Davis campus.

# Student Services and Activities

## STUDENT HEALTH PROGRAM

### Medical Evaluation

To safeguard the health of the student and the University community, every new student, as a part of registration, must be examined by the University Medical Examiners. Tests for tuberculosis are a part of the physical examination of all new students.

Applicants with contagious diseases will be excluded. Any student having a physical condition that might grossly disturb the classwork of other students should not apply for admission as he will be disqualified at registration.

Each prospective student is advised to have a physical examination by his own physician to determine his fitness for college work before coming to the University. Any defects capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent possible loss of time from studies.

Students returning after an absence must have a health evaluation at the Student Health Service.

### Supplementary Health Insurance

A supplementary health insurance plan is available at the time of registration. This insurance supplements the student health program and is used for medical care needed between quarters and when away from the campus. It likewise provides for surgical-professional fees and other benefits as outlined in the Supplementary Health Insurance brochure. Procurement of this insurance is strongly urged.

*International Students.* The purchase of health insurance is a condition of registration for all nonimmigrant international students. At the time of registration, all nonimmigrant international students must enroll in the Associated Students Supplementary Health Plan. Students who present documentary evidence of equivalent insurance coverage to the Director of the Cowell Student Health Service may have the requirement to purchase the Associated Students Supplementary Health Plan waived.

Those sponsored students who do not pay the registration fees are not eligible for Student Health Service or the Associated Students Supplementary Health Plan without making special arrangements.

### Student Health Service

The Student Health Service, by preventing and treating acute illnesses, conserves the time of students for their classwork and studies. This service is made possible, for the most part, by the registration fee. It is not a health insurance. Each regularly enrolled student may have such medical care as the Health Service is staffed and equipped to provide from the first day of the quarter through the last day of the quarter. Hospitalization, up to ten days per quarter, is provided as needed.

Continuing students not enrolled during a quarter or when on summer vaca-

tion but remaining in residence in the Davis area, may maintain their eligibility for the medical services of the Student Health Service by paying an appropriate fee to the Cashier. Enrollment in this program may be initiated only during the registration period for each quarter or summer session.

When, in the opinion of the Director of the Student Health Service, serious illness or injury requires prolonged care and will obviously prevent continuation in college during the current quarter, the patient will be returned to his community or home for definitive treatment.

The Student Health Service does not take responsibility for dealing with chronic physical defects or illnesses present at the time of entrance to the University. The Student Health Service does not assume responsibility for dental treatment. It does not take responsibility for treatment of remediable defects where medical or surgical treatment is elective and not of an emergency nature, and where the student's best interest will be served by treatment during vacation.

The Student Health Service is designed as a medical facility to provide medical care while the student is away from home and in attendance at the University; it does not supplant the medical care of the family physician. Full cooperation is encouraged between the student, the Student Health Service, and the family physician.

## **CAREER PLANNING AND PLACEMENT SERVICES**

Placement advisers assist students in their career planning, in locating initial positions following graduation, and in relocating positions as alumni. Students dropping out of the University for a term or longer who are interested in employment or military service should see a placement adviser. The services of the Placement Center are available without cost to students and alumni.

### **Occupational Information—Career Planning**

Students at all levels of study are encouraged to begin their career planning early and to discuss with placement advisers the various occupational opportunities available. A library of vocational information is maintained by the Placement Service and the Counseling Center (see below). Students may use this library at their convenience.

### **Career Placement Service**

Students and alumni seeking careers in business, industry, agriculture, and government are invited to use the services of the Placement Center. Placement advisers discuss matters of job choice and methods of obtaining jobs with registrants. In addition, they arrange employment interviews, receive job listings from employers, and refer qualified registrants to these employers. Graduating students regardless of impending military service, graduate school, or other plans are encouraged to register with the Placement Center early in their final year of study. Alumni may use the placement services for initial or subsequent placement at any time.

### **Educational Placement Service**

Placement service is available to students and alumni who are interested in teaching. Information on the background, training, and professional experience of its candidates, enables this office to match qualifications with specifications of available positions. Placement advisers counsel candidates, communicate with employers, receive vacancy data, and arrange interviews. The University reserves the right to refer only those persons who are considered to be fully qualified.

### **COUNSELING CENTER**

The Counseling Center is staffed with psychologists who provide educational-vocational and personal-social counseling to all regularly enrolled students. Through individual interviews and group discussions, they:

Help students with personal and interpersonal concerns.

Assist students in their choice of academic majors and future occupational and life goals.

Provide a wide range of psychological testing when appropriate.

Work with students who are involved in the process of self-exploration.

Organize and lead encounter, self-awareness and life goals groups.

### **EDUCATIONAL OPPORTUNITY PROGRAM COUNSELING**

Counseling services available to minority students at the University level are of two basic types—traditional counseling, which is available to all University students, and the EOP counseling services entirely devoted to minority and/or low income students.

EOP counselors are concerned and involved with the financial, social, psychological, academic, and overall campus adjustment of the students they serve.

EOP counselors represent four major ethnic backgrounds: Black, Chicano, Asian-American, and Native American.

### **Tutorial Services**

Tutoring is a free service available to EOP students. The tutor coordinator establishes and supervises tutorial services in areas of student need. The tutoring program is complemented by academic support classes taught by EOP staff or sponsored by the program. These classes are directed towards improving study skills.

### **PEER-ADVISING CENTER**

The First Resort, located in East Hall, is an advising center staffed by students. These student-advisers work with other students on academic questions, career interests, and personal concerns.

The First Resort is sponsored by the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science and by the Office for Student Affairs. Its staff works closely with these Colleges throughout the year and is prepared to advise students (particularly those who are new to campus and haven't selected an academic major) on academic requirements, course selection, and program planning.

Beyond this, the staff of The First Resort assists students in finding other members of the University community who are helpful in problem-solving.

## WORK-LEARN PROGRAMS

The Davis campus provides opportunities for students to enrich their academic studies through work-learn experiences. Work-Learn, an educational program linking academic learning with work, is closely tied to academic programs, advising, counseling, and career guidance. It expands learning beyond the campus, enables a student to explore potential professional and career opportunities, and seeks to provide practical experience in chosen careers.

Work-learn experiences cover a spectrum of activities. The range is from employees who work primarily for an income, to trainees and interns who work primarily to learn. To name only a few possibilities, the experience may be as a curriculum aide in a school district; youth workshop counselor; instructor in health courses; research analyst in a criminal justice department; teacher, counselor, or recreation specialist working with emotionally disturbed children; counselor for probation cases; research assistant with a conservation organization; legislative intern with legislators or legislative committees; administrative intern in a department of a local, state, or the federal government; design engineer with consultants and large industries; or specialist in agricultural and resource industries and agencies.

Academic credit may be awarded in an appropriate departmental or college course for work-learn experiences that meet appropriate criteria: they are planned and approved in advance, emphasize learning rather than routine activities, and include field supervision by a qualified nonfaculty person where appropriate and/or the faculty member responsible for giving the credit. In some cases, students receive both credit and monetary compensation for work-learn experience. Participation may be either full-time or part-time, depending on needs, interests, and time available.

Work-learn opportunities are available to all interested students through several organized programs at Davis; PROBE (Professional and Occupational Broadening Experience); *Public Affairs Internship* in the Department of Political Science; *Bixby Work-Learn* in the College of Agricultural and Environmental Sciences; *Environmental Management* in the Division of Environmental Studies; *Cooperative Education* in the College of Engineering; and *Health Sciences Practicum* in Family Practices in the School of Medicine. PROBE develops and supervises experiences on a campuswide basis, whereas the other programs maintain activities in more specific fields. Additional opportunities are available through the Departments of Family Practices, Applied Behavioral Sciences, Environmental Horticulture, Rhetoric, and others.

Interested students should contact the Campus Work-Learn Center.

## SELECTIVE SERVICE AND DRAFT HELP

The Office for Selective Service and Veterans Affairs assists students who have inquiries and problems regarding their Selective Service status. It is up to each

individual, however, to request educational or other deferments from his local draft board, which has exclusive authority over all deferments. The Office for Selective Service and Veterans Affairs will, upon request of the student, certify information about the student's educational progress to the local board. Under existing Selective Service regulations, a student must make satisfactory unit progress toward his degree to be eligible for a student deferment. All draft eligible male students (undergraduate and graduate) will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures.

*Note:* As of fall quarter 1971, students entering college for the first time are no longer eligible for deferment as students.

Students reaching their eighteenth birthday may register for Selective Service at the Office for Selective Service and Veterans Affairs, Room 224, South Hall. This is done as a service to the student. This office is not part of the Selective Service System.

Individual counseling in all areas relating to the draft is available at any time through the "Draft Help" section of this office, which is also located in Room 224, South Hall. Students with questions and concerns are urged to contact this office.

## **INTERNATIONAL STUDENT SERVICES**

Students from other countries may obtain from the staff of the International Student Services Office assistance, information, and advice on all matters pertaining to their attendance at the University and to their residence in the United States.

Prospective students are advised to study very seriously their ability to pay the costs of attending this institution. Approximate current costs for each academic quarter are listed on page 36. Total expenses for 12 months for non-resident students total U.S. \$4,800 to \$5,200, depending on a student's major; the specialized books, materials or implements he may have to purchase; and whether or not he is attending summer sessions. Living costs have been increasing yearly and it is possible for the compulsory fees to be raised between the time this catalog is printed and the start of the next academic year.

Students interested in taking the Test of English as a Foreign Language (TOEFL) can obtain copies of the *TOEFL Bulletin of Information* and Registration Forms from local Educational and Language Centers if living in Hong Kong, India, Nepal, and Taiwan. Students who cannot obtain these locally should write for the *TOEFL Bulletin of Information for Candidates, International Edition* and Registration Forms well in advance of University deadlines from: Test of English as a Foreign Language, Box 899, Princeton, New Jersey 08540, U.S.A.

## **SERVICE TO HANDICAPPED STUDENTS**

The office providing services for handicapped students is located in Room 224, South Hall, phone 752-2020 or 752-2021. This office seeks to assist the severely handicapped with finding attendants, readers, typists, people willing to

do paid and volunteer work, and in helping them to find solutions to problems related to mobility on the Davis campus. When the handicapped student is confronted with any problems relating to his attendance at the University, he is encouraged to contact this office.

## **EDUCATION ABROAD**

The University of California's Education Abroad Program offers students an opportunity to study overseas and receive academic credit from the University. The primary purpose of the program is to provide an academic experience in a different educational system. Through this academic experience the student is able to become involved in the language and culture of the host country.

Eligibility requirements for undergraduate students include: junior or senior standing by the time of participation in the program; the equivalent of two years of University-level language preparation with a B average; and the ability to adapt successfully to a different culture. Students planning to study abroad during the senior year are advised to investigate academic residency requirements. In addition to the teaching credential program described below, graduate students are eligible for consideration at some centers if they have completed at least one year of graduate work at the University of California, have the support of their department and the Graduate Division, meet the language requirements, and receive the endorsement of the Education Abroad Selection Committee on the Davis campus.

In 1972-73, nine-month programs for undergraduates will be continued in the United Kingdom, Japan, Sweden, Norway, Hong Kong, France, Lebanon, Germany, Italy, Israel, Ireland, Spain, Kenya, and Ghana; and a new ten-month program will be in effect at Mexico City. Special teaching credential programs are given in Mexico City and Paris for graduate students who intend to teach Spanish or French. At many centers, an intensive language and orientation program precedes the undergraduate academic schedule. The centers are administered overseas by University of California faculty members who assist students in meeting their educational objectives and help with living arrangements and personal problems.

Estimated minimum costs for the nine-month program range from \$2,940 (for Hong Kong) to \$3,920 (for Lund or Bergen). Estimated cost for the graduate teaching credential program is \$1,685 for Mexico City and \$1,825 for Paris.

The Education Abroad Program is administered centrally from the Santa Barbara campus. Detailed information on the program and application forms are available at UCD from the Education Abroad section of the International Student Services Office, Room 323, South Hall. Information pertaining to other opportunities for study, travel, and employment abroad is available at the same office.

## **STUDENT CONDUCT AND DISCIPLINE**

Students enrolled in or individuals seeking enrollment in the University assume an obligation to conduct themselves in a manner compatible with the



University's function as an educational institution. Misconduct for which such persons are subject to discipline falls into the following categories:

1. Dishonesty, such as cheating, plagiarism, or knowingly furnishing false information to the University;

2. Forgery, alteration, or misuse of University documents, records, or identification;

3. Obstruction or disruption of teaching, research, administration, disciplinary procedures, or other University activities, including its public service functions, or of other authorized activities on University premises, or, during times of campus emergencies, within one mile thereof;

4. Physical abuse or conduct which threatens the health or safety of any person on University-owned or -controlled property or at University-sponsored or -supervised functions, or, during times of campus emergencies, within one mile of a University campus or facility;

5. Theft or destruction of or damage to property of the University or of a member of the University community or campus visitor or, during times of campus emergencies, destruction of, or damage to property on campus or within one mile thereof;

6. Unauthorized entry to or use of University facilities;

7. Violation of University policies or of campus regulations, including campus regulations concerning the registration of student organizations, the use of University facilities, or the time, place, and manner of public expression;

8. Manufacture or attempted manufacture of or use, possession, or distribution of narcotic or dangerous drugs, including but not limited to marijuana and lysergic acid diethylamide (LSD), except as expressly permitted by law;

9. Violation of the rules governing residence in University-owned or -controlled property;

10. Disorderly conduct or lewd, indecent, or obscene conduct or expression on University-owned or -controlled property or at University-sponsored or -supervised functions;

11. Participation in mass disorder, disturbance of the peace, or unlawful assembly, on a University campus or facility, or, during times of campus emergencies, within one mile thereof;

12. Failure to comply with directions of a University official or other public officials acting in the performance of their duties while on a University campus or other University facility, or, during times of campus emergencies, within one mile thereof, or resisting, delaying, or obstructing such University or other public officials in the performance of or the attempt to perform their duties; or

13. Conduct which adversely affects the student's suitability as a member of the academic community.

Students are subject to disciplinary action for misconduct on other campuses of the University.

## Administration

The President of the University, through the Chancellor, has ultimate author-

ity for the administration of student discipline. Assistance in this area is provided by members of the teaching staff, the administrative officers concerned with student welfare, the Student Conduct Committee, and a student hearing body.

## **Types of Discipline**

The major types of disciplinary actions are:

*Warning:* Notice to the student that continuation or repetition of specified conduct may be cause for other disciplinary action;

*Censure:* Written reprimand for violation of specified regulation;

*Probation:* Exclusion from participation in privileges or extracurricular University activities as set forth in the notice of probation for a specified period of time. If a student while on probation violates any of the terms set forth in the notice of probation or violates the Standard of Conduct, as determined after the opportunity for a hearing, he shall be subject to further discipline in the form of suspension, dismissal, or expulsion;

*Interim Suspension:* Exclusion from classes and other privileges or activities as set forth in the notice of interim suspension, pending final determination of an alleged violation;

*Suspension:* Exclusion from classes, and exclusion from other privileges or activities or from the campus as set forth in the notice of suspension, for a definite period of time with reinstatement thereafter dependent upon a showing of observance during the period of suspension of the terms set forth in the notice of suspension. If a student while on suspension violates any of the terms set forth in the notice of suspension or violates the Standard of Conduct while on a campus of the University or in relation to a University-sponsored activity, as determined after the opportunity for a hearing, he shall be subject to further discipline in the form of dismissal or expulsion;

*Dismissal:* Termination of student status for an indefinite period and, if as specified in the notice of dismissal, exclusion from the campus for a period not to exceed one year. The student may be readmitted to the University only with the specific approval of the Chancellor of the campus to which he applies. If a dismissed student violates the Standard of Conduct while on a campus of the University or in relation to a University-sponsored activity, or if he violates any of the terms set forth in the notice of dismissal as determined after the opportunity for a hearing, he shall be subject to further discipline in the form of expulsion;

*Expulsion:* Permanent termination of student status without possibility of readmission to any campus of the University;

*Other:* Other types of discipline as set forth in campus regulations.

## **Student Relations Council**

The Student Relations Council of the Associated Students deals with student welfare, student conduct, student-faculty relations, and ASUCD Constitution interpretation. The Council fosters the honor spirit, a code which places the responsibility for classroom and campus conduct with the individual student.

## THE ASSOCIATED STUDENTS AND STUDENT ACTIVITIES

The entire undergraduate student body holds membership in the Associated Students, University of California, Davis (ASUCD). Graduate students may become members by paying the fee. The ASUCD, through its elected governing body (the ASUCD Senate), and appointed activities chairmen, is responsible for many student services and student activities on campus.

The ASUCD serves to represent students in both the administrative and the decision-making processes on the Davis campus. ASUCD also cooperates with the other University of California campuses to operate a full-time Student Lobby in Sacramento to represent student interests to State government. Recently, ASUCD involvement in such work has led to action by the Regents to increase, by \$4 million, the money available to student services on all University campuses.

ASUCD administers valuable student services such as a low-cost supplemental health insurance program; Unitrans, the only mass transit system in Davis; a convenient copying service; a free legal counseling service; a travel service for students traveling abroad during summer vacation; and the Coffee House.

The ASUCD publishes the *California Aggie*, a daily campus newspaper; the *Yearbox*, an innovative approach to the yearbook; and has Committees on Fair Housing (which publishes the annual *Housing Viewpoint*), Consumer Rights, and Academic Affairs.

A major effort of the ASUCD is Picnic Day, the campus open house welcoming the public each spring. Other special ASUCD events or activities include Experimental College, Judging Day (competition in agricultural skills and knowledge for high school students), Camp Cal Aggie (an annual summer encampment for underprivileged children in the area, financed by student fundraising events), many community service projects, Homecoming, Radio KDVS stereo FM and AM, the Cal Aggie Marching Band, Student Forums, Blood Bank, Spring Sing, and the all-important Orientation Week for incoming students. The ASUCD Entertainment Board presents a continuing entertainment program and concert series for students.

Independent student organizations are served by the Student Activities Office which is located in the Memorial Union. Included in this category are departmental, honor, service, special interest, political, and religious organizations, as well as an International Club.

Davis students join those of all other University campuses in All-University festivals featuring the arts and intramurals.

## RECREATIONAL FACILITIES

Student recreational activities at Davis are centered in the Memorial Union, the Recreational Swimming Pool Complex, the Putah Creek Recreational Area, the Silo Barn Student Center, the Coffee House and snack bars, the Gym and Intramural Playing Fields, and the campus theatres. The Memorial Union, located at the North end of the quad, is a center containing conference rooms;

offices for the Student Activities staff and the ASUCD staff, activities chairmen, and officers; lounges equipped with comfortable furniture, magazines, and newspapers; the Coop Vending Area and Dining Commons (largest meal and snack centers on campus); the UCD Bookstore; KDVS, the campus radio station; the *California Aggie*, the campus newspaper; the Memorial Union Art Gallery; the Craft Center with photo facilities, jewelry and small metal sculpture rooms, weaving equipment, and facilities for sewing, silk screening, block printing, leather work, and wood carving; the Campbell Library for recreational reading; the Cameron Music Listening room; the music rehearsal room with piano, music stands and chairs reserved for rehearsals by individuals, groups, or small bands and choruses; the Games Area with bowling lanes, billiard tables and facilities for shuffleboard, table tennis, and cards; Freeborn Hall, the largest campus auditorium for concerts, dances, banquets, and conferences; the MU Box Office; the Information Desk where the campus Master Calendar of events is compiled; the Reservation Desk where reservations for campus facilities are made; and the outdoor plazas. In order to more comfortably accommodate its many users, the Craft Center is scheduled to move out of the MU and into larger quarters in late 1972.

The Recreational Swimming Pool complex includes a large, cloverleaf-shaped swimming pool with a water capacity in excess of half a million gallons, separate wading pool, bath house, snack bar, terrace, shuffleboard courts, and a lodge. The lodge has a main floor lounge with a fireplace, a well-equipped kitchen, and meeting rooms on the second floor.

The Putah Creek Recreation Area features bicycle paths and hiking trails with footbridges at convenient intervals, a well-developed arboretum, bridal path, picnic areas, and a small lake with boating facilities. Recreational as well as instructional sailing and canoeing are offered fall and spring quarters. The Putah Creek Rec Lodge, set on a grassy area suitable for small-team sports has outdoor barbeque pits and tables as well as an indoor fireplace, kitchen, and lounge suited to dancing. Located along Putah Creek, just east of the Putah Creek Rec Lodge, are the UCD Horse Barn and Recreational Horse Arena. Throughout the year, recreational horseback riding instruction is offered. Complementing the recreational boating and horseback riding instruction is the recreational skiing instruction offered winter quarter. The instruction includes numerous ski trips to the Sierras.

The Silo Barn Student Center has a main floor meeting room, student office space on the second floor, and a snack bar area.

The Associated Students run a Coffee House in East Hall where delicatessen-type food, coffee, tea, cider, and soft drinks are sold. There is live entertainment on weekend evenings and recorded music during the week in an informal atmosphere. Other snack bars on campus are "The Roost" in Segundo Hall at the dorms; "The Silo" in the Silo Barn Student Center, serving the Vet Med, Medical School, engineering, and chemistry building portion of the campus; the Wyatt Pavilion snack bar on Putah Creek; and the Rec Pool Snack Bar. These are run by the campus food service and serve limited menus designed for the

needs of each area. Vending machines are located conveniently around the campus.

The Intramural Recreation Program is a major feature of the Davis Campus. Hundreds of students, male and female, participate in individual and team sports scheduled during all three quarters. They use the several gymnasiums; the Physical Education Pool; badminton, handball, volleyball, and tennis courts; playing fields; the MU Games Area; the track at Toomey Field; and off-campus facilities such as the Davis Municipal Golf Course. The well-attended competitions provide not only active sports participation but spectator sports for all living units of the campus—dorms, fraternities, and off-campus housing.

The campus theatres house a rich fare of dramatic art and concerts throughout the year. The Dramatic Art Department's Professional Resident Theatre brings professional actors and directors to work with faculty and students in productions given in the 500-seat, proscenium stage, Main Theatre of the Dramatic Art Building or in Wyatt Pavilion Theatre, a former horse-judging pavilion converted into an octagon-shaped Elizabethan theatre with thrust stage. Faculty and student productions utilize Theatre Labs A and B for dramatic readings and intimate theatre productions where arena performance is suitable, as well as the two larger theatres. Most off-campus groups perform in Freeborn Hall when visiting as a part of the Committee for Arts and Lectures or ASUCD Entertainment Board sponsored series.

## Requirements and Curricula

The programs and majors described in the following pages have been developed by the colleges and schools to aid students in achieving their educational goals. Self-designed and self-initiated programs of study can be arranged for students who, after a serious attempt, find no existing program which meets their needs. Academic advisers and deans will assist such students to draw up acceptable programs.

College of AGRICULTURAL AND ENVIRONMENTAL SCIENCES (includes College faculty listing) . . . . .	57
College of ENGINEERING . . . . .	105
College of LETTERS AND SCIENCE . . . . .	139
School of LAW . . . . .	154
School of MEDICINE . . . . .	158
School of VETERINARY MEDICINE . . . . .	161
PROFESSIONAL School Requirements and Preparation . . . . .	167
GRADUATE DIVISION . . . . .	172

# College of Agricultural and Environmental Sciences

Instruction in the College is administered by six divisions. The major programs within these divisions vary in their requirements but reflect the common desire:

- to ignite curiosity
  - to increase understanding of the significance, methods, and interrelations of the various ways of studying the universe
  - to cultivate the skills and self-discipline essential for successful inquiry and action
- to develop understanding of the student's own and other cultures
  - to permit the student to develop an educational program which utilizes to greatest advantage his individual abilities and interests
  - to provide the knowledge and sense of competence necessary for successful pursuit of a career.



Challenge and opportunity as a result of social and technological changes characterize these times. Today's challenges—protection of the environment from man's diverse activities, prevention of starvation in major segments of the burgeoning population, total development and utilization of human as well as renewable natural resources—are challenges of special significance.

Teaching and research in the College of Agricultural and Environmental Sciences now extend far beyond the traditionally important mission of food and fiber production. Activities reach from the soil to the home; from the farms to the cities. The needs and interests of families, rural as well as urban, are served. The wise and perpetual use of land and forest areas and control of water for home, agriculture, and industry, as well as for fish and wildlife and recreational purposes are studied. These areas, serving the needs associated with the production, processing, and marketing of more than 200 crops, offer special challenges as well as outstanding career opportunities.

The educational objective is the application of the biological, physical, and social sciences to resource management, farming and ranching, business, education, conservation, recreation, and the family and community.

Social problems as well as technological advances are major considerations. The goal is to develop concern within people, not only with technology, but with the human problems that such technology might create. The teaching and research programs of the College of Agricultural and Environmental Sciences were designed to meet these challenges and to contribute significantly to progress in these changing times.

## THE ADMINISTRATIVE STRUCTURE OF THE COLLEGE

The College operates under an administrative structure which was designed by students, faculty, and administrators as a mechanism for insuring the continuing flexibility, responsiveness, and rigor of the College's programs in the face of perpetually changing educational needs. Embodied in the program is

a new freedom of action for students in choosing courses and forming curricula. From the institution's point of view this freedom has brought with it the need to assist students in the development of the maturity required for such judgmental responsibility. The challenge of securing these objectives has been given to six teaching divisions, each representing a wide variety of course and curricular opportunities, and each administered by a chairman having but one concern: quality education. The divisions and their chairmen are concerned not only with the provision of good teaching in important areas of knowledge but also with student receptivity to subjects being taught. Thus, good advising has assumed an importance equivalent to good teaching. The College is organized to help a student determine what he wants and needs to learn and then assist him in learning it. Furthermore, the focus of the College's programs is to educate students for activities for which there is a societal demand. Thus, the program provides students with an opportunity to explore the utility of their training in study-internship situations. Division offices provide career guidance and the Bixby Work-Learn Program provides work experience opportunities for the student in areas as varied as ranching, city planning, laboratory research, child development, marketing, resource management, veterinary medicine, teaching, etc. The College is geared toward preparing people to successfully meet the challenge of leading productive lives, both from the personal and the societal points of view.

### **STUDENT RESPONSIBILITIES AS MEMBERS OF THE COLLEGE COMMUNITY**

In recent years student point of view has had a significant impact on both educational programs and College governance. Students participated in the design of the new look which characterizes the College's programs, and are actively participating in the implementation of the College plan. A wide spectrum of the College, division, and departmental committees which determine educational and administrative policy includes student members. Any student desirous of taking part in the committee system of college governance may do so. All that is required is an indication of interest to the Dean's Office, 228 Mrak Hall. The maintenance of standards of excellence in teaching is dependent on constructive help from every student concerning both courses and programs. Students in the College of Agricultural and Environmental Sciences, as full participants in the educational process, are expected to provide both the chairmen of the teaching divisions and the Deans with candid appraisals of the College's programs. Formal procedures for the distribution and collection of questionnaires concerned with immediate student reactions to specific courses are currently in use. Furthermore, students are encouraged to communicate with the Dean's office at any time, in person or by letter, concerning the impact of the College's programs on their education. Suggestions which could lead to the improvement of the courses and teaching programs are also encouraged. Such information is invaluable to the College community as plans are laid for meeting the educational needs of future classes of students.

## **UNDERGRADUATE PROGRAMS**

### **Program Planning**

University life is a complicated, sometimes bewildering, process. For example, the student who has the academic side of his existence under control may be in need of a small "assist" in dealing with some other area such as registration procedures, or vice versa. The College offers a variety of mechanisms by which students can obtain advice or help in solving such problems.

### **The Faculty Adviser**

Each student in the College is assigned a faculty adviser to help him with the planning of a program in the area of his educational interests. A student who has not decided on a specific course of study and who would normally spend a year or two in the exploratory program is assigned an adviser especially familiar with the breadth of course offerings available in this and the other colleges. A student having well defined educational objectives is assigned an adviser having the training and experience required to facilitate program planning in one of the many different special areas of study.

The function of the adviser is to sensitize the student to the educational opportunities which the Davis campus represents, to discuss the implications of the choice of one option or another, and generally, to use his experience to help students meet their educational goals. The great potential which the adviser-student relationship can have for the student has long been recognized in the College. As a result, a student is strongly urged to consult with his adviser, each quarter prior to registration for classes. The recommendation is only that the student receive the benefit of the advice of a faculty adviser, not that he adopt the advice. It is the student who must weigh the benefits of a particular course of action and ultimately make his own decision.

As a student's educational objectives evolve he may choose a new adviser whose area of expertise corresponds more directly with his own educational objectives. Because of his knowledge, experience, and interest in a particular field, the faculty adviser can be of particular value to the student.

### **Expanded Course Descriptions**

Most of the majors available in the College of Agricultural and Environmental Sciences provide for considerable student initiative in the selection of courses. It is therefore crucial that students be informed of the objectives and contents of the various courses they might want to consider taking. The courses section of this catalog is designed to assist in that process. Students sometimes find that, because of space limitations, the catalog does not include all the data they would like to have about a course. The faculty of the College has responded to this student need by writing up more detailed descriptions of each of its course offerings. These "Expanded Course Descriptions" are available for student use on campus at the University Library reference and periodicals desks, deans' offices, advisers' offices, College division and departmental offices, The First Resort, and in dormitory head residents' offices.



The "Expanded Course Descriptions" are prepared by the instructor a month prior to the initiation of the process of registration for classes. Copies are available just before the advising period for each quarter. These descriptions are current and contain information on such areas as: course objectives, texts used, prerequisite preparation required of the student, courses suggested for obtaining prerequisite preparation, notes on course organization, detailing of special assignments (papers, field trips, etc.), and a topical outline of the material to be covered. The "Expanded Course Descriptions" are an excellent guide to students as they search for the courses which will make up their Davis campus educational experience.

### **The Peer Adviser**

The faculty adviser is often quite removed from some of the day-to-day problems faced by a student, and may be unable to provide guidance on such matters. For this reason a team of student-advisers has made itself available at the Peer Advising Center—*The First Resort*, 161 East Hall. The student-advisers keep themselves up-to-date on the "how's," "where's," and "why's" of University operating procedures. The advisers are prepared to help other students with a variety of scholastic questions about courses, requirements, and enrollment procedures. They are both a source of information and a means of referral to appropriate action offices.

### **Associate Deans of Resident Instruction**

The College has three associate deans who work with students toward the realization of their educational objectives. Students are encouraged to consult with a dean on all matters related to the success of their academic programs. Although the deans excel in educational problem-solving, they welcome the opportunity to become acquainted with individual students and engage in informal conversations. It is through such mechanisms that the deans keep themselves apprised of the state of the educational process for which they are responsible.

### **Work-Learn Opportunities**

The College provides several activities which enrich academic programs through work-learn experiences. These may assist career selection, expand experience, and integrate classroom and field work. In many cases academic credit is included.

As students often prepare for careers about which they know very little, they may fail to grasp the usefulness and importance of their courses. Other students take courses that they hope may lead to an acceptable career possibility. Work-learn experience may assist in removing doubts about chosen careers, and improve motivation, learning, and achievement.

The College maintains an endowed program through which students may participate in work-learn experiences with selected employers. The Bixby Work-Learn Program—originally directed toward experience in production agriculture—now provides opportunities for experience in many of the fields for which

the College prepares students. This voluntary program provides supervised work-learn experiences, full-time or part-time, in summer or in any quarter of the academic year. Interested students should stop in or write to the College Work-Learn Office (Agricultural Practices, TB-10) or the Campus Work-Learn Center.

To facilitate credit for work-learn experiences, the College has initiated an internship course, Work-Learn 192, page 442. By planning in advance with a sponsoring faculty member a student can take up to 15 units per quarter that include appropriate academic processes and methods of evaluation.

Field-work experience is also possible through courses in Applied Behavioral Sciences (see page 20) and internships in environmental management in Environmental Studies (see page 293).

### **The Student**

Although many services are provided to assist the student in program planning, it is he who, in the last analysis, determines the program he will pursue. The most crucial decision the student makes in this process is the selection of his career and/or educational objectives. These may or may not require enrollment in a university. As part of making these decisions students should investigate their educational opportunities in the College by visiting the campus prior to applying for admission and talking with the deans, faculty and students. If the University is to be a means of reaching a career decision, its potential in that regard should be ascertained.

Once the student has decided to enroll in the College and has chosen an educational objective, be it specific or exploratory, the advising services enumerated above can be of assistance to him. Our advisers know the resources of the College and can help the student in using them to accomplish his specific goals. Advisers can be called upon long before a student plans to appear on campus. High school students desiring information about proper 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. It is best that this be done in person, but information can be provided by letter or phone.

It has been the experience of advisers that much of the inflexibility attributed to college programs exists only in the mind of the student. Recommendations meant to serve as guidance are sometimes understood to be hard and fast rules. The citation of "courses normally taken by students" often leads students to believe the courses so cited are required.

The concept of prerequisite knowledge which underlies the listing of prerequisite courses in the course descriptions is particularly misunderstood. 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 prerequisite knowledge through prerequisite courses, but that is not the only route available. Students who have acquired the prerequisite knowledge need not take a course in order to so certify. Courses may be challenged by examination. Instructors will often indicate to a student, on the basis

of an informal discussion, that he is prepared for advanced study without the need for examinations or courses. Students should also note that many upper division courses have no special requirements and are within a student's intellectual capacity as early as the freshman year.

Flexibility in planning has also been constrained by the belief that students in one college can not take courses in other colleges. This is not true. Within the boundaries of enrollment limitations and the student's ability to acquire useful knowledge as a result of taking a particular course, a student may elect to enroll in almost any course listed in this catalog.

### **General Requirements**

It is the *student's responsibility* to see that he fulfills all requirements for graduation. In brief these are:

*University Requirements:* Subject A requirement; American History and Institutions requirement; residence requirement; unit requirement, a total of 180 quarter units of work with a C average or better; and the requirement of filing an Announcement of Candidacy at the beginning of the quarter in which student plans to graduate (see pages 33–35 for complete details).

*College Requirements:* the student must fulfill the Bachelor of Science requirements in a major as prescribed by the faculty; not more than 6 units of the required total of 180 units may be Physical Education I, and 54 units must be upper division work.

*Major Requirements:* See various majors beginning on page 68 of this section.

*Natural Sciences, Social Sciences, and Humanities Requirements:* The purpose of these requirements is to provide breadth to a student's program. Since the broadening effect of any particular course is dependent on the student's major and his general interests, it is not possible to be specific as to what is desirable and what is not. The faculty adviser has guidelines for each major showing what the student should consider. In the last analysis it is the student, with the counsel of his adviser, who selects the breadth courses.

For example, natural science courses add more breadth to an agricultural economics major than they would to a biochemistry major.

### **Study List**

Majors offered in the College of Agricultural and Environmental Sciences are the mechanisms by which the faculty offers guidance to students interested in study in any one of a number of different areas of knowledge. The majors can be likened to roadmaps; each represents a variety of routes to a series of different but related educational goals. The great flexibility inherent in the majors makes them adaptable to a wide spectrum of student interests.

The study list is a personalized educational itinerary consisting of the courses in which a student has chosen to enroll during a particular quarter. It should be part of a grand plan for exploration or the attainment of specific long-term goals. It should allow for (a) the acquisition of prerequisite knowledge needed for courses to be taken in subsequent quarters, (b) the fulfillment of college and

major requirements and (c) a proper balance between the demands of the course program and the student's ability to master the subject matter under study.

In order to remain in good standing the full-time student is expected to take 12 units per quarter; he may take as many as 18 units. Normal progress toward the degree implies an average course load of 15 units. It is sometimes necessary and/or educationally desirable for a student to take less than 12 or more than 18 units per quarter; this can be done with the Dean's approval. Students should not hesitate to seek approval for educationally sound deviations from the normal course load. A lower division physical education course may be added to the maximum number of units without the Dean's approval. In estimating the demands of a particular program, students should plan an out-of-class effort of three hours per week for each unit of credit.

### **Passed or No Record Option**

A regular student in good standing registered in the College of Agricultural and Environmental Sciences may elect to take courses on a Passed or No Record basis. The P grade will be assigned for a grade of C- or better. Units thus earned are counted in satisfaction of degree requirements, but are disregarded in determining the student's grade-point average. In the event that a student does not pass a course under this option, no entry is made on his transcript. For graduation, at least 2/3 of the units taken in residence must be in courses taken for a letter grade; this leaves a maximum of 1/3 of the units in residence which may be taken with the Passed/No Record grading option. Courses which are *required* to be taken on a Passed or Not Passed basis *only* as designated in course descriptions, are considered part of the units which must be taken for a letter grade and are recorded on the transcript.

### **Credit by Advanced Placement Tests**

Students who have taken advanced courses in high school may earn up to 10 units advanced standing credit for each College Entrance Examination Board Advanced Placement Test successfully passed with a score of 5, 4, or 3.

The credit allowed will fulfill requirements within the College equivalent to the courses listed in the table on page 151. Students should consider the list carefully in selecting course work in the same areas to avoid taking equivalent courses and thus duplicating credit.

### **Transfer Students**

In order to facilitate program planning for students contemplating transfer to this University and the College of Agricultural and Environmental Sciences, the expositions of major requirements beginning on page 67 have preparatory work set out in a special category. These preparatory courses may be taken at the University of California or elsewhere. Generally the nature of the area of knowledge covered by a specific requirement can be determined through a reading of the course descriptions beginning on page 182 of this catalog. Students need not present identical courses but only ones having similar content. Students attending a community college should consult their counselors to deter-

mine which community college courses are appropriate and acceptable for satisfaction of College of Agricultural and Environmental Sciences requirements.

When questions arise as to the best approach to preparing for transfer to the Davis campus, students are encouraged to write directly to the division chairman responsible for their intended major for specific information and/or to plan a visit to the campus to discuss their programs with a faculty adviser.

## Honors

### Undergraduate Honors

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 on the Davis campus and have a cumulative grade-point average of at least 3.2 for all work undertaken in the University.

### Honors at Graduation

The graduating student who is completing his major with distinction may be recommended for honors or highest honors. The names of students to whom honors and highest honors have been awarded are announced at commencement, and the distinction is noted on their transcripts and diplomas. The minimum grade-point averages required to qualify for these honors are shown in the following table:

<i>Units Completed at the University</i>	<i>Grade-Point Average</i>	
	<i>Honors</i>	<i>Highest Honors</i>
135 or more .....	3.20	3.60
90-134 .....	3.40	3.70
45- 89 .....	3.50	3.80
Less than 45 .....	not eligible	

### College Medal

Each year the outstanding graduating senior in the College is awarded a silver medal bearing the University Seal and known as the "Agricultural and Environmental Sciences Medal." Scholastic excellence is the primary basis for choosing the recipient, but other considerations also receive attention.

### Scholarships

To encourage capable young men and women to pursue a career in the agricultural and environmental sciences, many companies and private individuals have established scholarships restricted to students majoring in the College.

Approximately one third of the scholarships administered by the Committee on Undergraduate Scholarships are awarded to students in the College of Agricultural and Environmental Sciences. Students with high scholastic standings who need additional financial support are, therefore, encouraged to apply (see page 37).

## Teaching Credentials

Inquiries concerning preparation for teaching credentials in subject matter taught in the College should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616.

## Choosing a Major

There are several alternatives available to undergraduate students:

1. a regularly established major program
2. an individually designed major program
3. a preprofessional program (preforestry)
4. the exploratory program leading to the selection of one of the first two alternatives above.

## MAJORS AND SPECIAL PROGRAMS

A list of the majors and special programs available to students enrolled in the College is presented below. Complete outlines of these majors and programs are presented on pages 67-97.

Majors and programs are grouped according to the divisions in order to facilitate student inquiry about them. Questions regarding the majors should be presented at the appropriate division office for resolution.

Students who fulfill the requirements for more than one major may have such accomplishments noted on their transcripts. Requests for certification of double, triple, etc., majors should be made to the Dean's Office.

**Division of Agricultural Sciences, D. S. Brown, Chairman**  
Division Office, 129 Hoagland Hall, 752-0265

Agricultural Science and Management	Entomology
Animal Science	International Agricultural Development
Crop Protection	Plant Science

**\*Division of Biological Sciences, S. R. Snow\*\*, Chairman**  
Division Office, 150 Mrak Hall, 752-0391

Bacteriology	Genetics
Biochemistry	Physiology
Biological Sciences	Zoology
Botany	

**Division of Food and Consumer Sciences, W. L. Dunkley, Chairman**  
Division Office, 165 Everson Hall, 752-0610

Community Nutrition	Food Science
Consumer Food Sciences	Food Service Management
Dietetics	Home Economics
Fermentation Science	Nutrition Science
Food Biochemistry	Textiles

\* An Intercollegiate Division.

\*\* Associate Dean of the Division of Biological Sciences.

**Division of Resource Sciences, L. D. Whittig, Chairman**

Division Office, 129 Hoagland Hall, 752-0265

Atmospheric Science	Renewable Natural Resources
Environmental Planning and Management	Soil and Water Science
Range Science	Wildlife and Fisheries Biology

**Division of Applied Economics and Behavioral Sciences, G. R. Hawkes,**

Acting Chairman

Division Office, 165 Everson Hall, 752-0769

Agricultural Economics and Business Management	Child Development Design
Agricultural Education	Development, Resource, and Consumer Economics
Applied Behavioral Sciences	

**Individual Major:** Dean's Office, 228 Mrak Hall, 752-0107

**Non-Degree Programs:** Dean's Office, 228 Mrak Hall, 752-0107

Exploratory Preforestry

**Exploratory Program**—an aid to finding a major

Many students are undecided about the major they really want to pursue and are unaware of the alternatives available to them. The *Exploratory Program* permits students, with the assistance of selected advisers, to take courses which pinpoint more accurately individual interests and aptitudes. This is not a degree program, but is an *aid to the student in finding a major best suited to him and his needs*. He should not expect to stay in the program more than two years as further delay in selecting a major may delay graduation. For registration purposes, students should indicate *Exploratory* on admission materials and study list cards.

**Advising for the health science students.** Because of strong interest in the area of health sciences a special group of advisers has been prepared to help Health Science students choose or create a major (see Individual Major below) which meets their specific educational needs. Students indicating an interest in any Health Science sub-profession (including community health, dental hygiene, dentistry, hospital administration, human medicine, medical technology, nursing, occupational therapy, optometry, pharmacy, physical therapy, recreation therapy, rehabilitation counseling, social work, veterinary medicine, X-Ray technology, etc.) will be given the benefit of the assignment of one of these specially qualified advisers.

**Individually Designed Major Programs**

An individual major may be designed by a student having a specific academic interest not represented by an established major. Such a major involves interrelated courses of 45 upper division units from two or more areas of study. After preliminary consultation with the dean of the College about this special program, the student plans his major with an adviser or a group of advisers. He

then submits the proposed program to the dean for review at least four quarters before he plans to graduate. This proposal must include: (1) a description of the special educational aims of the student and (2) a list of the planned courses. For further details concerning the Individual Major, contact one of the associate deans, 228 Mrak Hall.

Examples of major programs which have arisen through this option are: Agrarian Studies, Avian Sciences, Business Management and Human Relations, Creative Therapeutic Recreation, Family Development, Geobotany, Health Sciences, Human Ecology, Hydrometeorology, Physical Therapeutic Science, Plant Pathology, Psychobiology, Recreation Planning, Social Criteria for Environmental Design, The Child in Society, Vocational Therapy, Youth Guidance and Counseling, Zoo Management.

## THE MAJORS

**AGRICULTURAL ECONOMICS AND BUSINESS MANAGEMENT** focuses on the student's understanding of the total economic and social environment through study of the agricultural, biological, physical, and social sciences. The major offers an option of two areas of specialization:

The *Agricultural Economics* option is preprofessional, essentially preparation for continued study at the graduate level. The emphasis is on the theoretical aspects which lie behind decisions concerning production, marketing, use of resources, prices, and policy. Supplemental courses are offered in statistics, effects of governmental policy, rural appraisal, and related topics.

The *Agricultural Business Management* option, while considering the theoretical, deals more with the practical managerial problems. Emphasis is on the decision-making function of management, use of scientific management controls and organization, personnel policies, and procurement and marketing methods.

Both options prepare graduates for professional management positions in financial and research institutions not necessarily limited to agriculture.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	43
English (choose from English 1, 2, 3, 4A, 4B, or 5) .....	4
English (from above list) or Rhetoric (Rhetoric 1 or 2) .....	4
American History and Institutions† .....	8
Economics 11A-11B and (Economics 1A-1B or 2A-2B-2C) .....	17
Mathematics including Mathematics 13 and 16A .....	10
<i>Depth Subject Matter</i> .....	44-45
Theory (Agricultural Economics 100A, 100B) .....	6
Statistics: choose two from Agricultural Economics 106A, 106B, and 155 .....	6
Senior research (Agricultural Economics 190A, 190B) .....	4
<i>Agricultural Economics Option</i> (Preprofessional) .....	29

\*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.*

† Students meeting the American History and Institutions requirement may substitute social science and humanities as interpreted under the Social Sciences and Humanities requirement.



Mathematics 16B	
Agricultural Economics 100C	
Economics 101	
Additional upper division agricultural economics or economics	
or	
<i>Agricultural Business Management Option</i> .....	28
Agricultural Economics 18	
Additional upper division agricultural economics or economics	
<i>Breadth Subject Matter</i> .....	32
Agriculture (excluding agricultural economics)	
Natural science (including mathematics beyond preparatory subject matter)	
Social science (excluding economics) and humanities (other than history and philosophy)	
Required: 8 units in one area and 12 units in each of the other two.	
<i>Unrestricted Electives</i> .....	60-61
	180
Total Units for the Degree	180

The AGRICULTURAL EDUCATION major serves those interested in teaching agricultural sciences in high schools or junior 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 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.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	42
Biological sciences (including genetics) .....	21
Chemistry (including organic) .....	15
Physics (choose from Physics 2A, 2B, or 2C) .....	6
<i>Depth Subject Matter</i> .....	64
Agricultural economics .....	9
Agricultural Education 160, 320A .....	4
Agricultural engineering .....	11
Animal sciences .....	16
Environmental sciences (includes offerings in environmental horticulture, environmental studies, environmental toxicology, renewable natural resources, and wildlife and fisheries biology) .....	8
Plant and soil sciences .....	16

\* 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.

<i>Breadth Subject Matter</i> .....	33
English (choose from English 1, 2, 3, 4A, 4B, or 5) .....	12
Economics 1A or 1B .....	5
Social sciences and humanities electives† .....	16
<i>Restricted Electives</i> to supplement or expand any of the above areas.....	14
Choose from the following: Entomology 110; Environmental Horticulture 1; Nutrition 103; Plant Pathology 120; Soil and Water Science 1; Water Science 110A, 110B.	
<i>Unrestricted Electives</i> .....	27
	<hr/>
Total Units for the Degree	180

**Teacher Credential.** Students may make appointments with credential counselors and obtain a statement of the complete requirements for the credential at the Applied Behavioral Sciences departmental office. Required courses for professional preparation include: Education 110, 120; Agricultural Education 160, 320B, 320C, 320E; and 9 postgraduate quarter units of subject matter courses.

The **AGRICULTURAL SCIENCE AND MANAGEMENT** major is designed to provide the training required by business or industry to function in the management of the larger, more diverse agricultural operations. Students may specialize in one of three areas: *animal science, food science and technology, or plant science*. Course work in biological, physical, social, and agricultural sciences with supporting courses in economics, business, and management permits individual flexibility. In addition to the Bachelor of Science, normally completed in four years, a fifth year Master of Science program is offered.

**Bachelor of Science Major Requirements\***

UNITS

<i>Preparatory Subject Matter</i> .....	48
Biological Sciences (including Biological Sciences 1 and Botany 2) ..	16
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Mathematics: including calculus and statistics .....	10
Physics (Physics 2A and 2B or 2C) .....	6
<i>Depth Subject Matter</i> .....	58
Agricultural sciences (including at least one course in animal science, food science, plant science, soil and/or water science) .....	20
Agricultural economics (including Agricultural Economics 100A and two courses chosen from 112, 114, 117, and 140).....	15
Specialization (animal science, food science and technology, and plant science) .....	18
<i>Breadth Subject Matter</i> .....	36
English and/or rhetoric (choose from English 1, 2, 3, 4A, 5 and/or Rhetoric 1, 3).....	8
Economics (Economics 1A, 1B) .....	10
Social science and humanities electives .....	18

\* For convenience in program planning the *usual* courses taken to satisfy the requirement are shown in parentheses. Equal or more comprehensive courses are acceptable.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

<i>Restricted Electives</i> to supplement or expand any of the above areas .....	19
<i>Unrestricted Electives</i> .....	24
	180
Total Units for the Degree	180

**ANIMAL SCIENCE** is the study of man's domestic animal resources through the integration of genetics, biochemistry, physiology, nutrition, economics, and other social sciences for improvement and expansion of these resources for food and recreation. A student may emphasize scientific, production, or management aspects and may focus on animals for milk, meat, fiber, work, or recreation. This major leads to a variety of career opportunities in management and production including positions in feed and food processing, financial institutions, chemical industries, private and public extension services, education, and government service. *Preveterinary medicine* requirements may also be met through this major by the student electing qualitative and quantitative chemistry, embryology, and sufficient social science courses.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	43
General biological sciences (including Biological Sciences 1, Zoology 2, plus one from Bacteriology 2, Botany 2, or Entomology 1) .....	17
Physical sciences: including 13 units of chemistry and 10 units of physics and/or mathematics .....	23
Animal science (Animal Science 2) .....	3
<i>Depth Subject Matter</i> .....	48-49
Biochemistry (Biochemistry 101A-101B or Physiological Sciences 101A-101B) .....	6-7
Nutrition (Nutrition 110) .....	5
Physiology (Physiology 110A, 110B) .....	6
Genetics (Genetics 100A-100B) .....	6
Animal science: .....	25
Choose 7 units from Animal Science 114, 115, 116, and 117. Choose 18 units from Biochemistry 102; Genetics 107, 107A, 107B, 107C, 108, 131; or Animal Science 21, 31, 123, 124, 190, 194H, 197T, 198, 199; Epidemiology and Preventive Medicine 111; Nutrition 117, 121, 122, 123; Physiology 111A, 111B, 121, 121L, 130, 148, 149.	
<i>Breadth Subject Matter</i> † .....	20
Social science and humanities and/or art of communication.....	20
<i>Unrestricted Electives</i> .....	68-69
Selected by the student according to individual interests and objectives. Advisers will provide lists of recommended courses and will assist in the selection therefrom.	
	180
Total Units for the Degree	180

\* 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 earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

**APPLIED BEHAVIORAL SCIENCES** prepares students for creative work with people in helping them improve their social and their physical environments. The study of human social behavior together with the study of processes and strategies of social change are emphasized. Knowledge of the behavioral and environmental sciences is integrated with the development of skills necessary to apply this knowledge to the solving of complex social problems. The curriculum is intended primarily for students whose career goals are oriented toward public and community service. Community development, education, environmental design, and inter-group relations are examples of fields offering opportunities for employment of graduates in a wide variety of settings. The preparatory subject matter is designed to provide foundations of knowledge in the natural and social sciences and the humanities and to develop skills of inquiry and creative endeavor. The student and his adviser select course sequences most appropriate for the student's educational and career goals. *The Applied Behavioral Sciences majors are student designed programs and are available upon special application after admittance to the college through an entry major such as Exploratory.*

**Bachelor of Science Major Requirements**

UNITS

*Preparatory Subject Matter* ..... 48

A minimum of 12 units in each of the following areas\*

Inquiry: intellectual skills of inquiry and critical analysis.

Ecological-Environmental Studies: understanding the dynamic interaction of man and his environment.

Personal and Social Behavior: understanding the dynamics of human relationship extending from the individual to the international level.

Creative Expression: the student explores and develops his own creative powers, intellectual and aesthetic.

*Depth Subject Matter* ..... 60

Individualized program, including senior project, to be determined by student and advisory committee.†

*Breadth Subject Matter* ..... 32

Additional units in one or more of the areas in Preparatory Subject Matter above.

*Unrestricted Electives* ..... 40

Total Units for the Degree 180

Note Other Requirements. *Admission:* Development, in consultation with adviser, of a statement of academic and career objectives and plan for attaining stated goals. *Graduation:* Minimum of one year in residence in the major and satisfactory completion of supervised field experience, internship, thesis, or other creative activity.

\* List of suggested courses in each of these areas may be obtained from the Department of Applied Behavioral Sciences.

† It is recommended that a student take 15-20 units in the Applied Behavioral Sciences course series.

**ATMOSPHERIC SCIENCE** is the study of the physics of meteorological processes, including atmospheric circulation and weather systems; mass and energy transfers between atmosphere and surface and within the atmosphere; radiation; turbulence and diffusion; condensation and precipitation mechanisms; air pollution meteorology; and developments in meteorological instrumentation. This field is now a fully developed branch of applied physics, with impressive credentials of achievement and exciting prospects for the future. Numerous opportunities exist in the federal government, industrial research and development, and education. Examples of federal government projects are the weather satellite, hurricane research, and numerical weather forecasting. The course of study is designed to provide a strong mathematical and physical science background on which the student can build a career in research, education, resource management, or various areas of direct problem solving. In addition to a broad background in the basic meteorological elements, the major includes a strong emphasis on the biological and environmental sciences. Many students specialize in particular areas of atmospheric science through graduate study.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	68
Mathematics (including Mathematics 21A, 21B, 21C, 22A, 22B, 22C) .....	24
Physics (Physics 4A, 4B, 4C, 4D) .....	16
Chemistry .....	10
Biology and botany (Biological Sciences 1, Botany 2) .....	10
English and/or rhetoric .....	8
<i>Depth Subject Matter</i> .....	30
Resource sciences .....	6
Atmospheric science (Atmospheric Science 110A, 110B, 110C, 120, 121A, 121B, 123, 124) .....	24
<i>Breadth Subject Matter</i> .....	28
Social sciences and humanities electives† .....	28
<i>Restricted Electives</i> .....	21
Biological sciences .....	14
Resource and environmental sciences electives .....	7
<i>Unrestricted Electives</i> .....	33
Total Units for the Degree	180

With the **BACTERIOLOGY** major, a B.S. degree can be obtained in either the College of Agricultural and Environmental Sciences or the College of Letters and Science. For the list of requirements and course offerings please refer to page 211.

The **BIOCHEMISTRY** major is suitable for students who plan to pursue a professional career in biochemistry, to do graduate work in biochemistry or

\* For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

another biological science, or who intend to apply to schools of medicine, dentistry, medical technology, or veterinary medicine.

This major can be adopted by students in either the College of Agricultural and Environmental Sciences or the College of Letters and Science.

**Bachelor of Science Major Requirements\***

	UNITS
<i>Preparatory Subject Matter</i> .....	57-62
Biological Sciences 1 .....	5
Chemistry 1A-1B-1C, 5; or 4A-4B-4C .....	15-19
Mathematics (Mathematics 16A-16B-16C and one additional course, e.g. 13; or 21A-21B-21C and one additional course, e.g. 131A) .....	12 minimum
Physics (Physics 2A-2B-2C and 3A-3B-3C or 4A-4C-4D).....	12 minimum
At least one course or course sequence from the following:	
Bacteriology 2, 3; 105A-105B; 106A-106B (5 units will be credited toward restricted upper division electives);	
Botany 2; Zoology 2; Physiology 101-101L .....	5-6
English and/or rhetoric .....	8
Foreign language: No foreign language required but students are strongly urged to complete at least 12 units of college level foreign language or attain placement in the appropriate course by examination.	
<i>Depth Subject Matter</i> .....	44
Biochemistry 101A-101B, 101L, 108 .....	14
Genetics 100A-100B .....	6
Organic Chemistry (Chemistry 128A-128B-128C, 129A-129B-129C) .....	15
Physical Chemistry (Chemistry 110A-110B-110C; or 107A- 107B, 108) .....	9
<i>Breadth Subject Matter</i> .....	28
Social sciences and humanities† .....	28
<i>Restrictive Electives</i> .....	12
Upper division courses in biochemistry or related areas such as chemistry, biological sciences, zoology, botany, genetics, bacteriology, food science, nutrition, physics, mathematics, engineering, etc.	
At least one additional course in biochemistry or chemistry, in addition to those required above as depth subject matter, recommended.	
At least one course must be in a biological science other than biochemistry.	
No more than 3 units of courses numbered 198, 199, and 194H may be used.	
<i>Unrestricted Electives</i> .....	34-39
<hr/>	
Total Units for the Degree	180

\* For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

The **BIOLOGICAL SCIENCES** major leads to a B.S. degree in either the College of Agricultural and Environmental Sciences or the College of Letters and Science. For the list of requirements and course offerings please refer to page 215.

The **BOTANY** major leads to a B.S. degree in either the College of Agricultural and Environmental Sciences or the College of Letters and Science. For the list of requirements and course offerings please refer to page 217.

**CHILD DEVELOPMENT** is an appropriate undergraduate major for students who plan to work with people in a wide variety of situations—in teaching, counseling, or in welfare or community agencies for children and youth. It is valuable preparation for working with the “normal” child as well as the disadvantaged, the retarded, the handicapped, and the gifted. It is also an appropriate major for those students planning to pursue advanced degrees in the behavioral sciences. Students of Child Development observe infants, children, and their parents in a variety of situations: in real life, in films, and on closed-circuit television. They may participate in study projects with children from different socioeconomic and cultural backgrounds who need special counseling or educational services. They study intelligence, personality, and special abilities. The emphasis is on the interrelationship of the child, his family, and the community.

The major provides academic preparation for those who plan to pursue a teaching credential.

### Bachelor of Science Major Requirements

	UNITS
<i>Preparatory Subject Matter</i> .....	42
Cultural anthropology .....	4
Introductory psychology .....	13
Introductory sociology .....	8
Supervised observation of children .....	2
General biology .....	4
Nutrition .....	3
Physiology .....	4
Statistics .....	4
<i>Depth Subject Matter</i> .....	34-35
Human development 131, 133, 136, 137, 139, 140, 141, 142, and 133L or 136L .....	29-30
Human genetics .....	5
<i>Breadth Subject Matter</i> .....	20
English composition .....	4
English 103 .....	4
History 17A-17B or 174A-174B .....	8
Physics or chemistry .....	4
<i>Restricted Electives</i> .....	4
To supplement the depth subject matter students should complete at least 4 units of upper division psychology.	
<i>Unrestricted Electives</i> .....	79-80
Total Units for the Degree	180

The **COMMUNITY NUTRITION** program prepares students for work with public and private community agencies dealing with normal nutrition, therapeutic nutrition, malnutrition, and related social problems. Areas of learning include the biological and behavioral sciences, food, nutrition science, and community nutrition. The major provides flexibility that enables students to qualify for graduate admission into a master's degree program in Public Health Nutrition, which would greatly increase the career opportunities.

By selecting appropriate additional courses†, students may also fulfill the academic requirements for admission to an approved internship in Dietetics.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	44-45
Written expression (English 1, 2, or 5) .....	4
Oral expression (Rhetoric 1 or 3) .....	4
Statistics (Mathematics 13 or Economics 12) .....	4-5
Chemistry 1A-1B, 8A-8B .....	16
Biology (Biological Sciences 1) .....	5
Physiology with laboratory (Physiology 101, 101L) .....	6
Bacteriology with laboratory (Bacteriology 2, 3) .....	5
<i>Depth Subject Matter</i> .....	42
Nutrition 102A, 102B, 102L .....	9
Nutrition 116A-116B .....	6
Nutrition 118-118L, 119 .....	7
Foods 20 .....	3
Foods 100A-100B, 101A-101B .....	9
Consumer Economics 141, 142 .....	8
<i>Breadth Subject Matter</i> .....	43
Principles of economics (Economics 1A) .....	5
General psychology (Psychology 1A) .....	5
Sociology, social problems, race relations, social systems in rural and urban society (Sociology 3, 130, 143, 144) .....	16
Cultural anthropology (Anthropology 2) .....	4
Applied Behavioral Sciences 47, 151B .....	6
Human Development 137 .....	4
Methods of teaching (Applied Behavioral Sciences 161) .....	3
<i>Unrestricted Electives</i> .....	51-52
The following courses are recommended depending upon a student's specific career objectives: Economics 1B; Biochemistry 101A-101B; Nutrition 114; Foods 134; Human Development 131; Institution Management 125, 126, 127; Applied Behavioral Sciences 151A; International Agricultural Development 10.	
Total Units for the Degree	180

The major in **CONSUMER FOOD SCIENCES** is designed to provide students with a background in the biological and social sciences sufficient to prepare them for careers dealing with the utilization of foods by the consumer. Emphasis is placed on both the biological properties of foods and on the socio-

\* For conveniences 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.

† To fulfill the academic requirements for an internship in Dietetics add: Biochemistry 101A-101B, Economics 11A-11B, and Institution Management 125, 126, 127.



economic and cultural aspects of foods as they relate to consumer acceptability and use. Students are provided with sufficient range in study of the biological, natural, and social sciences to prepare them for a variety of careers dealing with the utilization of food by the consumer. Employment opportunities include research and development, marketing and product control, extension service, journalism, and community service.

The major provides academic preparation for those who plan to pursue a teaching credential.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	42
Biology (Biological Sciences 1) .....	5
Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B) .....	16
Microbiology (Bacteriology 2, 3) .....	5
Physics (Physics 10 or 2A, 2B, 2C) .....	4
Statistics (Mathematics 13) .....	4
Written or oral expression (choose from English 1, 2, 5, and/or Rhetoric 1) .....	8
<i>Depth Subject Matter</i> .....	49
Courses in foods and food science and technology, including Foods 100A, 100B, 101A, 101B and Food Science and Technology 107A, 107B .....	32
Nutrition 102A, 102B, 102L or equivalent (Nutrition 110) .....	9
Consumer Economics 141, 142 .....	8
<i>Breadth Subject Matter</i> .....	24
Courses from at least three of the following: cultural anthropology, economics, psychology, sociology, applied behavioral sciences .....	24
<i>Unrestricted Electives</i> .....	65
Recommended additional courses: Biochemistry 101A, 101B, 123; Foods 20, 134, 135; Food and Science Technology 1, 101, 103, 113, 131; a course in institution management; a course in physiology.	
Total Units for the Degree	180

The **CROP PROTECTION** major focuses on the study of sciences related to the control of agricultural pests. The philosophy on which the program is predicated is that increased production and quality of food and fiber is possible through the control of harmful insects, nematodes, plant disease, and weeds. To gain competence in diagnosing ills of agricultural crops and prescribing treatment, students in this major pursue studies in plant physiology and pathology, weed science, entomology, nematology, agricultural engineering, toxicology, and wildlife. Career opportunities are available as research technicians and in technical sales and service with chemical companies, food processing firms, farm adviser offices, and grower organizations.

\* 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.

<b>Bachelor of Science Major Requirements*</b>	<b>UNITS</b>
<i>Preparatory Subject Matter</i> .....	42
Biology (Biological Sciences 1) .....	5
Botany (Botany 2) .....	5
Zoology (Zoology 2) .....	6
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Mathematics, statistics .....	4
Physics (Physics 2A, 2B) .....	6
<i>Depth Subject Matter</i> .....	47
Plant science (Plant Science 1) .....	3
Soil and water science (Soil and Water Science 1) .....	3
Agricultural engineering (Agricultural Engineering 110) .....	1
Environmental toxicology (Environmental Toxicology 180) .....	3
Wildlife and fisheries biology (Wildlife and Fisheries Biology 151) .....	3
Plant physiology (Botany 111A, 111B) .....	6
Entomology (Entomology 110, 112, 130) .....	12
Nematology (Nematology 100) .....	4
Plant pathology (Plant Pathology 120, 125) .....	8
Weed science (Botany 107) .....	4
<i>Breadth Subject Matter</i> .....	20
English and/or rhetoric .....	8
Social sciences and humanities electives† .....	12
<i>Restricted Electives</i> .....	28
To provide a specialization in the following: agronomy, floriculture, landscape horticulture, nursery management, pomology, vegetable crops, or viticulture.	
<i>Unrestricted Electives</i> .....	43
Total Units for the Degree	180

**DESIGN** emphasizes textiles, costume, interiors, and environmental concerns. Graduates will be prepared for advanced study in design, for teaching, for entry into professional schools, and for the satisfaction of being a creative member of society. The design program is based on the unequivocal commitment that the designer should be an innovator with a broad understanding of his culture. Two approaches are offered:

Plan I: The *designer-craftsman* program is a general education in design. Emphasis is placed upon the exploration of expanding design areas without definite boundaries, on stimulating a joy in doing, on instilling a sense of intrinsic motivation. Concentration in a design area (costume, textiles, interior, or environmental) develops competence, maturity and aesthetic reaction to personal solutions of design problems.

Plan II: The *environmental design* program is intended as a preprofessional exploration of ideas and processes. The designer is seen not only as an individual creator but also as a participant in the group study of environmental problems such as the home, urban and rural environments, and design for specific groups or purposes. Group study presupposes interaction with other environmental disciplines and the behavioral sciences.

\* For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown. Equal or more comprehensive courses are acceptable.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

**Bachelor of Science Major Requirements**

UNITS

<i>Preparatory Subject Matter</i> .....	28-36
Introduction to design: Design 6A, 6B, 6C .....	8-12
Design 30A-G (elect four or five different sections) .....	16-20
A. Drafting and Perspective	
B. Calligraphy	
C. Figure Drawing	
D. Structure of Materials	
E. Personal Adornment	
F. Non-loom Textiles	
G. Model Construction	
Additional studio courses from design or art .....	4
<i>Depth Subject Matter</i> .....	33-36
<i>Plan I, Designer-Craftsman Program</i>	
Junior Year .....	18
Design 120A, 120B, 120C .....	9
Choose three courses from Design 140A, 140B, 142A, 142B, 143, 144 .....	9
Senior Year .....	15
Choose four courses from Design 160A, 160B, 160C, 170A, 170B, 170C, 180A, 180B, 180C .....	12
Design 196 .....	3
<i>Plan II, Environmental Design Program</i>	
Junior Year .....	18
Design 120A, 120B, 120C, 140A, 140B, 144	
Senior Year .....	18
Design 180A, 180B, 180C, 196, 198 or 199	
<i>Breadth Subject Matter</i> .....	81
Natural sciences .....	27
Humanities .....	27
Social sciences† .....	27
<i>Unrestricted Electives</i> .....	27-38
The following courses in art are recommended: Art 1A, 1B, 16 and two courses from Art 14, 112A, 112B, 128A.	

---

Total Units for the Degree	180
----------------------------	-----

The major in **DEVELOPMENT, RESOURCE, AND CONSUMER ECONOMICS** is designed to prepare students for careers in one or more of the following areas: the economics of community, regional and international development; the economics of human resources; the economics of natural resources; and consumer economics. This major enables the student to prepare for further studies at the graduate level as well as to pursue career opportunities in government agencies on all levels, non-profit organizations, social agencies, research organizations, and with firms employing economists with this background. New directions of economic application of theory and research to social problems are reflected in this major. Flexibility is provided by options which allow the student to focus either on the *natural and agricultural sciences* or on the *social sciences*.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

<b>Bachelor of Science Major Requirements*</b>	UNITS
<i>Preparatory Subject Matter</i> .....	36
English (choose from 1, 2, 3, 4A, 4B, and 5) .....	4
Rhetoric (1 or 2) or English .....	4
American History and Institutions† .....	8
Economics (1A-1B or 2A-2B-2C) .....	10
Mathematics (including Mathematics 13 and 16A) .....	10
<i>Depth Subject Matter</i> .....	38-40
Theory (Agricultural Economics 100A-100B-100C, Economics 101) 14	
Quantitative Methods: choose two courses from Agricultural Eco- nomics 106A, 106B, 155 .....	6
Research (Agricultural Economics 190A, 190B) .....	4
Policy and planning: choose four courses from Agricultural Eco- nomics 120, 148; Economics 125A, 125B, 130A, 130B, 152; Applied Behavioral Sciences 151A, 151B .....	14-16
<i>Breadth Subject Matter</i> .....	32
Natural sciences (including mathematics beyond Preparatory Sub- ject Matter requirement) and agriculture (excluding agri- cultural economics) .....	12 minimum
Social sciences (excluding economics) and humanities (other than history and philosophy) .....	12 minimum
<i>Restricted Electives</i> to supplement or expand one or more of the fol- lowing areas .....	20
Specialization requirement (select one or more from the following in the desired area of specialization)**	
Development economics: Agricultural Economics 148	
Natural resource economics: Agricultural Economics 147, 176	
Human resource economics: Agricultural Economics 150	
Consumer economics: Consumer Economics 141, 142	
<i>Unrestricted Electives</i> .....	52-54
Total units for the degree	180

The DIETETICS major provides students with training in normal and therapeutic nutrition, biological and social sciences, foods, communication, and management. This major fulfills the academic requirements for admission into a dietetic internship which the student must complete 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 food-centered institutions. Many dietitians are self-employed as dietary consultants. Students will be qualified for admission to graduate programs in dietetics, nutrition science, public health nutrition, and food service management.

\* 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.*

\*\* Additional restricted electives to be recommended by adviser.

† Students meeting the American History and Institutions requirement may substitute Social Science and Humanities as interpreted under the Social Science and Humanities requirement.

**Bachelor of Science Major Requirements\***

UNITS

<i>Preparatory Subject Matter</i> .....	41-42
Written expression (English 1, 2, 5) .....	4
Oral expression (Rhetoric 1, 3) .....	4
Statistics (Mathematics 13) .....	4
Physics (Physics 2A or 10) .....	3-4
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Biology (Biological Sciences 1) .....	5
Bacteriology with laboratory (Bacteriology 2, 3) .....	5
<i>Depth Subject Matter</i> .....	53
Biochemistry 101A, 101B .....	6
Physiology with laboratory (Physiology 101, 101L) .....	6
Foods 100A, 100B, 101A, 101B .....	9
Nutrition 110, 111, 111L, 114, 116A, 116B .....	20
Institution Management 125, 126, 127 .....	12
<i>Breadth Subject Matter</i> .....	23-24
Principles of economics (Economics 1A).....	5
Sociology or cultural anthropology .....	4
General psychology (Psychology 1A or 10) .....	4-5
Principles of learning or methods of teaching (Applied Behavioral Sciences 161) .....	3
Principles of accounting (Economics 11A-11B) .....	7
Completion of course in computer logic or programming.	
<i>Unrestricted Electives</i> .....	61-63
The following courses recommended depending upon student's specific career goals: Epidemiology and Preventive Medicine 150; Food Science and Technology 1, 104A-104B, 108A-108B; Foods 20, 134, 135; Consumer Science 100; Nutrition 117, 118, 118L, 190; Plant Science 2; Viticulture and Enology 3.	

Total Units for the Degree      180

The **ENTOMOLOGY** major provides students an opportunity for extensive study of insects—their behavior, classification, structure, and physiology. Some of the special branches of entomology are: transmission of plant and animal pathogens, control of insects with natural enemies and chemicals, and management of honeybees for honey production and crop pollination. Excellent employment opportunities are available in managerial and technical positions with agricultural chemical companies and state and federal agencies concerned with insects and their control. Some entomology graduates prepare to teach zoology, biology, and entomology in high schools and junior colleges.

**Bachelor of Science Major Requirements\***

UNITS

<i>Preparatory Subject Matter</i> .....	73
Biology (Biological Sciences 1) .....	5
Botany (Botany 2) .....	5
Zoology (Zoology 2) .....	6
Bacteriology (Bacteriology 2) .....	4
Genetics .....	4

\* 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.*

Plant pathology, plant or animal physiology, or biochemistry . . . .	4
Chemistry (Chemistry 1A, 1B, 8A, 8B) . . . . .	16
Mathematics, including statistics . . . . .	7
Physics . . . . .	4
Earth or atmospheric science . . . . .	3
Electives in biological sciences (exclusive of entomology) . . . . .	15
<b>Depth Subject Matter</b> . . . . .	26
Entomology 1, 101, 102, 103, 104, and 105 or 109 and another upper division course in entomology which requires a collec- tion of insects . . . . .	26
<b>Breadth Subject Matter</b> . . . . .	36
English and/or rhetoric . . . . .	8
Electives in social sciences and humanities† . . . . .	28
<b>Unrestricted Electives</b> . . . . .	45
<b>Total Units for the Degree</b>	<b>180</b>

**ENVIRONMENTAL PLANNING AND MANAGEMENT** is the study of the planning, design, management, administration, and interpretation of urban and natural environments that can include: the city or suburb, public or private outdoor recreation areas, scenic roadways, new communities, wilderness areas, and shopping, education, or industrial centers. A student selects training in one of these options: *landscape management*, *park and recreation administration*, *environmental education*, and *environmental planning*. The major emphasizes an interdisciplinary approach to problem solving that is based on a balanced program in the social and natural sciences. Graduates can expect career opportunities in: public park systems, private resort complexes, city planning, outdoor education, landscape contracting, recreation planning, landscape management, and environmental interpretation.

**Bachelor of Science Major Requirements\***

UNITS

<b>Preparatory Subject Matter</b> . . . . .	70-75
Chemistry (Chemistry 1A or 10) . . . . .	4-5
Physics (Physics 2A or 10) . . . . .	3-4
Geography, geology, or soil and water science (Geography 1, Geology 1, Soil and Water Science 2, Soil Science 88, or Water Science 10) . . . . .	6-7
Biology (Biological Sciences 1) . . . . .	5
Botany (Botany 2) . . . . .	5
Wildlife biology or zoology (Wildlife and Fisheries Biology 2 or Zoology 2) . . . . .	6
Landscape design: Environmental Horticulture 1, 2 . . . . .	5
Environmental quality: Environmental Planning and Manage- ment 1 . . . . .	3
Statistics (Environmental Studies 5 or Mathematics 13) . . . . .	4
Sociology (Sociology 1) . . . . .	5
Cultural geography (Geography 2) . . . . .	4

\* 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 earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

Psychology (Psychology 1A) .....	4-5
Principles of economics (Economics 1A, 1B or 2A) .....	4-5
Expository writing (English 1) .....	4
Public speaking (Rhetoric 1 or 3) .....	4
Humanities elective .....	4
<i>Depth Subject Matter</i> .....	39-46
<i>Park and Recreation Administration Option</i>	
Urban and regional planning: Environmental Planning and Management 110 .....	3
Introduction to environmental plants: Environmental Horticulture 5 .....	2
Landscape horticulture: Environmental Horticulture 128A, 128B ..	5
General ecology: Environmental Studies 100 .....	4
Outdoor recreation: Environmental Planning and Management 116 ..	3
Recreation policy: Environmental Planning and Management 122 ..	3
Leisure systems: Environmental Planning and Management 124 ..	3
Planning of recreation environments: Environmental Planning and Management 134 .....	3
Design of recreation environments: Environmental Planning and Management 136 .....	3
Park operations: Environmental Planning and Management 144 ..	3
Urban or natural resource economics: Economics 125A, 125B or Agricultural Economics 147 .....	3-4
Public administration (Political Science 181 or 182) .....	4
Environmental awareness or work and leisure: Environmental Studies 170 or Sociology 160 .....	4
<i>Landscape Management Option</i>	
Urban and regional planning: Environmental Planning and Management 110 .....	3
Outdoor recreation: Environmental Planning and Management 116 .....	3
General ecology: Environmental Studies 100 .....	4
Landscape construction: Environmental Horticulture 104 .....	3
Taxonomy and ecology of environmental plants: Environmental Horticulture 105 .....	4
Landscape horticulture: Environmental Horticulture 128A, 128B ..	5
Entomology (Entomology 110) .....	4
Plant Pathology 120 .....	4
Ecology of cultivated plants: Plant Science 101 .....	3
Elementary accounting .....	4
Environmental awareness: Environmental Studies 170 .....	4
<i>Environmental Education Option</i>	
Urban and regional planning: Environmental Planning and Management 110 .....	3
Outdoor recreation: Environmental Planning and Management 116 .....	3
General ecology: Environmental Studies 100 .....	4
Introduction to environmental plants: Environmental Horticulture 5 .....	2
Animal ecology (Environmental Studies 110, 144; Wildlife and Fisheries Biology 151; or Zoology 125) .....	3-4
Plant ecology (Botany 101, 117; Environmental Horticulture 105; or Plant Science 101) .....	3-4

Conservation of natural resources: Geography 161 .....	4
Introduction to educational psychology: Education 110.....	4
Philosophical and social foundations of education: Education 120..	4
Vocational education: Agricultural Education 160.....	3
Environmental interpretation: Environmental Planning and Man- agement 160 .....	3
Natural resource economics: Agricultural Economics 147 .....	3
<i>Environmental Planning Option</i>	
Urban and regional planning: Environmental Planning and Man- agement 110 .....	3
Outdoor recreation: Environmental Planning and Management 116.	3
General ecology: Environmental Studies 100 .....	4
Environmental awareness (Environmental Studies 170).....	4
History of urban form (Art 168) .....	4
Urban geography (Geography 155) .....	4
Urban economics (Economics 125A or 125B) .....	4
Urban society (Sociology 143) .....	4
Drafting and perspective (Design 30A) .....	4
Local government and politics (Political Science 100) .....	4
Cartography or interpretation of aerial photography (Geography 105 or 106) .....	4
Public mechanisms for controlling land use (Environmental Studies 160) .....	4
<i>Individual Requirements</i> .....	31-43
Courses selected with adviser's approval to complement each student's program option in this major.	
<i>Unrestricted Electives</i> .....	28
Total Units for the Degree	180

The **FERMENTATION SCIENCE** major is a program of study of the fundamental and applied sciences related to the use of microorganism and cell cultures as production and processing agents. A broad interdisciplinary food-related training may be combined with specializations in *enology* (wine studies), *brewing*, or *fermentation* of other foods and beverages such as cheese, sauerkraut, etc. Industrial fermentations as utilized in the production of drugs, enzymes, solvents, acids and vitamins, waste management, expansion of food supply, and purification of the environment are further opportunities for study. Courses may be selected with the consultation of advisers to qualify for supervisory, technical, research, sales, or executive positions. Background for graduate study leading to the M.S. degree in Food Science and the Ph.D. degree in microbiology, agricultural chemistry, or biochemistry is also provided.

**Bachelor of Science Major Requirements\***

	UNITS
<i>Preparatory Subject Matter</i> .....	65
Biochemistry (Biochemistry 101A, 101B) .....	6
Biology (Biological Sciences 1) .....	5
Chemistry (Chemistry 1A, 1B, 1C, 5, 8A, 8B) .....	25
Mathematics (Mathematics 13, 16A, 16B) .....	10
Microbiology (Bacteriology 2, 3) .....	5

\* For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.



Physics, mathematics or approved physical or Natural Sciences† . . .	6
Written or oral expression (English 1, 2, 5, and/or Rhetoric 1) . . . . .	8
<b>Depth Subject Matter</b> . . . . .	30
Choose from: Viticulture and Enology 3, 123, 124, 125, 126, 140, 217; Food Science and Technology 102, 104, 104L, 105, 106, 106L, 111, 235, 235L; Biochemistry 123; Botany 155; Bacteriology 101, 105A, 105B, 105AL, 105BL, 130A-130B-130L, 230, 250; Engineering: Agricultural 245; Nutrition 122; Environmental Toxicology 10, 180; Physiology 103; Water Science 116.	
<b>Restricted Electives</b> . . . . .	30
Selected according to student's educational goal and upon approval of adviser.	
<b>Breadth Subject Matter</b> . . . . .	30
Social sciences and humanities or others as approved by adviser†	
<b>Unrestricted Electives</b> . . . . .	25
<b>Total Units for the Degree</b>	<b>180</b>

The major in **FOOD BIOCHEMISTRY** stresses the principles of chemistry and biochemistry as related to the 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 program also offers excellent preparation for graduate work in agricultural chemistry, biochemistry, nutrition, medicine, and the life sciences.

### Bachelor of Science Major Requirements\*

	UNITS
<b>Preparatory Subject Matter</b> . . . . .	80-85
Biochemistry (Biochemistry 101A, 101B) . . . . .	6
Biology (Biological Sciences 1) . . . . .	5
Chemistry (Chemistry 1A-1B-1C, 5 or 4A-4B-4C; 128A-128B-128C, 129A; 107A-107B or 110A-110B) . . . . .	32-36
Mathematics, including one year of calculus (Mathematics 15, 16A, 16B or 21A, 21B, 21C) and one course from Mathematics 13, 16C, 29, 22A, 22B, 22C . . . . .	12
Microbiology (Bacteriology 2 and 3; Botany 2 or Zoology 2 may be substituted) . . . . .	5-6
Physics, any course except Physics 10 and including at least one laboratory course (Physics 2A, 2B, 2C and 3A, 3B, 3C or 4A, 4B, 4C, 4D, 4E) . . . . .	12
English or rhetoric . . . . .	8
<b>Depth Subject Matter</b> . . . . .	27

\* 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 earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

‡ Chemistry 5, and 107A-107B are recommended here or as part of the Restricted Electives. Those intending to work toward a doctorate are advised to substitute Chemistry 128A-128B-128C, 129A-129B-129C for 8A-8B and Chemistry 110A-110B-110C for 107A-107B.

Food Science and Technology, including 101, 103, 113, and 125..	23
Biochemistry 123 .....	4
<b>Breadth Subject Matter</b> .....	22
Social sciences and humanities, including 4 additional units of English or rhetoric† .....	22
<b>Restricted Electives</b> .....	28
Three upper division courses from biochemistry, plant or animal physiology, and bacteriology (e.g., Biochemistry 102, 108, 122; Physiology 100A, 100B; Bacteriology 130A-130B; Food Science and Technology 104) and two upper division courses from environmental toxicology, public health, and nutrition .....	15
Other courses in area of food biochemistry .....	13
<b>Unrestricted Electives</b> .....	18-23
Total Units for the Degree	
	180

The focus of the **FOOD SCIENCE** major is on the maintenance of product quality, especially in terms of controlling chemical and microbiological changes during processing and between processing and consumption. Emphasis in the major is given to the important roles of engineering, biological, physical, and behavioral sciences in the development of new food sources, food processing methods, and the evaluation, improvement, packaging, and distribution of food. Students also may specialize in *Food Processing* or *Food Technology and Management*. Graduates qualify for careers in supervisory, technical, sales, and executive positions in food processing, food research, and other food-related fields, or may qualify for graduate study leading to the M.S. degree in Food Science or the Ph.D. degree in such fields as agricultural chemistry, microbiology, biochemistry, and nutrition.

### Bachelor of Science Major Requirements\*

	UNITS
<b>Preparatory Subject Matter</b> .....	61
Biology and microbiology (Biological Sciences 1, Bacteriology 2, 3) .....	10
Chemistry and biochemistry (Chemistry 1A, 1B, 1C or 4A, 4B, 4C; 8A, 8B; Biochemistry 101A, 101B) .....	27
Mathematics and physics (Mathematics 13, 19; Physics 2A, 2B, 2C) .....	16
Written or oral expression (choose from English 1, 2, 5 and/or Rhetoric 1) .....	8
<b>Depth Subject Matter</b> .....	28
Food science (Food Science and Technology 1, 49, 103, 104, 104L, 105, 110A, 111, 131) .....	28
<b>Breadth Subject Matter</b> .....	28
Social sciences and humanities electives† .....	28
<b>Restricted Electives</b> suggested for students who elect to follow one of the three programs below .....	38
<b>General Program:</b>	
Food science and related courses .....	38

\* For convenience in planning your program the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses will be accepted upon approval by adviser.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

<i>Food Technology and Management:</i>	
Agricultural economics and economics .....	33
Related courses .....	5
<i>Food Processing:</i>	
Mathematics and physics .....	12
Food Science and Technology 110A, 110B, 130 .....	9
Related courses .....	17
<i>Unrestricted Electives</i> .....	25
Total Units for the Degree	180

The **FOOD SERVICE MANAGEMENT** program prepares students for careers in management in commercial organizations such as hotels, restaurants, industrial cafeterias and contract food services, and also in public and private institutions such as hospitals, correctional institutions, schools and colleges. The major also provides an excellent background for the student who eventually plans to operate his own food service establishment. Areas of learning include the biological sciences with an emphasis on nutrition and food chemistry, as well as a strong background in economics and business management.

By selecting appropriate additional courses, students may also fulfill the academic requirements needed for admission to an approved internship in Dietetics.†

**Bachelor of Science Major Requirements\***

UNITS

<i>Preparatory Subject Matter</i> .....	64
Written expression (English 1, 2, 5) .....	4
Oral expression (Rhetoric 1 or 3) .....	4
General principles of economics (Economics 1A, 1B or 2A, 2B, 2C) ..	10
Principles of accounting (Economics 11A–11B) .....	7
Concepts of computing (Mathematics 19) .....	3
Statistics (Mathematics 13 or Economics 12) .....	4
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Biology (Biological Sciences 1) .....	5
Physiology with laboratory (Physiology 101, 101L) .....	6
Bacteriology with laboratory (Bacteriology 2, 3) .....	5
<i>Depth Subject Matter</i> .....	52
Foods 100A, 100B, 101A, 101B, 134 .....	12
Nutrition 102A–102B, 102L .....	9
Microbiology of food (Food Science and Technology 104) .....	3
Institution Management 125, 126, 127 .....	12
Business law (Agricultural Economics 18) .....	4
Fundamentals of business management (Agricultural Economics 113, and 112 or 114) .....	8
Managerial accounting (Agricultural Economics 117) .....	4
<i>Breadth Subject Matter</i> .....	8
Two courses chosen from the following areas: cultural anthropology, psychology, sociology .....	8

\* 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.*

† To fulfill the academic requirements for an internship in Dietetics add: Biochemistry 101A–101B, Nutrition 110A–110B, and 3 units of principles of education.

*Unrestricted Electives* ..... 56

The following courses recommended depending upon student's specific career goals: Applied Behavioral Sciences 151A-151B; Agricultural Economics 130; Economics 134, 150, 151; Consumer Science 100; Epidemiology and Preventive Medicine 150; Food Science and Technology 104L, 108A-108B; Plant Science 112; Foods 20; Viticulture and Enology 3.

Total Units for the Degree 180

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.

Students may elect this major either in the College of Agricultural and Environmental Sciences or in the College of Letters and Science.

**Bachelor of Science Major Requirements**

UNITS

*Preparatory Subject Matter* .....57-65

Biological Sciences 1 ..... 5

Two of the following courses or course sequences:

Bacteriology 2 and 3 or 105A-105B; Botany 2; Zoology 2 . . .9-12

Chemistry 1A-1B-1C or 4A-4B-4C; 8A-8B or 128A-128B-128C, 129A .....21-26

Physics 2A-2B-2C ..... 9

Mathematics 13; 16A-16B-16C or 21A-21B-21C ..... 13

*Depth Subject Matter* .....22-25

Biochemistry 101A, 101B ..... 6

Genetics 100A, 100B, 100L ..... 7

Three additional courses in genetics .....9-12

*Breadth Subject Matter* ..... 36

English and/or rhetoric ..... 8

Social sciences and humanities† .....28

*Restricted Electives* ..... 18-30

Six upper division courses in biological sciences or other fields relevant to genetics and related to student's interest, chosen with approval of adviser. (Recommended: one course in animal, plant, or microbial physiology; Mathematics 105A-105B or 130A-130B, or 131A-131B-131C) .....18-30

*Unrestricted Electives* ..... 24-27

Total Units for the Degree 180

The HOME ECONOMICS major, through the study of the humanities; the biological, physical and social sciences; and specialized subject matter, provides an excellent background for professional home economists. Employment opportunities exist in governmental, industrial, and community agencies dealing with social services, private industry, extension services, and teaching at the

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

secondary and junior college levels. The program encompasses the broad field of family and consumer sciences combining laboratory work with academic theory in such areas as child development, foods, nutrition, and textiles. Graduates are qualified for admission to programs leading to a master's degree with study in the areas of child development, consumer economics, foods, nutrition, or textiles.

This major provides academic preparation for those who plan to pursue a teaching credential.

**Bachelor of Science Major Requirements\***

	UNITS
<i>Preparatory Subject Matter</i> .....	58-60
Biological and Physical Sciences:	
Biological Sciences 1 .....	5
Chemistry 1A, 1B, 8A, 8B .....	16
Mathematics 13 or Economics 12 .....	4-5
Additional course(s), recommended:	
bacteriology, physiology, or physics .....	4
Social Sciences and Humanities:	
Anthropology 2 or sociology .....	4
Introduction to design .....	4
Economics 1A .....	5
Written or oral expression (English 1, 2, 5 and/or Rhetoric 1)...	8
Psychology 1A or 10 .....	4-5
Additional course(s), recommended:	
Economics 1B or Psychology 1C .....	4
<i>Depth Subject Matter</i> .....	60
The following courses may be used to satisfy the depth subject requirement:	
Applied Behavioral Sciences 150	
Consumer Economics 141, 142	
Foods 100A, 100B, 101A, 101B	
Human Development 131, 133, 136, 137	
Home Management 140, 140L	
Nutrition 102A, 102B, 102L	
Textiles and Clothing 6, 7, 17A, 17B, 160, 172	
<i>Unrestricted Electives</i> .....	60-62
Total Units for the Degree	180

The INTERNATIONAL AGRICULTURAL DEVELOPMENT major provides an opportunity for a student to develop competence in a technical field and, in addition, to acquire those special qualities of mind and spirit requisite for effective performance in underdeveloped areas of the world. These individuals must also be perceptive, sensitive, understanding, and possess knowledge of the social-political-economic-cultural relationships existing among people. Graduates concerned with resource development, whether American or foreign, will find opportunities in government service and commercial firms with overseas departments, providing a wide variety of career opportunities.

Students in this major may select their areas of technical specialization from

\* 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.*

any of the fields of interest broadly grouped in agriculture and the environmental sciences. A wide selection of courses emphasizing development in the humanities, social sciences, and economics is available to students in order to develop some understanding of the broad cultural and economic environments in which agriculture operates in particular areas outside the United States.

<b>Bachelor of Science Major Requirements*</b>	<b>UNITS</b>
<i>Preparatory Subject Matter</i> .....	52
Chemistry, including organic (Chemistry 1A, 1B, 8A, 8B) .....	16
Physics .....	4
Mathematics, statistics (Mathematics 13) .....	4
Economics .....	5
Biological sciences (animal or plant physiology, bacteriology, biochemistry, botany, genetics, zoology) .....	15
English and/or rhetoric .....	8
<i>Depth Subject Matter</i> .....	27
International agricultural development (International Agricultural Development 101 or 102, 190, and other courses with international development emphasis) .....	27
<i>Breadth Subject Matter</i> .....	23
Social sciences and humanities .....	23
<i>Restricted Electives</i> .....	50
Agricultural and other science electives .....	12
Economics or agricultural economics .....	6
Humanities and social science courses relevant to an understanding of development .....	17
Foreign language or demonstrated proficiency in a single foreign language equivalent to passing Course 4. ....	15
<i>Unrestricted Electives</i> .....	28
<b>Total Units for the Degree</b>	<b>180</b>

The **NUTRITION SCIENCE** major provides organized study in nutrition and relevant biological and physical sciences as preparation for 1) graduate study in nutrition, including the nutrition of species or groups, as human, domestic animal, avian, and wildlife; 2) professional study of medicine, veterinary medicine, and other health sciences; 3) technical work in nutrition in animal, food, and pharmaceutical industries; 4) journalism and technical writing; and 5) health education. It is assumed that students will be advised and will take additional courses appropriate to their specific interest.

<b>Bachelor of Science Major Requirements*</b>	<b>UNITS</b>
<i>Preparatory Subject Matter</i> .....	53
Biochemistry (Biochemistry 101A, 101B or Physiological Sciences 101A, 101B) .....	6
Biology with laboratory (Biological Sciences 1) .....	5

\* 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.

Chemistry, general and organic (Chemistry 1A, 1B, 1C, 5, 8A, 8B) .....	25
Microbiology with laboratory (Bacteriology 2, 3) .....	5
Statistics (Mathematics 13) .....	4
Written or oral expression (choose from English 1, 2, 5 and/or Rhetoric 1) .....	8
<b>Depth Subject Matter</b> .....	20
Select from Nutrition 110, 111, 111L, 114, 116A, 116B, 117, 121, 122, 123, 190, 198, and 199.	
<b>Breadth Subject Matter</b> .....	20
Courses in social sciences and humanities.	
<b>Restricted Electives</b> .....	47
Biochemistry laboratory (Biochemistry 101L, 102, 123 or Physiological Sciences 102A, 102B) .....	3-5
Calculus or physics (excluding Physics 10) .....	6
Foods and food science .....	6
Physiology with laboratory (Physiology 110A, 110B, 111A, 111B, or Physiology 101, 101L, plus an additional physiology course) .....	10
Additional nutrition or related biological and physical sciences .....	19-21
<b>Unrestricted Electives</b> .....	40
Total Units for the Degree	180

The **PHYSIOLOGY** major is designed to provide students with 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 foundations 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 the M.S. and Ph.D. degrees.

This major can be adopted by students in either the College of Agricultural and Environmental Sciences or the College of Letters and Science.

### Bachelor of Science Major Requirements\*

	UNITS
<b>Preparatory Subject Matter</b> .....	52-53
Biological sciences (Biological Sciences 1) .....	5
Chemistry (Chemistry 1A, 1B, 1C, 5, 8A, 8B) .....	25
Mathematics (Mathematics 13, 16A, 16B, 16C or Physiology 108) .....	13-14
Physics (Physics 2A, 2B, 2C) .....	9
<b>Depth Subject Matter</b> .....	36
Physiology: including Physiology 100A-100B, 100L, 101L, 110A-110B, 111A-111B .....	36
<b>Breadth Subject Matter</b> .....	16
Social science and humanities (including 8 units of English and/or rhetoric) .....	16

\* 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.

<i>Restricted Electives</i> .....	40
Upper division units which must include either biochemistry and morphology or mathematics, chemistry, physics, and/or engineering. Program should be developed in consultation with major adviser.	

<i>Unrestricted Electives</i> .....	35-36
-------------------------------------	-------

Total Units for the Degree 180

The objective of the **PLANT SCIENCE** major is to train students in the biological and physical sciences as applicable to the technology required for the production and maintenance of plants. A student may specialize in agronomy, floriculture, landscape horticulture, nursery management, plant pathology, pomology, vegetable crops, or viticulture, or prepare for graduate work in the plant sciences. Occupational opportunities exist in nursery and greenhouse management, farming, technical and sales positions in agricultural business and associated enterprises (such as equipment and supply companies), as well as in private, state, and federal service in consulting or research.

**Bachelor of Science Major Requirements\***

	UNITS
<i>Preparatory Subject Matter</i> .....	36
Biology (Biological Sciences 1) .....	5
Botany (Botany 2) .....	5
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Mathematics (statistics) .....	4
Physics (Physics 2A and 2B or 2C) .....	6
<i>Depth Subject Matter</i> .....	34
Plant science (Plant Science 1, 2) .....	7
Soil and water science (Soil and Water Science 2) .....	3
Entomology (Entomology 110 or 112) .....	4
Nematology and/or weed science .....	4
Genetics (Genetics 100A, 100B) .....	6
Plant pathology (Plant Pathology 120) .....	4
Plant physiology (Botany 111A, 111B) .....	6
<i>Breadth Subject Matter</i> .....	20
English, rhetoric, or technical writing .....	8
Social sciences and humanities electives† .....	12
<i>Restricted Electives</i> .....	45
Courses in specialization and the natural sciences supportive of major. Specialization may be taken in: agronomy, floriculture, landscape horticulture, nursery management, plant pathology, pomology, vegetable crops, and viticulture.	
Students wishing to prepare for graduate training should elect at least 24 units from the following:	
Bacteriology 2; Biochemistry 101A, 101B, 101L;	
Botany 105, 108, 117, 130, 130L; Mathematics 15, 16A, 16B, 16C; Physics 2C; and Zoology 2.	
<i>Unrestricted Electives</i> .....	45

Total Units for the Degree 180

\* 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 earned in satisfaction of the American History and Institutions required may be used in partial satisfaction of the Social Sciences and Humanities requirement.



**PREFORESTRY** students may be admitted to the School of Forestry and Conservation located on the Berkeley campus, following completion of the sophomore year. The preparatory programs offered at Davis provide full preparation for admission to the School. To qualify for such admission, a student must complete at least 84 quarter units of credit with a grade-point average of C or higher. In addition, he must satisfy the preparatory subject matter requirements for one of the two majors offered.

For full details on the majors in general forestry and in wood science and technology, please consult the *Announcement of the School of Forestry and Conservation*, which may be obtained from the School of Forestry and Conservation, 145 Mulford Hall, Berkeley, California 94720.

**PREVETERINARY MEDICINE.** The College of Agricultural and Environmental Sciences has traditionally provided preveterinary students with advisers as part of the non-degree program in preveterinary medicine. By their very nature all non-degree advising programs culminate in the choice of a major. For a variety of reasons preveterinary students have been reluctant to give appropriate attention to the choice of a major and have continued to think of the preveterinary advising programs as a major.

In order to correct this misapprehension the College has discontinued its formal preprofessional listing for veterinary medicine in this Catalog. It has not, however, forsaken its obligation to provide preprofessional advising. Students desirous of advice in this area need only request assignment of an adviser knowledgeable in matters related to veterinary medicine at the College office, 228 Mrak Hall, and they will be assigned one.

The **RANGE SCIENCE** major includes the fields of study applicable to the development and management of public and private lands used primarily for grazing. However, this program also takes into account the demands imposed on these lands for recreation, forestry, and watershed. Students learn to make decisions affecting the multiple-use potential of an area as they draw upon the animal, plant, soil, water, and social sciences. Graduates will be prepared for positions in governmental agencies such as the Bureau of Land Management, the Soil Conservation Service, and the Forest Service, as well as for self-employment as consultants, ranch managers, or ranchers.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	44
Biology (Biological Sciences 1) .....	5
Botany (Botany 2) .....	5
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Physics (Physics 2A, 2B) .....	6
Mathematics (Mathematics 13, 16A) .....	7
Economics (Economics 1A or 1B) .....	5
<i>Depth Subject Matter</i> .....	65-68
Botany (Botany 108, 111A, 111B) .....	11

\* 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.

Geology (Geology 1) .....	3
Soil and water science (Soil and Water Science 2).....	3
Agronomy and Range Science 112-112L .....	4
Animal science (Animal Science 1, 2, 118A).....	9
Nutrition 103 or Wildlife and Fisheries Biology 108.....	4
Plant Science 1 or Range Management 1.....	3-4
Resource sciences (Resource Sciences 100, 190).....	4
Genetics .....	3
Ecology (Plant Science 101) .....	3
Animal physiology or zoology .....	4-6
Range Management 100, 103, 105, 133, 198, or 199.....	14
<b>Breadth Subject Matter</b> .....	<b>32</b>
English and/or rhetoric .....	8
Social sciences and humanities electives† .....	12
Upper division social sciences courses in at least two of the following: agricultural economics, economics, geography, or political science .....	12
<b>Unrestricted Electives</b> .....	<b>36-39</b>
<b>Total Units for the Degree</b> <b>180</b>	

The RENEWABLE NATURAL RESOURCES major provides for either a comprehensive or an exploratory study of environmental problems related to climate, air, water, land, vegetation, and animals. The emphasis is on an integrated approach to development, management, and protection of such resources. Students with definite interests in ecology and conservation but uncertain as to specialization may select this major to achieve a general undergraduate preparation. Essential social, biological, and physical sciences are combined with a large block of electives to allow for individualized programming and emphasis on different aspects of resource availability and use.

With appropriate electives within this major, students will have adequate preparation for graduate study in such fields as ecology, wildlife and fisheries, soil and water science, and range management. Graduates are prepared for consulting, education, and management positions in the general areas of resource use and conservation, including positions with private firms and local, state, or federal agencies.

**Bachelor of Science Major Requirements\***

	<b>UNITS</b>
<b>Preparatory Subject Matter</b> .....	<b>73</b>
Biological Sciences 1 .....	5
Choose two courses from:	
Animal Science 1, 2; Plant Science 1, 2.....	6
Additional courses in the biological sciences .....	14
English and/or rhetoric .....	8
Physics and chemistry .....	22
Mathematics (Mathematics 13) .....	9
Soil and/or water science .....	6
Geology or physical geography .....	3

\* 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 earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

<i>Breadth Subject Matter</i> .....	30
Biological, physical, environmental sciences electives .....	18
Social sciences and humanities electives† .....	12
<i>Depth Subject Matter</i> .....	36
Resource sciences (Resource Sciences 100) .....	3
Agricultural Economics 147, 148, or 176 .....	3
<i>Restricted Electives</i> .....	30
Resource-oriented courses, including at least one appropriate upper division course from three of the following areas: animal science, atmospheric science, botany, economics or agricultural economics, civil or agricultural engineering, environmental horticulture, environmental planning and management, environmental studies, environmental toxicology, geography, plant sciences, range management, resource sciences, soil and/or water science, wildlife and fisheries biology, zoology, or others with concurrence of adviser.	
<i>Unrestricted Electives</i> .....	41
Total Units for the Degree	180

**SOIL AND WATER SCIENCE** is concerned with the use and protection of our vital and limited land and water. The major is designed for students wishing to make a career involving these resources as well as for those who have a more general interest in their use and protection, but whose educational objectives are less sharply focused. While the major has a "core" of required courses, programs can be designed to meet the needs of students having different objectives. For example, those wishing to emphasize resource use and management would include more than the minimum number of units of physical and biological sciences, while those more interested in resource allocation and land-use planning would choose more courses in the social, political, and economic area. The flexibility of this major makes possible a wide variety of career opportunities which include 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, district, county, state, federal, and international organizations dealing with soil and water development, use, and conservation.

### Bachelor of Science Major Requirements\*

	UNITS
<i>Preparatory Subject Matter</i> .....	48
Biology and botany .....	10
Mathematics (including introductory computer programming)....	9
Chemistry and physics (Chemistry 1A-1B or 4A-4B-4C; Physics 2A-2B, 3A-3B or 4A-4B-4C or 10) .....	18
Economics or agricultural economics .....	3
English and/or rhetoric .....	8
<i>Depth Subject Matter</i> .....	29
Resource sciences (Resource Sciences 100) .....	3
Soil and/or water science (including Soil and Water Science 2, 130, 140, and 3 units of Soil and/or Water Science 199) .....	26

\* 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 earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

<i>Breadth Subject Matter</i> .....	17
Social sciences and humanities† .....	17
<i>Restricted Electives</i> to supplement or expand any of the above areas .....	51
At least 30 of these units must be in physical and biological sciences and mathematics.	
<i>Unrestricted Electives</i> .....	35
Total Units for the Degree	180

The **TEXTILES** major is concerned with studying the chemical and physical properties, applications, and care of fibers and fabrics; their use in design; and the socioeconomic aspects of clothing. Two options are offered: *Consumer Textiles* stresses the *social-science* aspects of textiles and clothing and can lead to careers in teaching, extension service, merchandising, design, and journalism; and *Textile Science* places more emphasis on the *scientific disciplines* related to textiles and, in addition to the preceding opportunities, can lead to careers in research and development, technical service, marketing, and product control.

With this major students will be qualified to enter graduate programs with specializations in Textiles or Textile Science.

**Bachelor of Science Major Requirements\***

	UNITS
<i>Preparatory Subject Matter</i> .....	29-32
Textiles and Clothing 6, 7 .....	5
Anthropology 2 .....	4
Statistics, one course (Mathematics 13, Economics 12, or Education 114) .....	4-5
Written or oral expression (English 1, 2, 5 and/or Rhetoric 1) . . . .	8
Principles of economics, one course (Economics 1A, 1B or 2A) . . . .	4-5
Psychology, one course (Psychology 1A or 10) .....	4-5
<i>Consumer Textiles</i>	
<i>Depth Subject Matter</i> .....	44-45
Textiles and Clothing 17A, 17B, 162, 162L, 170, 172, 197 .....	21
Sociology 1 .....	4
Chemistry, one course (Chemistry 10) .....	4
Design 143, 170A, 170B .....	9
History of art or design, one course .....	3-4
Consumer Science 100 .....	3
<i>Restricted Electives</i> .....	42
Required units chosen from: Agricultural Economics 18, 112; Applied Behavioral Sciences 150; Consumer Economics 141, 142; Design 160A, 160B, 160C, 170C; Economics 1A or 1B, or 2B, 2C, 11A, 11B; Mathematics 19; Physics 10; Psychology 145; Sociology 25, 148; Textiles and Clothing 47.	
<i>Unrestricted Electives</i> .....	61-65

\* 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 earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

<i>Textile Science</i>	
<i>Depth Subject Matter</i> .....	39-41
Textiles and Clothing 160, 161, 161L, 162, 162L, 172, 197.....	19
Chemistry 1A, 1B, 8A, 8B .....	16
Physics (Physics 2A and 2B, or 10).....	4-6
<i>Restricted Electives</i> .....	52
Required units chosen from: Agricultural Economics 112, 113; Bacteriology 2; Biological Sciences 1; Chemistry 1C, 5, 128A-128B-128C; Consumer Economics 141, 142; Consumer Science 100; Design 143; Economics 1A or 1B, or 2B, 2C; Mathematics 15, 16A, 16B, 19; Physics 2C; Textiles and Clothing 17A, 17B, 47, 170.	
<i>Unrestricted Electives</i> .....	55-60
Total Units for the Degree	180

The **WILDLIFE AND FISHERIES BIOLOGY** major deals with the interface between the needs of man and wildlife which must be maintained for the sake of future generations, both as to recreation and to food supply. Certain species of wildlife are threatened because they cannot adapt to man's activities, whereas others have thrived so well under man-made changes in the environment that their numbers must be controlled. Emphasis is placed on biological and physical sciences, with specialization in wildlife or fisheries. This program prepares students for careers as wildlife or fisheries biologists, animal control specialists, game technicians, or, following additional academic preparation, for careers in research and administration in those areas.

**Bachelor of Science Major Requirements\***

	UNITS
<i>Preparatory Subject Matter</i> .....	60
Biology (Biological Sciences 1) .....	5
Botany (Botany 2) .....	5
Chemistry (Chemistry 1A, 1B, 1C, 8A, 8B) .....	21
Mathematics (Mathematics 13, 16A-16B or 21A-21B, 105A) .....	14
Physics (Physics 2A, 2B, 2C) .....	9
Zoology (Zoology 2) .....	6
<i>Depth Subject Matter</i> .....	54-61
Biochemistry (Biochemistry 101A, 101B or Physiological Sciences 101A, 101B) .....	6-7
Ecology (Entomology 104 or Zoology 125) .....	3-4
Genetics (Genetics 100A, 100B) .....	6
Nutrition .....	4
Physiology (Physiology 110A, 110B) .....	6
Zoology (Zoology 105) .....	5
Additional courses:	
Wildlife Biology specialization .....	4
Plant taxonomy (Range Management 100).....	4
<i>or</i>	
Fisheries Biology specialization .....	9
Entomology (Entomology 116) .....	3
Mathematics (Mathematics 19, 105B) .....	6

\* 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.*

Courses in the Major .....	20
Wildlife and Fisheries Biology 2, 101 .....	9
With adviser's approval, select from Wildlife and Fisheries Biology 110A, 110B, 110C, 130, 135, 135L, 151, 152, or 190 .....	11
<i>Breadth Subject Matter</i> .....	16
Social sciences and humanities; including 8 units of English and/ or rhetoric† .....	4-5
<i>Restrictive Elective</i> .....	4-5
One course selected with adviser's approval from: Zoology 116, 136, 137; Environmental Studies 140, 144.	
<i>Unrestricted Electives</i> .....	38-46
Wildlife Biology specialization .....	43-46
Fisheries Biology specialization .....	38-40
	180
Total Units for the Degree	

The ZOOLOGY major leads to a B.S. degree in either the College of Agricultural and Environmental Sciences or the College of Letters and Science. For the list of requirements and course offerings please see page 443.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirement.

## Faculty of the College of Agricultural and Environmental Sciences

In order to better meet its educational responsibilities, the faculty of the College of Agricultural and Environmental Sciences is organized into a variety of overlapping administrative formats and units. Most individuals are associated with one or more undergraduate teaching divisions, graduate groups, and research departments. Since many of these units are not places where faculty can physically be found, but only coordinating devices, the uninitiated often are confused by them. The faculty list which follows is organized according to research departments. Each member of the faculty listed under a department designation can be most conveniently reached through his departmental address:

### AGRICULTURAL ECONOMICS

Harold O. Carter, Ph.D., Chairman of the Department  
Department Office, 112 Voorhies Hall 752-1515

#### *Professors:*

Harold O. Carter, Ph.D.  
Gerald W. Dean, Ph.D.  
Daniel B. DeLoach, Ph.D. (*Emeritus*)  
Jerry Foytik, Ph.D.  
Benjamin C. French, Ph.D.  
Varden Fuller, Ph.D.  
Trimble R. Hedges, Ph.D.  
Gordon A. King, Ph.D.  
Sylvia Lane, Ph.D.  
Elmer W. Learn, Ph.D.  
Samuel H. Logan, Ph.D.  
Chester O. McCorkle, Jr., Ph.D.  
J. Herbert Snyder, Ph.D.  
Stephen H. Sosnick, Ph.D.

#### *Associate Professors:*

Warren E. Johnston, Ph.D.  
Alexander F. McCalla, Ph.D.

#### *Assistant Professors:*

Hoy F. Carman, Ph.D.  
David E. Hansen, Ph.D.  
Theodore P. Lianos, Ph.D.  
Quirino Paris, Ph.D.  
Gordon C. Rausser, Ph.D.

◇ ◇ ◇

#### *Assistant Professor:*

Edith H. Parker, A.B. (*Acting*)

#### *Lecturers:*

Stanley S. Johnson, Ph.D.  
John W. Mamer, Ph.D.  
Charles V. Moore, Ph.D.

### AGRICULTURAL ENGINEERING

John R. Goss, M.S., Chairman of the Department  
Department Office, 2030 Bainer Hall 752-0102

#### *Professors:*

Norman B. Akesson, M.S.  
Roy Bainer, M.S., LL.D. (*Emeritus*)  
William J. Chancellor, Ph.D.  
Kinsell L. Coulson, Ph.D.  
Robert B. Fridley, M.S.  
John R. Goss, M.S.  
John C. Harper, Sc.D.  
S. Milton Henderson, M.S.  
Clarence F. Kelly, D.Sc. (*Emeritus*)  
Robert A. Kepner, B.S.  
Coby Lorenzen, Jr., M.S. (*Emeritus*)  
Allan A. McKillop, Ph.D.  
Loren W. Neubauer, Ph.D., (*Emeritus*)  
Michael O'Brien, Ph.D.

Herbert B. Schultz, Ph.D.  
Wesley E. Yates, M.S.

#### *Associate Professors:*

Roger E. Garrett, Ph.D.  
Stanton R. Morrison, Ph.D.  
Leonard O. Myrup, Ph.D.

#### *Assistant Professors:*

Louis D. Albright, Ph.D.  
Thomas H. Burkhardt, Ph.D.  
John J. Carroll, III, Ph.D.

◇ ◇ ◇

#### *Lecturers:*

Pictiaw (Paul) Chen, Ph.D.  
John B. Dobie, M.S.

## AGRICULTURAL PRACTICES

Harry O. Walker, Ed.D., Chairman of the Department  
Department Office, 105 TB-10 752-2861

◇ ◇ ◇

### Lecturers:

George F. Hanna, M.Ed.  
Albert H. Lederer, B.S.

Gene E. Rapp, Ph.D.  
Harry O. Walker, Ed.D.

## AGRONOMY & RANGE SCIENCE

Paulden F. Knowles, Ph.D., Chairman of the Department  
Department Office, 131 Hunt Hall 752-1703

### Professors:

Fredrick T. Addicott, Ph.D.  
John P. Conrad, Ph.D., (*Emeritus*)  
Ray C. Huffaker, Ph.D.  
Paulden F. Knowles, Ph.D.  
Horton M. Laude, Ph.D.  
Robert S. Loomis, Ph.D.  
R. Merton Love, Ph.D.  
Ben A. Madson, LL.D. (*Emeritus*)  
Duane S. Mikkelsen, Ph.D.  
Maurice L. Peterson, Ph.D.  
Charles W. Schaller, Ph.D.  
Francis L. Smith, Ph.D. (*Emeritus*)  
Ernest H. Stanford, Ph.D.  
William A. Williams, Ph.D.  
Frederick P. Zscheile, Jr., Ph.D.

### Associate Professors:

Calvin O. Qualset, Ph.D.  
Charles A. Raguse, Ph.D.

◇ ◇ ◇

### Lecturers:

R. William Breidenbach, Ph.D.  
Beecher Crampton, M.S.  
Subodh K. Jain, Ph.D.  
M. B. Jones, Ph.D.  
Donald W. Rains, Ph.D.  
Earlene A. Rupert, Ph.D.  
J. Neil Rutger, Ph.D.  
Donald E. Seaman, Ph.D.  
Barbara D. Webster, Ph.D.

## ANIMAL PHYSIOLOGY

James M. Boda, Ph.D., Chairman of the Department  
Department Office, 196 Briggs Hall 752-0203

### Professors:

James M. Boda, Ph.D.  
Ray E. Burger, Ph.D.  
Walter E. Howard, Ph.D.  
Frederick W. Lorenz, Ph.D.  
Edward A. Rhode, Ph.D.  
Arthur H. Smith, Ph.D.  
Irving H. Wagman, Ph.D.

### Assistant Professors:

John M. Horowitz, Jr., Ph.D.  
Dennis G. Raveling, Ph.D.  
Robert G. Schwab, Ph.D.

◇ ◇ ◇

### Lecturers:

Robert W. Brocksen, Ph.D.  
William M. Longhurst, Ph.D.  
Charles M. Winget, Ph.D.

### Associate Professors:

Harry W. Colvin, Jr., Ph.D.  
Dorothy E. Woolley, Ph.D.

## ANIMAL SCIENCE

Magnar Ronning, Ph.D., Chairman of the Department  
Department Office, 130 Animal Science 752-1250

### Professors:

R. L. Baldwin, Jr., Ph.D.  
G. Eric Bradford, Ph.D.  
Floyd D. Carroll, Ph.D.  
Harold H. Cole, Ph.D. (*Emeritus*)  
Perry T. Cupps, Ph.D.

William N. Garrett, Ph.D.  
Irving I. Geshwind, Ph.D.  
Harold Goss, Ph.D., (*Emeritus*)  
Paul W. Gregory, Sc.D. (*Emeritus*)  
Hubert Heitman, Jr., Ph.D.



Carroll E. Howell, M.S., (*Emeritus*)  
 Max Kleiber, D.Sc. (*Emeritus*)  
 Robert C. Laben, Ph.D.  
 Glen P. Lofgreen, Ph.D.  
 James H. Meyer, Ph.D.  
 Wade C. Rollins, Ph.D.  
 Magnar Ronning, Ph.D.  
 William C. Weir, Ph.D.  
 James F. Wilson, LL.D. (*Emeritus*)

*Associate Professors:*  
<sup>1</sup>Graham A. E. Gall, Ph.D.  
 Verne E. Mendel, Ph.D.  
 James C. Morris, Ph.D.  
 David W. Robinson, Ph.D.

*Assistant Professors:*  
 C. Robert Ashmore, Ph.D.  
 J. Warren Evans, Ph.D.  
 Gary P. Moberg, Ph.D.

**APPLIED BEHAVIORAL SCIENCES**

Orville E. Thompson, Ph.D., Chairman of the Department  
 Department Office, 206 Walker Hall 752-1804

*Professors:*  
 Jack D. Forbes, Ph.D.  
 Glenn R. Hawkes, Ph.D.  
 Milton Hildebrand, Ph.D.  
 Elwood M. Juergenson, Ph.D.  
 David B. Lynn, Ph.D.  
 Orville E. Thompson, Ph.D.  
 Emmy E. Werner, Ph.D.

Alan B. Horowitz, Ph.D.  
 George Kagiwada, Ph.D.  
 Robert B. Yoshioka, Ph.D.



*Lecturers:*  
 Barbara A. Adams, M.P.H.  
 Michael Y. Corbett, M.A.  
 Isao Fujimoto, M.A.  
 Helen E. Giambruni, M.A.  
 Carl N. Gorman  
 Peter C. Leung, M.S.  
 Kenneth R. Martin, B.A.  
 Helge B. Olsen  
 David Risling, M.A.  
 JoAnn A. Stabb, M.A.  
 Jane N. Welker, M.A.

*Associate Professors:*  
 Mary C. Regan, Ph.D.  
 Katherine W. Rossbach, M.S.

*Assistant Professors:*  
 Louise M. Bachtold, Ed. D.  
 Brenda K. Bryant, Ph.D.  
 Frances Butler, Ph.D.  
 Dolph E. Gotelli, M.A.  
 Lawrence V. Harper, Ph.D.

**AVIAN SCIENCES**

C. Richard Grau, Ph.D., Chairman of the Department  
 Department Office, 109 Asmundson Hall 752-1300

*Professors:*  
 Ursula K. Abbott, Ph.D.  
 Hans (Johannes) Abplanalp, Ph.D.  
 Vigfus S. Asmundson, Ph.D. (*Emeritus*)  
 Ray E. Burger, Ph.D.  
 C. Richard Grau, Ph.D.  
 F. Howard Kratzer, Ph.D.  
 Frank X. Ogasawara, Ph.D.  
 Wilbor O. Wilson, Ph.D.

*Associate Professors:*  
 Daniel W. Peterson, Ph.D.  
 Pran N. Vohra, Ph.D.  
 Barry W. Wilson, Ph.D.



*Lecturers:*  
 Dorothy C. Lowry, M.A. (*Biological Sciences*)  
 Leo C. Norris, Ph.D.

**BIOCHEMISTRY AND BIOPHYSICS**

Jack Preiss, Ph.D., Chairman of the Department  
 Department Office, 149 Briggs Hall 752-3611

*Professors:*  
 Sterling Chaykin, Ph.D.  
 Eric E. Conn, Ph.D.  
 Richard S. Criddle, Ph.D.

Roy H. Doi, Ph.D.  
 Lloyd L. Ingraham, Ph.D.  
 Jack Preiss, Ph.D.  
 Paul K. Stumpf, Ph.D.

<sup>1</sup> Absent on leave, 1972-73.

*Associate Professors:*

George E. Bruening, Ph.D.  
 Jerry L. Hedrick, Ph.D.  
 Irwin H. Segel, Ph.D.

*Assistant Professors:*

Michael E. Dahmus, Ph.D.  
 Marilyn E. Etzler, Ph.D.  
 Adolphus P. Toliver, Ph.D.

**CONSUMER SCIENCES**

Mary Ann Morris, Ph.D., Chairman of the Department  
 Department Office, 148 Everson Hall 752-0668

*Professors:*

Mary Ann Morris, Ph.D.  
 Howard G. Schutz, Ph.D.

*Assistant Professors:*

Howard L. Needles, Ph.D.  
 Gerald F. Russell, Ph.D.

◇ ◇ ◇

*Associate Professors:*

Rose M. Pangborn, M.S.  
 S. Haig Zeronian, Ph.D.

*Lecturers:*

Christine M. Bruhn, M.S.  
 Karen E. Engel, M.A.  
 Rosalie H. Haines, M.S.  
 Harold P. Lundgren, Ph.D.

**ENTOMOLOGY**

Oscar G. Bacon, Ph.D., Chairman of the Department  
 Department Office, 367 Briggs Hall 752-0475

*Professors:*

Oscar G. Bacon, Ph.D.  
 Stanley F. Bailey, Ph.D. (*Emeritus*)  
 Richard M. Bohart, Ph.D.  
 John E. Eckert, Ph.D., (*Emeritus*)  
 Albert A. Grigarick, Jr., Ph.D.  
 Harry H. Laidlaw, Jr., Ph.D.  
 William H. Lange, Jr., Ph.D.  
 Leslie M. Smith, Ph.D. (*Emeritus*)  
 Eugene M. Stafford, Ph.D.  
 Frank E. Strong, Ph.D.  
 Francis M. Summers, Ph.D.

Charles L. Judson, Ph.D.  
<sup>2,3</sup>G. A. H. McClelland, Ph.D.  
 Donald L. McLean, Ph.D.

*Assistant Professor:*

Warren R. Cothran, Ph.D.

◇ ◇ ◇

*Lecturers:*

Richard W. Bushing, Ph.D.  
 Thomas F. Leigh, Ph.D.  
 Gary B. Pitman, Ph.D.  
 Richard E. Rice, Ph.D.  
 Robbin W. Thorp, Ph.D.  
 Robert K. Washino, Ph.D.

*Associate Professors:*

Norman E. Gary, Ph.D.

**ENVIRONMENTAL HORTICULTURE**

Harry C. Kohl, Jr., Ph.D., Chairman of the Department  
 Department Office, 140 Environmental Horticulture 752-0130

*Professors:*

Richard W. Harris, Ph.D.  
 Anton M. Kofranek, Ph.D.  
 Harry C. Kohl, Jr., Ph.D.  
 John H. Madison, Jr., Ph.D.  
 Roy M. Sachs, Ph.D.

*Associate Professors:*

Seymour M. Gold, Ph.D.  
 Wesley P. Hackett, Ph.D.  
 James A. Harding, Ph.D.  
 Andrew T. Leiser, Ph.D.  
 Jack L. Paul, Ph.D.

**ENVIRONMENTAL TOXICOLOGY**

Wendell W. Kilgore, Ph.D., Chairman of the Department  
 Department Office, 111 Environmental Toxicology 752-1142

*Professors:*

Donald G. Crosby, Ph.D.  
 Wendell W. Kilgore, Ph.D.

*Associate Professor:*

Dorothy E. Woolley, Ph.D.

<sup>2</sup> Absent on leave, fall quarter 1972.

<sup>3</sup> Absent on leave, winter quarter 1978.

*Assistant Professor:*

James N. Seiber, Ph.D.



*Lecturers:*

T. E. Archer, B.A.  
Raymond A. Fleck, Ph.D.  
Dennis P. Hsieh, Ph.D.  
Robert I. Krieger, Ph.D.

**FOOD SCIENCE AND TECHNOLOGY**

Bernard S. Schweigert, Ph.D., Chairman of the Department  
Department Office, 126 Cruess Hall 752-1465

*Professors:*

Richard A. Bernhard, Ph.D.  
W. Duane Brown, Ph.D.  
Clinton O. Chichester, Jr., Ph.D.  
Edwin B. Collins, Ph.D.  
Walter L. Dunkley, Ph.D.  
Robert E. Feeney, Ph.D.  
Eugene L. Jack, Ph.D. (*Emeritus*)  
Walter G. Jennings, Ph.D.  
George L. Marsh, M.S. (*Emeritus*)  
Martin W. Miller, Ph.D.  
Emil M. Mrak, Ph.D. (*Emeritus*)  
Thomas A. Nickerson, Ph.D.  
Harold S. Olcott, Ph.D.  
Herman J. Phaff, Ph.D.  
Bernard S. Schweigert, Ph.D.  
J. M. Smith, Sc.D.  
Lloyd M. Smith, Ph.D.  
Clarence Sterling, Ph.D.  
George F. Stewart, Ph.D.

Aloys L. Tappel, Ph.D.  
Nikita P. Tarassuk, Ph.D. (*Emeritus*)  
Reese H. Vaughn, Ph.D.  
John R. Whitaker, Ph.D.

*Associate Professors:*

Jerald M. Henderson, D.Eng.  
Michael J. Lewis, Ph.D.  
Mendel Mazelis, Ph.D.  
Rose M. Pangborn, M.S.

*Assistant Professors:*

Eli V. Crisan, Ph.D.  
Dieter W. Gruenwedel, Ph.D.  
R. Larry Merson, Ph.D.  
Gerald F. Russell, Ph.D.



*Lecturers:*

A. Wade Brant, Ph.D.  
Sherman J. Leonard, B.S.  
Bor S. Luh, Ph.D.

**GENETICS**

Robert W. Allard, Ph.D., Chairman of the Department  
Department Office, 357 Briggs Hall 752-0200

*Professors:*

Robert W. Allard, Ph.D.  
Theodosius Dobzhansky, D.Sc.  
(*Adjunct*)  
Melvin M. Green, Ph.D.  
S. Richard Snow, Ph.D.  
G. Ledyard Stebbins, Jr., Ph.D.

James B. Boyd, Ph.D.  
Gordon J. Edlin, Ph.D.  
Paul E. Hansche, Ph.D.

*Assistant Professors:*

Kathleen M. Fisher, Ph.D.  
Leslie D. Gottlieb, Ph.D.  
Robert Shleser, Ph.D.

*Associate Professors:*

Francisco J. Ayala, Ph.D.

**NEMATOTOLOGY**

Dewey J. Raski, Ph.D., Chairman of the Department  
Department Office, 223 Hoagland Hall 752-1403

*Professors:*

Merlin W. Allen, Ph.D.  
Bert Lear, Ph.D.  
Benjamin F. Lowensbery, Ph.D.  
Dewey J. Raski, Ph.D.



*Lecturers:*

Armand R. Maggenti, Ph.D.  
David R. Viglierchio, Ph.D.

<sup>1</sup> Absent on leave, 1972-73.

## NUTRITION

Fredric W. Hill, Ph.D., Chairman of the Department  
Department Office, 109 Everson Hall 752-0851

### Professors:

Nemat O. Borhani, M.D.  
Fredric W. Hill, Ph.D.  
Robert E. Hodges, M.D.  
\*Lucille S. Hurley, Ph.D.

### Assistant Professors:

Andrew J. Clifford, Ph.D.  
Jess F. Krauss, Ph.D.  
Susan M. Oace, Ph.D.  
Robert B. Rucker, Ph.D.

◇ ◇ ◇

### Associate Professor:

Frances J. Zeman, Ph.D.

### Lecturer:

Carolyn P. Sugars, B.S.

## PLANT PATHOLOGY

Raymond G. Grogan, Ph.D., Chairman of the Department  
Department Office, 354 Hutchison Hall 752-0301

### Professors:

Edward E. Butler, Ph.D.  
Robert N. Campbell, Ph.D.  
James E. DeVay, Ph.D.  
W. Harley English, Ph.D.  
Raymond G. Grogan, Ph.D.  
William B. Hewitt, Ph.D.  
Tsune Kosuge, Ph.D.  
Lysle D. Leach, Ph.D. (*Emeritus*)  
George Nyland, Ph.D.  
Joseph M. Ogawa, Ph.D.  
Thomas A. Shalla, Ph.D.

Robert J. Shepherd, Ph.D.  
Edward E. Wilson, Ph.D. (*Emeritus*)

### Associate Professor:

Robert K. Webster, Ph.D.

### Assistant Professor:

Clarence I. Kado, Ph.D.

◇ ◇ ◇

### Lecturers:

John M. Duniway, Ph.D.  
Dennis H. Hall, Ph.D.  
William J. Moller, Ph.D.  
William C. Schnathorst, Ph.D.

## POMOLOGY

Royce S. Bringham, Ph.D., Chairman of the Department  
Department Office, 1035 Wickson Hall 752-0124

### Professors:

Frank W. Allen, M.S. (*Emeritus*)  
Royce S. Bringham, Ph.D.  
Dillon S. Brown, Ph.D.  
Lawrence L. Claypool, Ph.D.  
Julian C. Crane, Ph.D.  
Luther D. Davis, Ph.D. (*Emeritus*)  
William H. Griggs, Ph.D.  
Hudson T. Hartmann, Ph.D.  
Claron O. Hesse, Ph.D.  
Dale E. Kester, Ph.D.  
Edward C. Maxie, Ph.D.

E. Louis Probesting, Ph.D. (*Emeritus*)

◇ ◇ ◇

### Lecturers:

Muriel V. Bradley, Ph.D.  
Patrick J. Breen, Ph.D.  
Robert M. Carlson, Ph.D.  
Peter B. Catlin, Ph.D.  
George C. Martin, Ph.D.  
Roger J. Romani, Ph.D.  
\*Kay Ryugo, Ph.D.  
Noel F. Sommer, Ph.D.  
Kiyoto Uriu, Ph.D.

## SOILS AND PLANT NUTRITION

Victor V. Rendig, Ph.D., Chairman of the Department  
Department Office, 139B Hoagland Hall 752-1406

### Professors:

Daniel G. Aldrich, Ph.D.  
Francis E. Broadbent, Ph.D.

C. C. Delwiche, Ph.D.  
Emanuel Epstein, Ph.D.  
Frank F. Harradine, Ph.D. (*Emeritus*)

\* Absent on leave, fall quarter 1972.

Victor V. Rendig, Ph.D.  
 Perry R. Stout, Ph.D.  
 Lynn D. Whittig, Ph.D.

*Associate Professors:*

Richard G. Burau, Ph.D.  
 Donald N. Munns, Ph.D.

*Assistant Professor:*

Dennis E. Rolston, Ph.D.



*Lecturers:*

Eugene L. Begg, B.S.  
 A. Lloyd Brown, Ph.D.  
 Gordon L. Huntington, M.S.  
 Bertril A. Krantz, Ph.D.  
 H. Michael Reisenauer, Ph.D.

**VEGETABLE CROPS**

James M. Lyons, Ph.D., Chairman of the Department

Department Office, 155 Hunt Hall 752-1735

*Professors:*

William J. Flocker, Ph.D.  
 \*James F. Harrington, Ph.D.  
 James E. Knott, Sc.D. (*Emeritus*)  
 Oscar A. Lorenz, Ph.D.  
 James M. Lyons, Ph.D.  
 John H. MacGillivray, Ph.D. (*Emeritus*)  
 Leonard L. Morris, Ph.D.  
 Harlan K. Pratt, Ph.D.  
 Lawrence Rappaport, Ph.D.

Charles M. Rick, Jr., Ph.D.  
 Paul G. Smith, Ph.D.

*Associate Professors:*

Frederick D. Howard, Ph.D.  
 Arthur R. Spurr, Ph.D.



*Lecturers:*

Kenneth N. Paulson, Ph.D.  
 M. Allen Stevens, Ph.D.  
 Masatoshi Yamaguchi, Ph.D.  
 Shang F. Yang, Ph.D.

**VITICULTURE AND ENOLOGY**

Harold W. Berg, M.S., Chairman of the Department

Department Office, 1023 Wickson Hall 752-0380

*Professors:*

Maynard A. Amerine, Ph.D.  
 Harold W. Berg, M.S.  
 James A. Cook, Ph.D.  
 James F. Guymon, Ph.D.  
 Lloyd A. Lider, Ph.D.  
 Klayton E. Nelson, Ph.D.  
 Harold P. Olmo, Ph.D.  
 Vernon L. Singleton, Ph.D.  
 Robert J. Weaver, Ph.D.

A. Dinsmoor Webb, Ph.D.  
 Albert J. Winkler, Ph.D. (*Emeritus*)

*Associate Professor:*

Ralph E. Kunke, Ph.D.



*Lecturers:*

Curtis J. Alley, Ph.D.  
 W. Mark Kliever, Ph.D.  
 Cornelius S. Ough, M.S.

**WATER SCIENCE AND ENGINEERING**

James N. Luthin, Ph.D., Chairman of the Department

Department Office, 119 Veihmeyer Hall 752-0453

*Professors:*

Jaime Amorocho, Ph.D.  
 James W. Biggar, Ph.D.  
 Robert H. Burgy, M.S.  
 Lloyd D. Doneen, Ph.D. (*Emeritus*)  
 Robert M. Hagan, Ph.D.  
 Delbert W. Henderson, Ph.D.  
 James N. Luthin, Ph.D.  
 Donald R. Nielsen, Ph.D.  
 Verne H. Scott, Ph.D.  
 Frank J. Veihmeyer, Ph.D., LL.D.  
 (*Emeritus*)

*Associate Professors:*

Theodore C. Hsiao, Ph.D.  
 Allen W. Knight, Ph.D.  
 Theodor S. Strelkoff, Ph.D.



*Lecturers:*

Leo R. Beard, B.S.C.E.  
 Elmer R. Malakoff, LL.B.  
 \*William O. Pruitt, Jr., M.S.  
 Kenneth K. Tanji, M.S.

\* Absent on leave, fall quarter 1972.

## COLLEGE OF ENGINEERING

Engineering is the profession in which a knowledge of the physical, biological, and social sciences is applied in the utilization of the materials and forces of nature for the benefit of mankind. As such, engineering is oriented to problems dealing with human needs. Students learn not only to observe and describe problems, but also to seek useful solutions. For this reason, engineering graduates are in demand not only for the engineering profession, but also in fields such as management, sales, operations, and manufacturing.

Seven undergraduate engineering curricula are offered at Davis. These are four-year programs leading to the degree Bachelor of Science in Engineering. The curricula are: Aerospace, Agricultural, Chemical, Civil, Electrical, and Mechanical Engineering, and Materials Science and Engineering. Within each curriculum, informal options are available through the selection of a suitable series of technical elective courses. In addition, a curriculum called Individual Engineering major is available for students who have specific career objectives which are not compatible with any of the seven curricula. Dual majors (e.g., Mechanical Engineering and Electrical Engineering) are possible, and dual degrees (simultaneous degrees in an engineering and a nonengineering major) are encouraged.

Degree requirements for each of the undergraduate curricula are shown on subsequent pages. Graduate programs leading to the degrees Master of Engineering, Master of Science, Doctor of Engineering, and Doctor of Philosophy are also offered. In addition to the above-mentioned curricula, the College of Engineering offers graduate study in Applied Science.

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 fundamental engineering courses. The lower division program is, to a great extent, the same for all engineering curricula, with the principal exception of Chemical Engineering. The second part (the Upper Division Program) is made up of a group of required technical courses pertinent to the intended major and elective courses. Most of the senior year is elective, to be divided between technical and non-technical courses. Engineering faculty advisers play a major role in helping students select those courses of importance to the students' goals.

Students cannot learn in four years all that one needs to know in any profession. The objective of the undergraduate programs in Engineering is to form an appropriate basis for a lifetime of learning. Extended learning after graduation, in the form of work-learn experience, individual study, extension courses, or formal graduate study, is an essential part of engineering education. Such integrated work-learn experience also is useful prior to graduation; undergraduates are encouraged and assisted in finding engineering employment in part-time internships during the school year, in summer jobs, and in the engineering cooperative education program.

### Admission to Freshman Standing

General requirements for admission to the University begin on page 16. There are no separate or additional requirements for admission to the College of Engineering. However, it is advisable that students who plan to study engineering include in their high school programs the following subjects:

	<i>Units</i>
Algebra* .....	2
Plane geometry* .....	1
Trigonometry* .....	½
Chemistry (physics is also recommended) .....	1

These subjects are prerequisite to certain basic courses in the freshman engineering program. A student who is admitted without this preparation will be required to make up equivalent work while in college. As a result, his graduation could be delayed.

In addition, a year of high school mechanical drawing is recommended but not required.

### Admission to Advanced Undergraduate Standing

Many students transfer to Davis after completing two years of work at a community college. It is possible to transfer with a sophomore status, but students who begin their studies at a community college are urged to complete the lower division program at that college before transferring. Students who have questions regarding their community college program should consult their adviser or contact the UC Davis College of Engineering Undergraduate Office directly.

The engineering curriculum at Davis is arranged so that a student completing the basic lower division curriculum in engineering at a California community college should be able to complete his work at Davis in two additional years. (See later section on Undergraduate Programs.) Records maintained over the years show that, on the average, engineering transfer students from the community colleges perform at an academic level virtually indistinguishable from that of those who began at Davis as freshmen.

A student who is admitted with less than 84 quarter units (or 56 semester units) of college work is classified in lower division standing, and is required to complete one of the two lower division programs listed on pages 117-118. Such a student is advanced to upper division standing on completion of 84 units.

A student who is admitted with 84 or more units is classified in upper division standing, but is required to complete the equivalent Lower Division Program for Transfer Students listed on page 116.

### Academic Advisers

In establishing the undergraduate programs in the College of Engineering, every effort has been made to provide for maximum flexibility consistent with

\* Or equivalent integrated courses covering same subject material.

rigorous preparation for professional practice or graduate study. The key to successful flexibility in an academic program is an effective system of advising. Every Engineering undergraduate is assigned to a faculty member for academic and career advising, and every Engineering faculty member has 15 to 20 advisees. Adviser assignments are made and coordinated through the Undergraduate Office of the College. Initial assignments are made prior to the student's first term on campus, and each individual is encouraged to select and change to an adviser of his own choice whenever he has an alternative preference. A close relationship between the student and his academic adviser can be one of the most important factors in a successful educational experience. For new students, individual appointments with Engineering faculty advisers are scheduled during Summer Advising or before classes begin during the first week of the quarter.

### **Engineering Undergraduate Office**

The Undergraduate Office of the College, located in Room 2132 Bainer Hall, operates as a service center for Engineering students. Information and assistance on academic, career, and personal matters are available either directly or through individual referral to other offices on campus.

### **Choosing a Major**

Many students who enter the College of Engineering have well-defined career objectives. Others do not. All students in Engineering are formally classified as *Engineering—Lower Division* until 84 quarter units of college work have been completed. The official designation of one of the Engineering curricula does not take place until the end of the sophomore year. However, students who plan to graduate under the *Chemical Engineering* curriculum need to make that decision during the freshman year and plan their entire program accordingly. During the first two years a student who is uncertain about his future choice of curriculum is encouraged to make use of the many sources of advising and counseling available to him. These include his academic adviser, his instructors, the academic deans in the College Office, and personnel in the Counseling Center, the Office of Placement Services, and the Office for Student Development.

A number of freshmen courses in Engineering are designed to describe the role of the engineer in society and the similarities and differences among the branches of engineering. Included are: Engineering 3—Introduction to Engineering Systems, Agricultural Engineering 1—The Agricultural Engineer in Tomorrow's World, Chemical Engineering 1—The Scope of Chemical Engineering, Civil Engineering 1—The Civil Engineer in Society, Electrical Engineering 1—Introduction to Electrical Engineering, and Mechanical Engineering 1—Mechanical Engineering. Work-learn experiences in the form of internships, summer jobs, and cooperative study programs also are valuable aids in the evolution of a career objective.



### **Options**

Within the formal curricula, informal options may be structured by selection of a suitable series of technical elective courses. Individual options are described on pages 117-137. With the help of the academic advisers, options other than those named may be tailored to suit the interests of individual students. Broader flexibility is available through the Individual Engineering Major discussed on page 137.

### **Dual Degrees**

Individual engineering students who can afford the time are encouraged to enroll for simultaneous bachelor's degrees in an engineering major and a nonengineering major of their choosing. Such "dual degree" students must satisfy the requirements for both degrees. Most students have found five years to be necessary for dual degrees.

### **Planning a Program**

The student is responsible for planning his own program. Many sources of assistance are available. Primary among these is the individual's academic adviser. Program planning assistance is also available through the Undergraduate Office of the College, The First Resort (the Peer Advising Center) in East Hall, and the Resident Adviser in the student's Residence Hall.

Degree requirements in Engineering are given on pages 110-137. The minimum number of required units ranges from 180 in some curricula to somewhat higher in others. The programs normally require twelve quarters of study at an average of approximately 15 units per quarter. Students may not enroll for less than 12 units, exclusive of physical education, without special approval from the Dean of the College. Continuing students may enroll for no more than 21 units and students in their first quarter of residence may enroll for no more than 17 units, unless authorized by the Dean.

### **Program Flexibility**

In the Engineering Lower Division Program for all curricula except Chemical Engineering, only mathematics and four additional required courses are prerequisite to required upper division Engineering-prefix courses (as distinguished from Agricultural Engineering, Civil Engineering, etc., courses). The four courses are: Engineering 17, 35, Physics 4A, and 4C. (Exception: Engineering 45 is prerequisite to Engineering 188, a required course in the Materials Science and Engineering curriculum.) These four courses and the lower division mathematics requirements should be completed in the first two years, and can be scheduled in only a limited variety of ways. The other required physics, chemistry, engineering, humanities, and social sciences courses in the lower division program are requirements for graduation, but their scheduling may be timed to suit the undergraduate program of the individual student.

In planning the four-year program care must be taken to observe course prerequisite requirements, or a delay in graduation may result. Course prerequisites

are specified to help the student avoid courses for which he is unprepared, and to guide the instructor in the establishment of a starting point for a given course. The prerequisites for any course may be waived for good cause for individual students by the course instructor.

### **Suggested Course Priorities for First Quarter of Freshman Year**

An extensive background in mathematics is prerequisite to the junior-year courses in the Engineering curricula. Therefore both students who are enrolled in Engineering and those who are considering possible future enrollment in Engineering should include mathematics in their program from the outset. A suggested sequence of course priorities for the first quarter of the freshman year is listed below:

1. Mathematics 11 (if not completed in high school)
2. Mathematics 21A (if not completed in high school)
3. Subject A (if not yet otherwise satisfied)
4. Other (Chemistry 4A, Engineering 3 or 4, English 1 or 3, Rhetoric 1, or other humanities-social sciences electives)

Students who plan to graduate, or are considering the possibility of graduating, under the Chemical Engineering curriculum should take Chemistry 4A-4B-4C in their freshman year.

### **Technical Electives**

Technical electives permit a student to develop a major area of emphasis within his chosen curriculum. Each Upper Division Program listing includes a group of "Suggested Technical Electives." Other technical courses may be elected. Courses in engineering, mathematics, and the physical and biological sciences are suitable, as are technical courses in the social sciences such as accounting and urban administration. For credit as technical electives, courses in engineering, mathematics and physics must be upper division courses. Decisions regarding suitability of particular courses for technical elective credit are made in the Undergraduate Office on advice of the Undergraduate Study Committee.

### **Special Study Courses**

Attention is directed to the Special Study Courses (98, 99, 198, and 199) described in detail on page 179. A maximum of 5 units of elective credit per quarter may be made up of such courses.

### **University Extension Courses**

Appropriate courses taken under University Extension may be used for degree credit. Simultaneous enrollment in resident courses and extension courses requires *prior* approval of the Dean 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.

### **Cooperative Program (Work-Learn)**

A cooperative work-learn program is available in the College of Engineering in cooperation with the campuswide program PROBE (PROfessional and Oc-cupational Broadening Experiences). Quarters of study may be alternated with quarters of engineering employment on a schedule tailored to meet the requirements of the individual student, his employer, and his curriculum. Academic credit for this is available, in appropriate cases, through an internship course, Engineering 92 or 192. Information is available in the Undergraduate Office or the Campus Work-Learn Center.

### **Degree Requirements**

#### **GENERAL UNIVERSITY REQUIREMENTS**

The degree of Bachelor of Science is awarded to those candidates who satisfy the requirements of the University (pages 33-35) in regard to:

Subject A

American History and Institutions

Residence (see additional College requirement specified below)

Scholarship

Units

Application for Degree Candidacy

#### **COLLEGE OF ENGINEERING REQUIREMENTS**

The candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in Engineering. Detailed requirements for seven approved curricula (in Aerospace, Agricultural, Chemical, Civil, Electrical, and Mechanical Engineering, and Materials Science and Engineering) are given on pages 117-137. Each of the curricula consists of a specified Lower Division Program (or, for students who transfer into the College with 84 or more quarter units, an approved equivalent program) and a specified Upper Division Program. As an alternative to following one of these curricula, a student may tailor an Individual Engineering Major with the help of his academic adviser, and submit it to the College Committee on Undergraduate Study for approval. Requirements for the Individual Engineering Major are given on page 137.

*The student is held responsible for planning his program and for satisfactory completion of graduation requirements.*

Individual students, for good cause, may request waiver of particular degree requirements of the College of Engineering by submitting a Student Petition. Petition forms are available in the Undergraduate Office. Such petitions may be approved only by the Undergraduate Study Committee or by majority vote of the entire faculty of the College, not by an adviser or dean. Five professors and five students serve on the committee.

#### **Residence Requirement**

Of the total units required for the Bachelor of Science in Engineering degree, at least the final 45 units characteristic of the student's curriculum must be completed while he is registered in the College of Engineering.

### **Credit by Advanced Placement Examinations**

University credit allowed for College Entrance Examination Board (CEEB) Advanced Placement Examinations is counted in partial fulfillment of the requirements for the Bachelor of Science in Engineering degree to the extent that the UCD course equivalences (see page 151) satisfy parts of the student's chosen curriculum. Duplicate credit may not be earned in courses for which Advanced Placement Credit has been allowed.

### **Humanities-Social Sciences Electives**

The Humanities-Social Sciences electives in the Engineering curricula are intended to contribute to the development of the graduate as an individual and as a professional engineer in society. In general, any humanities or social science course is acceptable, although a course in, for example, statistical methods in sociology is considered to be a technical course rather than a social science course. In addition, certain basic-skills courses in departments whose other courses are acceptable are excluded (e.g., Economics 12, Introduction to Quantitative Methods in Economics). Decisions regarding suitability of particular courses are made in the Undergraduate Office on the advice of the Undergraduate Study Committee.

The Humanities-Social Sciences portion of the engineering curricula is regarded as an integral part of the engineering student's preparation for the practice of his profession, rather than being considered no more than a desirable part of general education. As guidelines to help the student in making effective use of this part of his program, the Engineering faculty endorses as objectives the recommendation of a committee of the American Society for Engineering Education:

1. An understanding of the principal changes which are taking place in the contemporary world, considered as an interacting whole, but with attention to the role of technology in human life;
2. A perspective on the human condition, and on human values and problems, as they are embodied in history, philosophy, literature, and the other arts;
3. An understanding of the ways in which social scientists are contributing to the analysis and direction of social processes;
4. An ability to continue the engineering student's education in all these directions—to extend, refresh, and bring up to date;
5. An ability to work with others, who have specialized in other areas, in the formulation of ideas and in the process of criticism, dialogue, and problem solving;
6. An increase in critical judgment, in flexibility, creativity, tolerance, and sensitivity to the response of others and to ethical and esthetic values.

Engineering degree programs must include a minimum of 31 quarter units of study in the humanities and social sciences. The 31 units must be selected from an approved list (see below). They must include English 1 and either English 3 or Rhetoric 1. Both subject and unit credit for English 1 is given for a score of 5, 4, or 3 on the CEEB Advanced Placement Examination in English (see page 33).

At least 8 of the 31 units of humanities-social sciences courses must be completed after the student has received credit for 84 units of college work. With certain exceptions (listed below), any course taken in any of the following groups is considered to be an acceptable humanities-social sciences elective:

Afro-American (Black) Studies	Foreign Languages (all groups)
American Studies	Geography
Anthropology	History
Applied Behavioral Sciences	Human Development
Art	Music
Asian American Studies	Philosophy
Classics	Political Science
Comparative Literature	Psychology
Dramatic Art	Religious Studies
Economics	Rhetoric
English	Sociology

The exceptions which are *not* acceptable as humanities-social sciences electives are the following:

Economics	11A, 11B	Elementary Accounting
	12	Introduction to Quantitative Methods in Economics
English	25, 26	English for Foreign Students
Geography	1	Physical Geography
	3	Climate and Weather
	4	Introduction to Maps
	105	Cartography
	106	Interpretation of Aerial Photography
	107	Advanced Cartography
	108	Analysis of Land Forms
	162	Geography of Water Resources
Music	10	Basic Musicianship
Psychology	107	Psychometric Methods
	108	Physiological Psychology
Sociology	106	Quantitative Methods of Research

In addition, not more than 4 units in any course which may be repeated for credit (such as Music 42 or Dramatic Art 30) may be counted toward satisfaction of the requirement.

### Passed/No Record Option

A student registered in the College of Engineering may elect to enroll in not more than one course each quarter in which he shall be graded Passed (P) or No Record. In the event that a student does not pass a course under this option, no entry is made on his transcript. Courses may be taken on this option in addition

to courses offered only on a Passed or Not Passed basis. The following conditions must be met for the use of the Passed or No Record option:

1. The student must have a 2.0 overall average and not be subject to academic disqualification.
2. He must be enrolled in a program of at least 12 units, including the course to be taken on this grading basis.
3. The course must not be a required course in the curriculum, unless it is in English or rhetoric, or a course offered to satisfy the natural science elective requirement.
4. A petition to take the course on this grading basis must be approved by the Dean or his designated representative. (Petition will be approved if all of the listed conditions are met.)

The units earned in courses taken P/No Record are counted in satisfaction of degree requirements, but such courses are disregarded in determining the student's grade-point average. A student registered in the College of Engineering who enrolls in a course offered by any department of the University for a P/No Record grade receives a grade of P if his work in the course is of quality equivalent to a grade of C- or better, under the general letter grade system. A course in which a grade of D or F has been recorded may not be repeated on a P/No Record basis.

### Passed/Not Passed Grading

Some courses are authorized to be given on a Passed/Not Passed basis only and are identified as such in course descriptions. These courses may be taken simultaneously with the courses for which a student exercises his Passed/No Record Option. An NP is recorded on the transcript for courses which would otherwise be graded D or F.

### Honors at Graduation

Honors at graduation may be awarded to students who achieved distinguished scholarship records in all courses completed in the University. Students who display marked scholarship superiority may receive High Honors or Highest Honors. The minimum grade-point averages for Engineering students are as follows:

<i>Total quarter units completed at UC</i>	<i>Honors</i>	<i>High Honors</i>	<i>Highest Honors</i>
45- 89	3.50	3.65	3.80
90-134	3.40	3.55	3.70
135-	3.20	3.40	3.60

### Dean's Honors List

The Dean's Honors List includes the names of all students who have completed 12 or more units in the University and earned a cumulative grade-point average of 3.2 or higher in all courses taken in the University.

## Lower Division Programs

The Lower Division Programs for six of the seven curricula—Aerospace, Agricultural, Civil, Electrical, and Mechanical Engineering, and Materials Science and Engineering—are the same with minor exceptions which are noted. The Lower Division Program for the Chemical Engineering curriculum is different because students who plan to graduate under that curriculum must include a larger number of chemistry courses in their program. A separate, equivalent Lower Division Program is listed for students who transfer into the College with 84 or more quarter units of college credit.

### LOWER DIVISION PROGRAM—ALL ENGINEERING CURRICULA EXCEPT CHEMICAL ENGINEERING

	<i>Units</i>	<i>Quarter Usually Taken</i>
Chemistry 4A–4B (General Chemistry) . . . . .	10	
Engineering 3 (Introduction to Engineering Systems) . . . . .	3	1 or 3
Engineering 4 (Engineering Graphics in Design)* . . . . .	3	1 or 2
Engineering 5A (Engineering Applications of Computers) . . . . .	3	2 or 3
Engineering 17 (Circuits) . . . . .	3	5 or 6
Engineering 35 (Statics) . . . . .	3	4 or 5
Engineering 45 (Properties of Materials) . . . . .	4	4 or 6
English 1 (Expository Writing) . . . . .	4	
Rhetoric 1 (Introduction to Public Speaking) <i>or</i> English 3 (Introduction to Literature) . . . . .	4	
Mathematics 21A†–21B–21C (Calculus) . . . . .	12	1–2–3
Mathematics 22B (Differential Equations) . . . . .	3	5
Mathematics 22C (Vector Analysis) . . . . .	3	4
Physics 4A–4C–4E (General Physics) . . . . .	12	2–4–6
Electives in natural sciences** . . . . .	12	
Electives in humanities or social sciences . . . . .	8	
Unrestricted electives*** . . . . .	3	
Total	90	

\* Students who graduate under the Electrical Engineering curriculum take 3 units of humanities or social sciences in place of Engineering 4.

\*\* The 12 units of natural sciences must be selected from among the following courses: Astronomy 1A, 1B; Bacteriology 2; Biological Sciences 1, 10; Botany 2; Chemistry 4C, 8A, 8B; Geology 1, 1L; Genetics 10; Mathematics 22A; Physics 4B and D (recommended for those who do not have specific alternative interests); Physiology 2; Zoology 2. (Students may petition to add other courses to the list, including upper division courses.) The courses selected should reflect the academic and career objectives of the student and should be chosen in consultation with a faculty adviser.

\*\*\* Students who graduate under the Civil Engineering curriculum or the Forest Engineering option of the Agricultural Engineering curriculum take Civil Engineering 10 in place of 3 units of unrestricted electives.

† Prerequisites to Mathematics 21A are two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry (or course Mathematics 11, which may be taken concurrently with Mathematics 21A).

### Sample Lower Division Program

(Aerospace, Agricultural, Civil, Electrical, and Mechanical Engineering and Materials Science and Engineering curricula)

<i>Freshman Year</i>	<i>Fall</i>		<i>Winter</i>		<i>Spring</i>
Chemistry 4A . . . . .	5	Chemistry 4B . . . . .	5	Engineering 3 . . . . .	3
Engineering 4 . . . . .	3	Engineering 5A . . . . .	3	Mathematics 21C . . . . .	4
Mathematics 21A . . . . .	4	Mathematics 21B . . . . .	4	Electives* . . . . .	9
		Physics 4A . . . . .	4		
	—		—		—
	12		16		16
 <i>Sophomore Year</i>					
Engineering 35 . . . . .	3	Engineering 17 . . . . .	3	Engineering 45 . . . . .	4
Mathematics 22C . . . . .	3	English 1 . . . . .	4	Rhetoric 1 . . . . .	4
Physics 4C . . . . .	4	Mathematics 22B . . . . .	3	Physics 4E . . . . .	4
Elective* . . . . .	4	Elective* . . . . .	6	Elective* . . . . .	4
	—		—		—
	14		16		16

### LOWER DIVISION PROGRAM—CHEMICAL ENGINEERING CURRICULUM

	<i>Units</i>	<i>Quarter Usually Taken</i>
Chemistry 4A–4B–4C (General Chemistry) . . . . .	15	1–2–3
Chemistry 128A (Organic Chemistry) . . . . .	3	6
Chemistry 129A (Organic Chemistry Laboratory) . . . . .	2	6
Engineering 3 (Introduction to Engineering Systems) . . . . .	3	1 or 3
Engineering 5A (Engineering Applications of Computers) . . . . .	3	5
Engineering 17 (Circuits) . . . . .	3	5
Engineering 35 (Statics) . . . . .	3	4
English 1 (Expository Writing) . . . . .	4	
Rhetoric 1 (Introduction to Public Speaking) <i>or</i> English 3 (Introduction to Literature) . . . . .	4	
Mathematics 21A†–21B–21C (Calculus) . . . . .	12	1–2–3
Mathematics 22A (Linear Algebra) . . . . .	3	6
Mathematics 22B (Differential Equations) . . . . .	3	5
Mathematics 22C (Vector Analysis) . . . . .	3	4
Physics 4A–4B–4C–4D–4E (General Physics) . . . . .	20	2–3–4–5–6
Electives in humanities or social sciences . . . . .	11	
	—	
Total	92	

\* The elective courses must include 12 units of natural sciences and 8 units of humanities or social sciences.

† Students who have not had analytic geometry must take Mathematics 11 concurrently with Mathematics 21A.



**Sample Lower Division Program**  
(Chemical Engineering curriculum)

<i>Freshman Year</i>	<i>Fall</i>		<i>Winter</i>		<i>Spring</i>
Chemistry 4A . . . . .	5	Chemistry 4B . . . . .	5	Chemistry 4C . . . . .	5
Engineering 3 . . . . .	3	English 3 . . . . .	4	English 1 . . . . .	4
Mathematics 21A† . . . . .	4	Mathematics 21B . . . . .	4	Mathematics 21C . . . . .	4
		Physics 4A . . . . .	4	Physics 4B . . . . .	4
	—		—		—
	12		17		17
 <i>Sophomore Year</i>					
Engineering 35 . . . . .	3	Engineering 5A . . . . .	3	Chemistry 128A . . . . .	3
Mathematics 22C . . . . .	3	Engineering 17 . . . . .	3	Chemistry 129 . . . . .	2
Physics 4C . . . . .	4	Mathematics 22B . . . . .	3	Mathematics 22A . . . . .	3
Humanities-Social		Physics 4D . . . . .	4	Physics 4E . . . . .	4
Sciences Elective . . . . .	4	Humanities-Social		Humanities-Social	
		Sciences Elective . . . . .	4	Sciences Elective . . . . .	3
	—		—		—
	14		17		15

**LOWER DIVISION PROGRAM FOR TRANSFER STUDENTS**

A student who transfers into the College of Engineering with *less* than 84 quarter units is required to complete one of the Lower Division Programs listed above. Courses completed at another institution are evaluated on the basis of substantial equivalences.

A student who transfers with *84 or more* quarter units is required to have completed the minimum number of quarter units in the subjects specified in the following table before he is considered to have completed a Lower Division Program:

<i>Subject Areas</i>	<i>Minimum Quarter Units</i>
Mathematics (recommended: analytic geometry, calculus, differential equations, vector analysis) . . . . .	18
Physical and biological sciences (at least 10 units must be in chemistry for engineering and science students and at least 12 units in physics for engineering and science students) . . . . .	27
Engineering (lower division subjects such as graphics, properties of materials, surveying, computer programming, statics, and circuit theory. Students preparing for the Chemical Engineering curriculum at Davis may elect to take only 12 units of engineering in their lower division program) . . . . .	15
Humanities-social sciences (must be selected from a list of course groups approved by the Committee on Undergraduate Study, and must include the equivalent of English 1 and either English 3 or Rhetoric 1) . . . . .	16

† Students who have not had analytic geometry must take Mathematics 11 concurrently with Mathematics 21A.

Unspecified subjects (students preparing for the Chemical Engineering curriculum at Davis should take in their sophomore year quantitative analysis and one course in organic chemistry with laboratory) . . . . .	8
<b>Total</b>	<b>84</b>

A student who has completed the Lower Division Program on this basis is not required to take additional lower division courses, except those which are prerequisite to upper division courses in his curriculum.

The above subject requirements are minimum. Additional units must be added to these and the units listed in the respective Upper Division Program to total the minimum number of units (180 to 195) required for graduation under each curriculum.

## Upper Division Programs

### AEROSPACE ENGINEERING CURRICULUM

Minimum Units Required: 180.

Aerospace engineering is the application of scientific knowledge to flight or movement in the atmosphere. Specific objectives are the design, development, and manufacture of airplanes, V.T.O.L. aircraft, and high speed ground transports. Within this context aeronautics becomes an essential branch of mechanical engineering in which knowledge in certain areas related to transportation is strengthened. For example the aerodynamic and structural design of a high speed train and a low speed airplane have much in common. The undergraduate curriculum combines the study of basic engineering disciplines with courses in aerodynamics, propulsion, power plant structures, and control. A broad range of technical elective courses is available from which the student may select subjects of a more specialized nature.

The curriculum is organized to develop the student's ability to apply basic engineering principles in the design of engineering systems. This training is intended to prepare him for technical leadership in this rapidly changing field.

### UPPER DIVISION PROGRAM—AEROSPACE ENGINEERING

	<i>Units</i>	<i>Courses</i>
Required Subjects		
Electronic circuits . . . . .	4	Engineering 100
Applied mechanics . . . . .	15	Engineering 102A, 102B, 103A, 103B, 104A
Applied thermodynamics . . . .	6	Engineering 105A, 105B
Vehicle aerodynamics . . . . .	3	Mechanical Engineering 127
Systems . . . . .	4	Mechanical Engineering 171
Structures . . . . .	6	Engineering 104B, Civil Engineering 135
Aeronautical design . . . . .	4	Mechanical Engineering 128A, 128B

Laboratory .....	8	Mechanical Engineering 111, 126A, 126B
Mathematics .....	3	Engineering 180
Technical electives*	20	
Humanities-social sciences electives .....	15	
Unrestricted electives .....	2	
	—	
Total	90	

**Recommended Sequence of Courses**

<i>Junior Year</i>	<i>Fall</i>		<i>Winter</i>		<i>Spring</i>
Engineering 102A ..	3	Engineering 100 ....	4	Mechanical	
Engineering 103A ..	3	Engineering 102B ..	3	Engineering 111...	4
Engineering 104A ..	3	Engineering 103B ..	3	Civil Engineer-	
Engineering 105A ..	3	Engineering 104B ..	3	ing 135 .....	3
Elective .....	2	Engineering 105B ..	3	Engineering 180 ....	3
				Humanities-Social	
				Sciences Elective ..	4
	—		—		—
	14		16		14
 <i>Senior Year</i>					
Mechanical		Mechanical		Mechanical Engineer-	
Engineering 126A .	2	Engineering 126B .	2	ing 128B .....	2
Mechanical		Mechanical		Humanities-	
Engineering 127 ..	3	Engineering 128A .	2	Social Sciences	
Humanities-Social		Mechanical		Elective .....	4
Sciences Elective ..	4	Engineering 171 ..	4	Technical Electives ..	9
Technical Elective ..	7	Humanities-Social			
		Sciences Elective..	3		
		Technical Elective ..	3		
	—		—		—
	16		14		15

**AGRICULTURAL ENGINEERING CURRICULUM**

*(Accredited by Engineers' Council for Professional Development.)*

Minimum units required

(all Agricultural Engineering options except Forest Engineering, 180; Forest Engineering, 195.\*\*)

Agricultural engineers apply engineering principles to problems of food and fiber production, storage, and processing; animal and plant environment; agri-

\* At least 12 units of technical electives must be chosen from the following list: Mechanical Engineering 121, 125, 126C, 134, 135, 172, 185, 186; Engineering 190; Civil Engineering 133; Electrical Engineering 150. Other suggested technical electives: Mechanical Engineering 155; Applied Science 115, 135A, 144; Civil Engineering 131; Electrical Engineering 110A, 111A, 112A, 130A, 157A, 157B; Engineering 106, 183, 187, 188.

\*\*A ten-week summer field program offered by the School of Forestry and Conservation at the UC Forestry camp in Plumas County provides a unique opportunity to develop an understanding of the whole series of related elements which constitute a forest environment. This summer program, which should be taken between the sophomore and junior years, accounts for the 15 additional units required for the Forest Engineering option as compared with other Agricultural Engineering options.

cultural wastes management; soil and water control and conservation; and other phases of agriculture and related industries. Agricultural engineering is unique in that it requires a general understanding and appreciation of the biological, soil-management, and environmental aspects of agriculture in addition to a thorough knowledge of basic and applied engineering.

The upper division program includes fundamental engineering courses in mechanics, fluid mechanics, thermodynamics, and electronics. It also contains a substantial number of technical electives, thus permitting the student to choose courses appropriate to one of the following specializations.

### **Agricultural Processing**

This area of specialization is concerned with the transformation of raw agricultural products into different, more usable, or more valuable forms or materials. The fundamental concepts of drying, sorting, cleaning, handling, storage, size reduction, and heat and energy transfer, as well as the biological and physical characteristics of agricultural materials, are considered as factors in research, development, and design for processing systems and operations.

### **Power and Machinery**

This area of specialization is concerned with the design, development, and application of field machines and power units for soil preparation, crop production, and related activities. The economic aspects of mechanization and the effects of machines on soils and crops are considered. Procedures for developing machine components and synthesizing them into an engineering system are studied.

### **Structures and Environment**

This area of specialization is concerned with the design of agricultural structures and analysis of their functional effectiveness, efficiency of space and labor utilization, and economic value to an overall enterprise. The structure is considered as a means of providing an optimum environment for animal production, product storage and conditioning, or crop production in greenhouses. Agricultural wastes management, environment modification, and micrometeorology may also be studied.

### **Soil and Water Engineering**

This area of specialization is concerned with those aspects of soil and water that depend upon a blending of agricultural and environmental sciences with engineering. The planned development, use, and management of agricultural land and water resources involves consideration of new concepts in hydraulics, hydrology, irrigation and drainage systems, water and soil quality, and plant-soil-water relations. The Soil and Water Engineering option is administered with the cooperation of the Department of Water Science and Engineering.

### **Forest Engineering**

This area of specialization is concerned with the application of engineering principles and silviculture knowledge to the engineering aspects of the manage-

ment of forest lands for the production of wood products, with due regard for the ecological and aesthetic aspects and recreational uses of this renewable natural resource. Forest Engineers are concerned with systems and equipment for forest production and harvesting, reforestation, forest waste management, forest recreational development, soil and water control and conservation, developing forest road systems, materials handling in the forest and at the sawmill, and other phases of forestry and related industries. The Forest Engineering option is administered with the cooperation of the School of Forestry and Conservation at Berkeley.

### UPPER DIVISION PROGRAM—AGRICULTURAL ENGINEERING

*Courses Common to all Agricultural Engineering Options:*

	<i>Units</i>	<i>Courses</i>
Required Subjects		
Electronic circuits . . . . .	4	Engineering 100
Applied mechanics . . . . .	9	Engineering 102A, 103A, 104A
Applied thermodynamics . . . .	3	Engineering 105A
Design and analysis . . . . .	3	Civil Engineering 131 or Mechanical Engineering 150
Professional responsibilities . . .	3	Engineering 190
Mathematics† . . . . .	2	Mathematics 22A, 24, 130A, or Applied Science 115
Humanities-social sciences		
electives . . . . .	15	
Unrestricted electives . . . . .	2	
	—	
Total	41	

*All Agricultural Engineering Options Except Forest Engineering:*

Required Subjects		
Applied mechanics . . . . .	6	Engineering 104B; 102B or 103B
Engineering economics . . . . .	3	Engineering 106
Technical electives . . . . .	40	18 units must be selected from the courses whose numbers are in heavy type in the list of suggested technical electives. These 18 units must include at least 3 units in each of three of the four areas. In addi- tion, the technical electives must in- clude at least two courses from the list of suggested Agricultural and Biological Sciences electives, one of which must be an upper division course.
	—	
Total	90	

† The mathematics course must be three or more units if Mathematics 11 is not taken in the lower division program. It is recommended for the Forest Engineering Option that Mathematics 130A be included and be taken in the sophomore year.

**Forest Engineering Option:**

Required subjects

Silviculture .....	4
Forest regulation and planning .....	4
Forest utilization facilities ...	4
Summer field courses .....	15
Technical electives .....	37

General Forestry 125\*

General Forestry 113\*

General Forestry 103\*

General Forestry 100A\*, 100B\*,  
100C\*, 100D\*

12 units must be selected from the list of General Forestry courses and Wood Science 131 offered at the Berkeley campus. These 12 units must include General Forestry 110, 112, or 114. In addition, one course in engineering design, such as Agricultural Engineering 119, 126, or Civil Engineering 160, must be selected. Excess units of required subjects earned by taking equivalent courses at the Berkeley campus may be applied toward the total technical elective requirement.

—  
Total 105

**All Agricultural Engineering Options—Except Forest Engineering**

**Sample Sequence of Courses**

<i>Junior Year</i>	<i>Fall</i>		<i>Winter</i>		<i>Spring</i>
Engineering 102A ..	3	Engineering 100 ....	4	Engineering 102B	
Engineering 104A ..	3	Engineering 103A ..	3	or 103B .....	3
Engineering 105A ..	3	Engineering 104B ..	3	Electives** .....	12
Elective** .....	6	Elective** .....	5		
	—		—		—
	15		15		15
<i>Senior Year</i>					
Civil Engineering 131 or Mechanical En-		Engineering 106 ....	3	Engineering 190 ....	3
gineering 150 ..	3	Electives** .....	12	Electives** .....	12
Electives** .....	12		—		—
	—		15		15

**Forest Engineering Option**

**Sample Sequence of Courses**

<i>Junior Year</i>		<i>Summer</i>
General Forestry	100A* .....	5
General Forestry	100B* .....	6
General Forestry	100C* .....	4
		—
		15

\* Offered by the Berkeley campus.

\*\* The electives are to be distributed among required and elective subjects as indicated in the Upper Division Program.

	<i>Fall</i>		<i>Winter</i>		<i>Spring</i>
Electrical Engineering 100A* . . . . .	3	Civil Engineering 165A* . . . . .	3	Civil Engineering 130* . . . . .	4
General Forestry 125* . . . . .	5	General Forestry 103* . . . . .	3	Electives** . . . . .	11
Mechanical Engineering 104A* . . . . .	3	General Forestry 113* . . . . .	4		
Mechanical Engineering 105A* . . . . .	4	Electives** . . . . .	5		
	<hr style="width: 100%;"/>		<hr style="width: 100%;"/>		<hr style="width: 100%;"/>
	15		15		15
 <i>Senior Year</i>	 <i>Fall</i>		 <i>Winter</i>		 <i>Spring</i>
Civil Engineering 131 or Mechanical Engineering 150 . . . . .	3	Electives** . . . . .	15	Engineering 190 . . . . .	3
Electives** . . . . .	12			Electives** . . . . .	12
	<hr style="width: 100%;"/>		<hr style="width: 100%;"/>		<hr style="width: 100%;"/>
	15		15		15

Suggested technical electives are:

**Agricultural Processing**—Agricultural Engineering 132, 141; Applied Science 115; Chemistry 107A; Electrical Engineering 150; Engineering 105B; Food Science and Technology 111; Mathematics 105A; Mechanical Engineering 185, 186.

**Power and Machinery**—Agricultural Economics 140; Agricultural Engineering 110, 114, 116, 118, 119, 141; Applied Science 115; Engineering 105B, 184; Mathematics 105A; Mechanical Engineering 114, 115, 121.

**Soil and Water**—Applied Science 115; Civil Engineering 141, 142, 144; Soil and Water Science 2, 101; Water Science 110A, 110B, 141, 160.

**Structures and Environment**—Agricultural Engineering 107, 125, 126; Applied Science 115; Atmospheric Science 20, 123, 124; Civil Engineering 132A, 132B, 132C, 133, 134, 142, 148, 171; Mechanical Engineering 186.

**Agricultural and Biological Sciences**—Agronomy and Range Science 100; Animal Science 2; Biological Sciences 10; Botany 2; Plant Science 2, 112; Physiology 149; Soil and Water Science 2; Vegetable Crops 100, 101.

**Forest Engineering**—Agricultural Economics 176; Agricultural Engineering 107, 110, 116, 118, 119, 126; Atmospheric Science 120, 123; Civil Engineering 160, 171; Geography 161; General Forestry (Berkeley campus) 101, 102, 110, 112, 114; Mathematics 22A; Mechanical Engineering 114, 121; Resource Sciences 100; Soil and Water Science 101; Water Science 120; Wood Science 131 (Berkeley campus).

\* Offered by the Berkeley campus.

\*\* The electives are to be distributed among required and elective subjects as indicated in the Upper Division Program.

## CHEMICAL ENGINEERING CURRICULUM

*(Accredited by Engineers' Council for Professional Development.)*

Minimum units required: 183.

Chemical engineering is concerned with application of the principles of chemistry and engineering to the production of useful products. The products of the process industries range from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals and foods to synthetic plastics. Chemical engineers are increasingly concerned with chemical and engineering processes in animals and humans. Preparation for careers in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The chemical engineering curriculum has been planned to give the student a sound knowledge of engineering and chemical sciences so that he may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In the junior year, attention is focused on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy and mass transfer. In the senior year these fundamentals are drawn together and applied in process design and process dynamics. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 17 credit hours of technical electives which allow for special training in an area of particular interest. For students electing the normal chemical engineering program, 3 of the 17 credit hours would consist of Engineering 104A. It is strongly recommended that two of the additional technical elective courses in the normal program be chosen from Chemistry 111A, 129B, Applied Science 115, Mathematics 118A, 118B, 118C, 130A, 130B. For students in other areas, the 17 credit hours of technical electives may be chosen from one of the following options.

### Environment Engineering

The environment engineering option prepares the student to deal with problems of environmental quality by developing his knowledge of fundamental chemical and transport phenomena, that is, 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, along with other courses involved specifically with environmental topics, prepares the student to seek employment with industry or government. For this option the following six courses should be taken: Civil Engineering 147, 148, 149, 242, Atmospheric Science 121A, 121B.

### Premedical and Prebiomedical Engineering

This option has been specifically designed so that a student may prepare himself for graduate work in biomedical engineering or meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and their application to fluid mechanics, mass transport,



heat transfer, thermodynamics, reaction kinetics, and process dynamics, the student is unusually well prepared to understand similar problems in living systems. Many biological phenomena such as blood flow, passive solute transport, and energy exchange can be dealt with using the theoretical tools learned as an undergraduate student. The inclusion of both organic and physical chemistry in the curriculum allows the student to complete the premedical requirements and also to complete the requirements for a Bachelor of Science degree in Chemical Engineering. The following courses are recommended for this option: Biological Sciences 1, Physiology 110A, 110B, 111A, 111B, and Chemistry 129B.

### Food Process Engineering

This option is designed to prepare students for graduate work in food science and technology and to work in the food processing industry. Technical elective courses should be chosen from the following: Food Science and Technology 104, 104L, 106, 113, 130, 198; Bacteriology 2; and Biochemistry 123.

### Applied Chemistry

The chemical engineering curriculum includes an important core of chemistry courses. Students can take advantage of this background to build a strong program in chemistry by choosing electives from among the advanced undergraduate courses chosen from the following: Chemistry 111A, 121, 124, 128C, 129B, 129C, 130, 131, 150A, and 150B.

### Applied Mathematics

The mathematics specialization is designed both to strengthen the student's understanding of the foundations of engineering science and to improve his ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems. Recommended technical electives should be chosen from the following: Mathematics 24, 118A, 118B, 118C, 119, 127A, 127B, 127C, 128A, 128B, 128C, 130A, 130B, 132A, 132B, 185A, 185B, Applied Science 115, Engineering 180, and Chemical Engineering 159.

### UPPER DIVISION PROGRAM—CHEMICAL ENGINEERING

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemical	Chemical	Chemical	Chemical
Engineering 151 .. 3	Engineering 150A. 3	Engineering 150B. 3	Engineering 150B. 3
Chemistry 110A .... 3	Chemical	Chemical	Chemical
Chemistry 128B .... 3	Engineering 152A. 3	Engineering 152B. 3	Engineering 152B. 3
Engineering 102A .. 3	Chemistry 110B .... 3	Chemical	Chemical
Humanities-Social	Technical Elective .. 3	Engineering 153.. 4	Engineering 153.. 4
Sciences Elective . 4	Humanities-Social	Chemistry 110C .... 3	Chemistry 110C .... 3
	Sciences Elective . 4	Technical Elective .. 3	Technical Elective .. 3
	—	—	—
	16	16	16

*Senior Year*

Chemical Engineering 154A. 3	Chemical Engineering 154B. 3	Chemical Engineering 155B. 2
Chemical Engineer- ing 157 . . . . . 4	Chemical Engineering 155A. 2	Chemical Engineering 156B. 3
Engineering 100 . . . . 4	Chemical Engineering 156A. 3	Chemical Engineering 158. . . 3
Technical Elective .. 3	Technical Elective .. 6	Technical Elective .. 3
		Humanities-Social Sciences Elective . 4
—	—	—
14	14	15

**CIVIL ENGINEERING CURRICULUM**

(Accredited by Engineers' Council for Professional Development.)

Minimum units required: 180.

Civil engineering is devoted to the improvement of the human environment for the purposes of making human activities productive, safe, and enjoyable, and providing aesthetically pleasing surroundings. The profession contributes directly to humanity's continued health and well-being by the design of systems that provide plentiful supplies of healthful and potable water; freedom from disease-carrying wastes; land-, water-, and air-transportation; housing and other structures; flood control; and large recreational facilities. Civil engineers plan and design all or major portions of these systems that so enhance the quality of human life.

The programs in civil engineering include *civil engineering planning, environment engineering, structural engineering and mechanics, and water resources engineering*. These options are interrelated, and flexible programs are developed for individual students. Every option is designed to program educational preparation for real and significant contributions to humanity.

**Civil Engineering Planning**

The programs are directed toward planning of resources utilization and development projects and planning of community, economic, and environmental development and redevelopment programs on an urban or regional scale. Civil engineering planning requires a basic understanding of the principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. Planning implies the formulation of program objectives; development of engineering, economic, and social data constraining alternative choices; and preparation of alternative plans that include a variety of options and opportunities for reformulation as circumstances change. Students are encouraged to plan their programs early with the aid of advisers and to complement the suggested technical electives with courses in the humanities and social sciences.

### Environment Engineering

The programs are concerned with improving and maintaining the qualities of the air, land, and water environment that affect the health and well-being of man in the face of increasing population and expanding industrial activity. The program depends on a firm basic science and civil engineering foundation and emphasizes the design of waterborne, solid, and airborne waste management systems, the design of potable water-supply systems, and environment monitoring.

### Structural Engineering and Mechanics

The programs are concerned with the conception, design, and construction of structures. Structural engineering involves buildings, bridges, highways, dams, economics of the construction industry, and construction practices. Consideration is given to the response of structures not only to gravity loading but also to earthquake, wind, and blast loading. Structural mechanics emphasizes the more analytical aspects of structural engineering. Principles of structural analysis applicable to structures of all kinds, from office buildings to space vehicles, are examined. Special topics include the mechanics of deformable bodies and the theory of elasticity.

### Water Resources Engineering

The programs include Hydraulics, Irrigation and Drainage, and Water Resources Systems Design. *Hydraulics* is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures, and depends upon a strong foundation in fluid mechanics, systems analysis, and hydrology. *Irrigation and Drainage* provides a unique program aimed at the solution of water-oriented agricultural problems by emphasizing the application of hydrologic sciences, hydraulic engineering, agricultural sciences, and systems analysis to the design and operation of irrigation and drainage projects. Special topics include study of water-soil-plant relations, water rights, land preparation and water application, water quality, and soil and water pollution. *Water Resources Systems 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 and wastes of industry, agriculture, recreation, and other activities. The program may include elective courses in the geography, economics, and politics of water resources.

### UPPER DIVISION PROGRAM—CIVIL ENGINEERING

	<i>Units</i>	<i>Courses</i>
Required Subjects		
Electronic circuits . . . . .	4	Engineering 100
Applied mechanics . . . . .	9	Engineering 102A, 103A, 104A
Applied thermodynamics . . . .	3	Engineering 105A or Chemistry 110A
Structures . . . . .	6	Engineering 104B; Civil Engineering

Soil mechanics . . . . .	5	Civil Engineering 171, 172
Water supply and pollution control . . . . .	9	Engineering 103B; Civil Engineering 142, 148
Civil engineering design . . . .	6	Civil Engineering 132B; Civil Engineering 132A or 145
Economics . . . . .	3	Engineering 106 or Agricultural Eco- nomics 148
Technical electives . . . . .	21	12 units must be selected from Engi- neering courses
Humanities-social sciences electives . . . . .	15	
Mathematics electives . . . . .	5	Selected from Mathematics 22A, 24, 128A, 128B, 128C, 130A, 130B, 131A, 131B, Applied Science 115 or Engineering 180.
Unrestricted electives . . . . .	4	
	—	
Total	90	

Sample Sequence of Courses\*

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 100 . . . .	4	Engineering 103A . . .	3
Engineering 102A . .	3	Engineering 104B . . .	3
Engineering 104A . .	3	Engineering 105A . . .	3
Elective** . . . . .	5	Elective** . . . . .	6
	—		
	15	15	15
 <i>Senior Year</i>			
Civil		Civil	Electives** . . . . .
Engineering 142 . . .	3	Engineering 132A . . .	3
Civil		Civil	
Engineering 172 . . .	2	Engineering 148 . . .	3
Electives** . . . . .	10	Engineering 106 . . . .	3
		Elective** . . . . .	6
	—		
	15	15	15

\* Study list arrangements are governed only by course prerequisites and the schedule of quarters in which a given course is offered. The arrangement of courses in this sample program satisfies both criteria, and lists the courses in what is probably the easiest order academically. Other course sequences are possible.

\*\* The 46 units of electives are to be distributed among technical, mathematics, and humanities-social sciences electives as indicated in the Upper Division Program.

**Suggested Technical Electives:**

Because of the direct concern of professional civil engineering for the quality of human life, civil engineering majors are encouraged to include courses such as Economics 125A, 125B, 130A, and 130B, Environmental Planning and Management 110, and Political Science 108, 109A, 109B, and 186 among their technical electives. Other technical electives of possible interest to majors in all four of the programs include Applied Science 115, Engineering 180, Mechanical Engineering 175, and Sociology 141 and 170. Additional suggested courses for students in each of the options are as follows:

*Civil Engineering Planning:* Agricultural Economics 148, 155; Civil Engineering 137, 143, 160; Economics 125, 130A, 130B; Engineering 106; Geography 106; Mathematics 130A, 130B; Environmental Planning and Management 110; Political Science 181; Sociology 170; Water Science 150.

*Environment Engineering:* Applied Science 115; Atmospheric Science 120, 121A, 121B, 122, 123; Bacteriology 2; Biochemistry 101A, 101B; Chemical Engineering 154A, 154B, 156A, 156B; Chemistry 8A, 110A, 110B; Civil Engineering 145, 146, 147, 149; Mechanical Engineering 175, 185; Water Science 120.

*Structural Engineering and Mechanics:* Agricultural Engineering 125, 126; Civil Engineering 132C, 133, 134, 135, 137, 138, 160, 173, 174; Engineering 122, 183, 184, 187, 188; Mathematics 185A, 185B.

*Water Resources Engineering:* Chemistry 5; Civil Engineering 141, 143, 144, 145, 146; Electrical Engineering 112A, 150; Mechanical Engineering 185; Soil and Water Science 103; Water Science 10, 110A, 116, 141, 150, 160.

**ELECTRICAL ENGINEERING CURRICULUM**

*(Accredited by Engineers' Council for Professional Development.)*

Minimum units required: 180.

Present-day electrical engineering embraces a broad spectrum of disciplines based upon the physical and mathematical sciences. Electrical engineering encompasses such diversified fields as automation and control, information processing and computers, micro-miniaturization of circuits and components, instrumentation, communications and microwaves, and stimulated energy emission by means of quantum effects (masers and lasers). Work in these fields is being applied to medicine, communications, transportation, education, and business.

The variety of course offerings in the department permits the student to prepare himself for graduate study in electrical engineering, or for a career as a practicing engineer. In the electrical engineering curriculum close correlation between theory and experiment is emphasized.

The course of study in electrical engineering allows the student maximum flexibility to pursue studies in a special technical area of his choice or in a wide range of topics. Required courses insure his attainment of a broad background in basic electrical engineering. The engineering core courses for the lower division provide a strong foundation for the specialized topics to follow. In addi-

tion, a specified group of upper division courses in electromagnetic field theory, systems, and solid-state electronics prepares the student for the technical electives of his choice.

Technical electives are a substantial part of the upper division curricula and may be used to develop a specialty within the program. They may be selected from a wide range of courses in electrical engineering, other engineering fields, mathematics, and the physical and biological sciences. Typical fields of specialization are biomedical engineering, computer science, high-frequency phenomena and devices, information and control, solid-state devices and physical electronics, and systems and circuits.

### **Biomedical Engineering**

Biomedical engineering is a rapidly growing field which applies engineering concepts to the measurement of biological systems, the processing of biological data, and the description or modeling of biological processes. The field encompasses the design and operation of instruments used in biology and medicine.

### **Computer Science**

Computer science deals with the design, application, and theory of computing machines. Specific areas such as switching theory, theory of automata, programming languages, artificial intelligence, and sequential machines are all part of the increasingly important field of computer science.

### **High-Frequency Phenomena and Devices**

High-frequency phenomena and devices deals with the study of the generation and transmission of high-frequency electromagnetic waves and the interaction of these waves with matter, including the design of useful devices based on these interactions.

### **Information and Control**

Information and control is concerned with the transfer and processing of information, and the use of information to control processes. An understanding of the transfer of information is basic to modern communication such as radio, radar, television, and data communications such as deep space telemetry. The principles of control underlie industrial automation and the control of vehicles.

### **Solid-State Devices and Physical Electronics**

Solid-state devices and physical electronics is the study of electrons in the presence of electric and magnetic fields and of quantum electronic effects. Among the devices included are transistors, diodes, vacuum tubes, lasers, masers, and traveling wave tubes.

### **Systems and Circuits**

Systems and circuits encompass a large body of engineering knowledge. A study of systems includes engineering as well as nonengineering systems such as sociological and economic systems. Circuit theory is the systematic analysis of the properties of electric networks.

**UPPER DIVISION PROGRAM—ELECTRICAL ENGINEERING**

*Courses Common to all Electrical Engineering Options:*

	<i>Units</i>	<i>Courses</i>
<b>Required Subjects</b>		
Electronic circuits and systems .....	12	Engineering 100, Electrical Engineering 110A, 110B, 111A
Applied mechanics .....	3	Engineering 102A
Applied thermodynamics ....	3	Engineering 105A
Electromagnetics .....	3	Electrical Engineering 130A
Linear systems .....	6	Electrical Engineering 112A, 112B
Physical electronics .....	6	Electrical Engineering 140A, 140B
Mathematics .....	3	Mathematics 22A*
Professional responsibilities ...	3	Engineering 190
	—	
Total	39	

*All Electrical Engineering Options (Except Computer Science):*

	<i>Units</i>	<i>Courses</i>
<b>Required Subjects</b>		
Electronic circuits and systems .....	2	Electrical Engineering 111B
Electromagnetics .....	3	Electrical Engineering 130B
Technical electives† .....	29	
Humanities-social sciences electives .....	15	
Unrestricted elective .....	2	
	—	
Total	90	

*Computer Science Option:*

<b>Required Subjects</b>		
Switching theory .....	3	Electrical Engineering 172
Computer organization .....	3	Electrical Engineering 174
Programming .....	3	Choice of Electrical Engineering 176, 177, Applied Science 115, Mathematics 129A, or 129B
Technical electives† .....	25	
Humanities-social sciences electives .....	15	
Unrestricted elective .....	2	
	—	
Total	90	

\*Students who have taken Mathematics 22A to satisfy the natural sciences elective requirement for the Lower Division Program must substitute a 3-unit mathematics course of their choice.

† The technical electives must include the following: 1) 3 units of an upper division mathematics or physics course; 2) one of the technical elective courses taken in the student's last 3 quarters must include work in an electrical laboratory.

The upper division program consists of required courses and elective courses. The required courses are coordinated sequences of courses that form the basis of all branches of electrical engineering. These courses are taken as early as possible, in order to prepare the student for technical elective courses in his area of interest. A typical upper division program, showing a suitable ordering of the required courses, is shown below.

## Sample Sequence of Courses

<i>Junior Year</i>		<i>Fall</i>	<i>Winter</i>		<i>Spring</i>
Engineering 100 . . . .	4	Engineering 102A . . .	3	Electrical	
Engineering 105A . . .	3	Electrical		Engineering 112B . .	3
Electrical		Engineering 112A . .	3	Electrical	
Engineering 130A . . .	3	Electrical Engi-		Engineering 140B . .	3
Mathematics 22A* . . .	3	neering 130B** . .	3	Elective . . . . .	9
Elective** . . . . .	2	Electrical			
		Engineering 140A . .	3		
		Elective . . . . .	3		
	—		—		—
	15		15		15
<i>Senior Year</i>					
Electrical		Electrical		Engineering 190 . . . .	3
Engineering 110A . . .	3	Engineering 110B . .	3	Elective . . . . .	12
Electrical		Electrical Engi-			
Engineering 111A . . .	2	neering 111B** . .	2		
Elective . . . . .	10	Elective . . . . .	10		
	—		—		—
	15		15		15

There are three kinds of electives in the Electrical Engineering curriculum: technical electives, humanities or social sciences electives, and unrestricted electives. Twenty-nine units of technical electives may be selected with the counsel of the faculty adviser from upper division courses in engineering, physics, and mathematics to suit the student's interests or career objectives. Other courses which are also acceptable as technical electives are indicated below. The choice of technical electives must include at least three units of upper division physics or mathematics. In addition, one of the technical elective courses taken in the student's last three quarters must include work in an electrical laboratory. This requirement can be satisfied by enrolling in a course consisting entirely of laboratory work, a course which combines lectures and laboratory, or an appropriate experimental individual study project under faculty supervision. The department has facilities for laboratory work in a large number of specialties.

\* Students who have taken Mathematics 22A to satisfy the natural sciences elective requirement for the Lower Division Program must substitute a 3-unit mathematics course of their choice.

\*\* A student in the computer science option takes Electrical Engineering 172 in the fall quarter of the junior year, and takes Electrical Engineering 174 and a choice of Applied Science 115, Electrical Engineering 176, or Mathematics 129A-129B in place of Electrical Engineering 111B and 130B.



**Suggested Technical Electives:**

Upper division courses in engineering, chemistry, mathematics, physics, and the biological sciences are in general acceptable as technical electives. The student is *strongly encouraged* to review his program of technical electives with his adviser to insure that it will meet his educational objectives. The technical elective offerings corresponding to the major options of electrical engineering are given in the following list. A student may sample a number of these areas, or he may prefer to specialize.

*Biomedical Engineering:* Chemistry 5, 8A, 8B, 107A, 107B; Physiological Sciences 101A, 101B; Biological Sciences 1; Zoology 2, 121; Physiology 101, 110A, 110B, 111A, 111B; Physical Education 104A, 104B; Human Physiology 151; Engineering 103A, 103B; Electrical Engineering 150, 157A, 157B, 182, 184.

*Computer Science:* Mathematics 108A, 125, 128A, 128B, 128C, 129A, 129B, 131A, 131B, 131C, 168; Applied Science 115; Electrical Engineering 173, 175, 176, 177; Education 155; Human Physiology 151; Economics 103.

*High-Frequency Phenomena and Devices:* Mathematics 185A, 185B; Applied Science 115; Electrical Engineering 131A, 131B, 131C, 133, 145A, 145B, 145C; Physics 104A, 104B.

*Information and Control:* Mathematics 131A, 131B, 131C, 151A, 151B, 151C, 185A, 185B; Applied Science 115; Electrical Engineering 157A, 157B, 172, 174, 182, 184.

*Solid-State Devices and Physical Electronics:* Mathematics 185A, 185B; Applied Science 115; Engineering 130, 142, 188; Electrical Engineering 131A, 131B, 131C, 145A, 145B, 145C, 176; Physics 104A, 104B.

*Systems and Circuits:* Applied Science 115; Mathematics 127A, 127B, 127C, 128A, 128B, 128C, 185A, 185B; Electrical Engineering 116, 117, 157A, 157B, 182; Physics 104A, 104B.

**MATERIALS SCIENCE AND ENGINEERING CURRICULUM**

Minimum units required: 180.

Materials engineering is directed towards an understanding of the structure, properties and behavior of materials, including bio-materials. The demand for materials for high-speed transportation systems, for surgical and dental implants, for new generation of power plants where components are subjected to radiation and elevated temperatures, for solid-state electronic devices in computer and communication technology, etc., has broadened the search for new and improved materials with capabilities well beyond those attainable with common metals, alloys, and ceramics. The development of these new materials and understanding of materials presently in use demand a thorough knowledge of the basic engineering and scientific principles such as crystal structure and diffrac-

tion, elastic and plastic behavior, thermodynamics, phase relationship and reaction rates, and physical and chemical behavior of engineering materials.

The undergraduate program provides the materials engineer with the background for activities in research, processing, and utilization of materials and also provides preparation for graduate work in materials science. The services of materials engineers are required in a diverse array of engineering operations, e.g., from the impact and fracture behavior of automobiles to fatigue behavior of aircraft frames, from creep and corrosion behavior in petrochemical refineries to radiation induced damage in nuclear power plants, and from the manufacturing and fabrication of steel and other basic structural materials to the doping of semiconductors to obtain optimum electrical response. Materials engineers are also increasingly involved in the search for bio-materials and in the solution of pollution problems resulting from metallurgical smelting practices.

The curriculum is based on a common core of courses basic to engineering, taken during the first two years, which provides a strong foundation in the basic and unifying concepts in engineering. The third and fourth years are devoted to the further study of fundamental subjects and the introduction of specific materials courses, which provide a broad base in materials science and prepare the student for the technical electives of his choice. These technical electives form a very significant part of the program and can be used to emphasize specific areas such as mechanical metallurgy, electronic materials, design and processing, ceramic and high temperature materials, automatic control, environmental engineering, bio-materials, computational methods, etc. These electives can be chosen from a wide range of courses in mechanical engineering, other engineering disciplines, mathematics, geology, physics, chemistry, and biological sciences.

#### UPPER DIVISION PROGRAM—MATERIALS SCIENCE AND ENGINEERING

Required Subjects	Units	Courses
Electronic circuits . . . . .	4	Engineering 100
Applied mechanics . . . . .	9	Engineering 102A, 103A, 104A
Applied thermodynamics . . . .	7	Engineering 105A, 130
Materials in design . . . . .	4	Engineering 140
Materials science . . . . .	7	Engineering 142, 188
Controls and systems analysis .	4	Mechanical Engineering 171
Laboratory . . . . .	4	Mechanical Engineering 123A, 123B
Applied mathematics . . . . .	9	Engineering 180, Physics 104A, 104B
Technical electives . . . . .	25	
Humanities-social sciences electives . . . . .	15	
Unrestricted electives . . . . .	2	
	Total	90

## Recommended Sequence of Courses

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 102A .. 3		Engineering 100 .... 4	Engineering 140 .... 4
Engineering 104A .. 3		Engineering 130 .... 4	Engineering 180 .... 3
Engineering 105A .. 3		Technical Elective .. 7	Humanities-
Technical Elective .. 3			Social Sciences
Elective ..... 2			Elective ..... 4
	—	—	—
	14	15	14
 <i>Senior Year</i>			
Engineering 103A .. 3		Mechanical Engineer-	Engineering 188 .... 4
Engineering 142 .... 3		ing 123A ..... 2	Mechanical
Physics 104A ..... 3		Mechanical	Engineering 123B . 2
Technical Elective .. 3		Engineering 171 .. 4	Technical Elective .. 6
Humanities-Social		Physics 104B ..... 3	Humanities-Social
Sciences Elective .. 4		Technical Elective .. 3	Sciences Elective .. 3
		Humanities-Social	
		Sciences Elective .. 4	
	—	—	—
	16	16	15

## Suggested Technical Electives:

Twenty-five units of technical electives may be selected in order to complete the undergraduate materials science and engineering program. By the selection of appropriate technical electives and humanities and social science electives, a student may orient his program to suit his interests and also his career objectives, i.e., production and development, applied research, basic research, teaching, management, etc. Upper division courses in engineering, chemistry, physics, mathematics, and biological sciences are in general acceptable as technical electives. However, to insure that his educational objectives will be met, the student is strongly encouraged to select his technical electives only after reviewing his program with his adviser. The following technical elective courses and the suggested areas of specialization are guidelines to assist the student and his adviser in the preparation of study lists. A student may elect to take courses from a number of these areas or he may wish to specialize.

*Electronic materials:* Electrical Engineering 130A, 140A, 140B, 145A, 145B, 145C; Physics 121.

*Materials design and processing:* Engineering 104B, 106, 180, 183, 184, 187; Mechanical Engineering 111, 115, 121, 150, 151, 155; Civil Engineering 137.

*Automatic control and systems analysis:* Mechanical Engineering 155, 171, 172; Electrical Engineering 150, 157A, 157B, 182.

*Physics of solids:* Physics 115A, 115B, 140A, 140B; Electrical Engineering 145A, 145B, 145C.

*Environmental engineering:* Mechanical Engineering 175; Atmospheric Science 120, 122, 123; Biochemistry 101A, 101B; Water Science 120; Chemistry 8A; Civil Engineering 149.

*Chemical corrosion:* Chemistry 110A, 110B, 110C, or 107A, 107B; Chemical Engineering 151, 152A, 152B.

*Heat transfer:* Engineering 105B; Mechanical Engineering 186; Chemical Engineering 150A, 153.

*Biomedical engineering:* Chemistry 107A, 107B; Biological Sciences 1; Zoology 2; Physiology 110A, 110B, 111A, 111B; Electrical Engineering 150; Human Physiology 151; Physical Education 104A, 104B; Mechanical Engineering 175.

*Computers:* Applied Science 115; Electrical Engineering 173, 175, 176, 177; Mathematics 129A, 129B, 130A, 133, 168.

## MECHANICAL ENGINEERING CURRICULUM

(Accredited by Engineers' Council for Professional Development.)

Minimum units required: 181.

The modern mechanical engineer uses basic science in the design and manufacture of complex engineering systems. This requires the application of physical and mechanical principles in the development of machines, energy conversion systems, materials, and equipment for guidance and control. Preparation for this 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. The third year is spent in further study of fundamental courses, and in the fourth year the student may tailor his studies to his own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, or materials science. With the range of electives available, the student can prepare himself for graduate study in mechanical engineering, or obtain a broad background for entering engineering practice at the bachelor's level.

## UPPER DIVISION PROGRAM—MECHANICAL ENGINEERING

	<i>Units</i>	<i>Courses</i>
Required Subjects		
Electronic circuits . . . . .	4	Engineering 100
Applied mechanics . . . . .	12	Engineering 102A, 102B, 104A, 104B
Applied thermodynamics . . . .	6	Engineering 105A, 105B
Fluid mechanics . . . . .	6	Engineering 103A, 103B
Mechanical design . . . . .	6	Mechanical Engineering 121, 150
Controls and systems analysis .	4	Mechanical Engineering 171
Laboratory . . . . .	8	Mechanical Engineering 111, 123A, 123B
Professional responsibilities . . .	3	Engineering 190
Applied mathematics . . . . .	3	Engineering 180

Technical electives .....	22
Humanities-social sciences electives .....	15
Unrestricted electives .....	2
	—
Total	91

**Recommended Sequence of Courses**

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 102A ..	3	Engineering 100 ....	4
Engineering 103A ..	3	Engineering 102B ..	3
Engineering 104A ..	3	Engineering 103B ..	3
Engineering 105A ..	3	Engineering 104B ..	3
Elective .....	2	Engineering 105B ..	3
	—		—
	14	16	14
<i>Senior Year</i>			
Mechanical Engineering 150 ..	3	Engineering 190 ....	3
Mechanical Engineering 171 ..	4	Mechanical Engineering 123A. .	2
Technical Electives ..	9	Humanities-Social Sciences Elective ..	4
	—	Technical Electives .	6
	16		15
	—		16

The electives are to be distributed among technical, humanities-social sciences, and unrestricted electives as indicated in the Upper Division Program.

Current areas of interest in mechanical engineering are outlined in the following options. Each includes a suggested list of electives from which a student interested in a particular option can select.

**System Dynamics and Control Option**

Modern engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without consideration of the overall system in which they will be used. This option is concerned with the modeling, analysis and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on physical systems from the domains of the engineering sciences represented in mechanical engineering, but the techniques for studying systems apply equally well to social, economic, and other dynamic systems.

Suggested technical electives: Engineering 122, 180; Mechanical Engineering 171, 172, 185, 186; Electrical Engineering 112A, 112B.

### **Creative Design Option**

The creation of new products, processes, or systems which are mechanical in nature is the primary goal of a professional mechanical engineer. A designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to organize and solve a variety of problems.

Suggested technical electives: Mechanical Engineering 114, 115, 128A, 128B, 151, 155, 172, 175, 185, 186; Applied Science 115; Civil Engineering 131, 135; Engineering 122, 140, 180, 183, 184, 187; Agricultural Engineering 118.

### **Sociotechnological Systems Option**

The objective of this option is to provide the student with the background necessary for developing mathematical models of man's impact on his environment. Geophysical, living systems, and social environments are the subjects of study. It is expected that the student will become a competent specialist in general system analysis while gaining breadth in ecology and social system analysis. Examples of specific topics of study are: 1) generation, transport, and effects of pollution; 2) interspecies and intraspecies conflict and cooperation; 3) urban dynamics.

Suggested technical electives: Mechanical Engineering 171, 172, 175, 185, 186; Civil Engineering 147, 149; Electrical Engineering 112A, 112B, 184; Environmental Studies 140; Zoology 116, 155.

### **Power, Propulsion, and Pollution Option**

This option is specifically designed for students who would like to work in the fields of electric power generation, propulsion for transportation, and energy conversion, where the impact of potential pollution on the environment is assuming increasing importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics, and heat transfer with applications to such diverse components as combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generators and so forth.

Suggested technical electives: Mechanical Engineering 125, 135, 137, 171, 175, 185, 186; Applied Science 115, 135A, 144; Electrical Engineering 130A, 130B; Engineering 180.

### **INDIVIDUAL ENGINEERING MAJOR**

Minimum units required: 180.

Any student who has a definite career objective that is not compatible with one of the named curricula may, with the help of his adviser, propose an Individual Engineering Major. The student, on approval of his adviser, must submit his complete program of study, including a statement of objectives, to the Undergraduate Study Committee of the College of Engineering for final approval. A student must enter this program at least three quarters before his anticipated graduation date, preferably no later than the second quarter of his

junior year. Such a program must include at least the following minimum number of quarter units in the specified subject areas:

<i>Subject Areas</i>	<i>Minimum Quarter Units</i>
Mathematics . . . . .	18
Physical and biological sciences (including at least 12 units of physics and 10 units of chemistry for engineering and science students) . . . . .	27
Analytic mechanics and strength of materials . . . . .	6
Applied thermodynamics . . . . .	3
Applied electricity and magnetism . . . . .	5
Properties of materials . . . . .	4
Engineering design . . . . .	5
Humanities-social sciences . . . . .	31

### **Graduate Study**

The Departments of Agricultural Engineering, Applied Science (Davis-Livermore), Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering offer courses of study leading to the degrees of Master of Science and Doctor of Philosophy. These programs are particularly appropriate for those wishing to prepare themselves for careers in teaching, research or analytical design. Professional programs emphasizing design and leading to the degrees of Master of Engineering and Doctor of Engineering are offered by the Departments of Agricultural Engineering, Civil Engineering, and Mechanical Engineering.

At both master's and doctoral levels, the student plans his course of study with the help of an adviser or guidance committee. He is permitted wide latitude in the selection of courses and thesis subjects so long as his program is purposeful and well-integrated.

The graduate courses offered in the College of Engineering are described in the departmental listings (pages 254-278).

General information on graduate study may be found in the *Announcement of the Graduate Division* which can be obtained by writing to the Dean of the Graduate Division. Detailed information on graduate engineering programs is contained in the bulletin *Graduate Study in Engineering* which can be obtained from the Associate Dean, Graduate Studies, College of Engineering. Students interested in programs in Applied Science should request a copy of the *Announcement of the Department of Applied Science* from the Department of Applied Science.

## COLLEGE OF LETTERS AND SCIENCE

The College of Letters and Science offers curricula that enable the student to pursue fundamental knowledge primarily for its own sake and to learn basic intellectual disciplines. Programs of study in the College expose the student to man's social, aesthetic, and material achievements, as well as to the challenge of his ethical, political, and physical environment. In many cases the pursuit of cultural truths will also lead the student to an appreciation of the individual's capacity for unique creative expression. Such a liberal education has increasing vocational value, since more and more career opportunities presuppose a basic letters and science degree; nevertheless, the main emphasis in the College rests on the ends of living rather than on the means. A well-balanced liberal education, including specialized knowledge in his major field, prepares the graduate for a satisfying life whatever his career.

Graduation from the College of Letters and Science presupposes fulfillment of the general University requirements. In addition, to achieve its educational objectives, the College has established certain specific standards relating to scholarship, senior residence, and unit distribution within the student's program of study. The two most important standards determining the unit-distribution pattern are those which relate to the Breadth Requirements, and to the Departmental Major Requirement. The *Breadth Requirements* are designed to provide a broad background of knowledge and to promote awareness of the variety of interdependencies of knowledge. The *Major Requirement* enables the student to gain intellectual depth and competence in his chosen field of specialization. Requirements of the major program are determined and administered by the separate departments, or, in the case of interdepartmental or individual majors, by an interdepartmental committee or group.

The College offers the undergraduate degrees of Bachelor of Arts and Bachelor of Science. These degrees are conferred upon completion of the University, College, and major requirements, detailed on the succeeding pages. **Every student is responsible for seeing that he meets these requirements for graduation.**

The study program or unit load may be easily changed within the established deadlines. Changes after the deadline must be justified to the satisfaction of the Dean of the College. In all cases, however, the student has the sole responsibility for initiating these changes by contacting his instructor and the Dean of the College. The student also has the full responsibility throughout the academic term to apprise himself of the quality of his performance by means of consultation with his instructors during their designated office hours.

The specific subject requirements for the bachelor's degree may be satisfied only by:

1. U.C. courses taken in regular or summer session periods.
2. Courses for which transfer credit is granted from another college or university.
3. Regular U.C. courses taken on a concurrent enrollment basis through University Extension.
4. Note: Subject to prior written approval, the Dean of the College may permit



students in residence to enroll in University Extension courses. A maximum of 9 units may be taken for elective credit only. Such units and courses cannot be applied to fulfillment of the breadth, foreign language, upper division or senior residence requirements of the college. No grade points are assigned for courses completed in University Extension.

**University Requirements**

All candidates for the bachelor's degree are obligated to satisfy the University requirements (pages 33-35) in regard to:

- Subject A
- American History and Institutions
- Scholarship
- Residence (for additional College stipulations, see page 142)
- Policies governing maximum unit credit from community colleges (see page 19)
- Application for Degree Candidacy (see filing deadlines, page 7)

**College of Letters and Science Requirements**

**BREADTH REQUIREMENTS**

A. *English Reading and Composition Requirement, A.B. and B.S. degrees:*  
Satisfied by passing an essay examination in English composition. The examination, administered at announced intervals, should be taken during the final quarter of the sophomore year or as soon as possible thereafter.

Prerequisite: Subject A.

B. *Foreign Language* (for details of this requirement, see page 147).

<p><i>A.B. degree:</i> 12 units or the equivalent in one language.</p>	<p><i>B.S. degree:</i> none (some major programs have specific language requirements, however).</p>
--	---

C. *Area Requirements* (see page 149 for classification of courses).

<i>A.B. degree</i>	<i>Units</i>	<i>B.S. degree:</i>	<i>Units</i>
Humanities	} . . . . . 52	Natural Sciences . . . . .	90
Natural Sciences		Humanities	} . . . . . 20
Social Sciences		Social Sciences	
(A minimum of 12 units and a maximum of 20 units in any one area, e.g., 20-20-12; 20-18-14; 20-16-16)		(A total of 20 units in either area or in combination)	
			110

**UNIT DISTRIBUTION REQUIREMENTS**

Satisfactory completion of a minimum of 180 units is required for graduation. (A minimum of 75 units must be completed in institutions beyond the junior college level.)

A. At least 150 units must be completed in courses given by teaching departments in the College of Letters and Science (page 150) or included on a list of selected courses offered by other Colleges and Schools. (This list is available in the Dean's Office.)

- B. Of the 150 units in A above, at least 54 units must be in upper division course work (courses numbered 100-199). For the A.B. degree, a minimum of 12 of the 54 required upper division units must be outside the major department (not applicable to interdepartmental or individual majors).**
- C. A combined total of 30 units may be offered toward the bachelor's degree from the following categories:
1. Units other than those offered by teaching departments in the College of Letters and Science (see page 150), and other than on the approved list of selected courses.
  2. All military science courses.
  3. Physical Education 5 and not more than 6 units in Physical Education 1.
  4. Not more than 9 units in 300-400 series courses.
  5. Not more than 9 units in University Extension courses.
- D. Total degree credit in *special study courses* (99 and 199) may not exceed 5 units in any one quarter, with the exception of those students whose programs have been approved by the Independent Studies Board (see page 179). A student is eligible to take the upper division courses, 194H and 199, for credit only after he has accumulated 84 units.

### **SCHOLARSHIP REQUIREMENTS**

In addition to the general University requirement of a C average (2.0) for all University work, the College stipulates separate University averages of at least C for 1) all courses required for the major and 2) all upper division courses required for the major.

At the option of the department or interdepartmental committee administering the major, students failing to meet the above conditions may be denied the privilege of pursuing that major.

### **PROBATION AND DISQUALIFICATION**

(See page 31.)

### **READMISSION AFTER DISQUALIFICATION**

Disqualified students should contact the Dean of the College well in advance concerning the requirements to be met before their readmission can be considered. Ordinarily, an agreement involving improved performance in a University of California Summer Session is mandatory.

### **PASSED OR NO RECORD OPTION**

The intent of this option is to encourage exploration by alleviating grading pressures in areas in which a student has little or no previous experience. New students and continuing students in good standing (not on probation or subject to academic disqualification) who are registered for at least 12 units, may take any one course each quarter on a Passed or No Record basis. A part-time student in good standing wishing to take a course on this basis must consult with the Dean's Office. More than one Passed or No Record course may be taken each

quarter if a student has accumulated unused options. There is one option for each quarter completed on the Davis campus while in good standing.

P grades are awarded for work otherwise qualifying for A, B, or C grades (C is the lowest passing grade for which a P can be awarded). Passed units are counted toward the degree, but neither a P grade nor a No Record affects a student's grade-point average. The unit value of a P grade is included in the *total units completed* on the transcript; it is not reflected in the *units attempted* column, the figure used for computing the grade-point average. No Record grades are not recorded on the transcript.

**Passed or No Record Enrollment Procedure:** Passed or No Record petitions are available in the Dean's Office, 150 Mrak Hall, between the dates listed below and must be filed in person. No signature other than the student's is required on the petition.

A student may change his enrollment in a particular course from the letter grade basis to the Passed or No Record option up to the end of the fifth week of each quarter. After the fifth week of classes, approval to elect or reverse the option is rarely given.

Some courses are graded upon completion of a two or three-quarter sequence (In-Progress grading). If electing the Passed or No Record option in this instance, the student files a petition only in the final quarter of the sequence.

**File petitions in the Dean's Office between the following dates.**

Fall quarter 1972: October 23 through October 27

Winter quarter 1973: February 1 through February 7

Spring quarter 1973: April 27 through May 4

Graduating seniors as well as any other student planning to undertake graduate or professional studies should consult an adviser before enrolling on a Passed/No Record basis in a course required in the major program.

Some courses are authorized to be given on a Passed/Not Passed basis only and are identified as such in course descriptions. These courses may be taken simultaneously with the courses for which a student exercises his Passed/No Record option. An NP is recorded on the transcript for courses which would otherwise be graded D or F. The Passed or No Record grading option may not be used when a course is to be graded on the Passed or Not Passed only basis.

## **RESIDENCE REQUIREMENT**

All candidates for the bachelor's degree must complete 35 of the final 45 quarter units in residence in the College of Letters and Science. While up to ten of the final 45 quarter units may thus be credited from another college in the University or from another accredited institution, any student planning to take senior-year work elsewhere should secure the approval of the Dean and his major department before undertaking such work. He should realize that a delay in granting the degree may result, since credit is not allowed until an official transcript is received from the institution attended.

Students entering the College in advanced standing from another institution or from another college or school within the University, must complete 35 units

of which at least 27 quarter units must be in upper division courses offered by departments in Letters and Science, including at least 18 units in the major program.

Three terms is the minimum residence at the University. Each Summer Session period may be used in satisfaction of one half a term of residence.

Students enrolled in the Education Abroad Program (junior year abroad) may not apply more than 55 units taken abroad towards the unit requirement for the degree and, following study abroad, must return and complete 12 units in residence in the College of Letters and Science.

### REQUIREMENTS IN THE MAJOR

The number of upper division units a student must complete in the subject of his major varies among departments, the requirement ranging from 36 to 45 units. Major programs are designed by the faculty of the College to insure that all students pursuing the same major will acquire certain knowledge in common. In addition, advanced students are encouraged to engage in independent study within the major.

A student must declare his major program by the time he has completed 84 units, but he may designate his preference at the end of his freshman year.

A student may change from one major to another with the approval of the Dean of the College and with the consent of the department or committee in charge of the new major. Petitions for Change or Declaration of Major are available in the offices of departments administering respective major programs. Office locations are printed in the *Class Schedule*. After the beginning of the senior year, a student may not transfer from one major program to another, or from B.S. to A.B. (or vice versa).

Three types of programs satisfy requirements for the major: departmental, interdepartmental, and individual major programs.

**A. Departmental Majors.** The requirements for departmental major programs are described in detail under departmental listings. Major programs leading to a Bachelor of Arts degree are offered in the following departments; those departments also offering programs leading to a Bachelor of Science degree are indicated by an asterisk (\*):

Anthropology*	Geography	Philosophy
Art History	Geology*	Physical Education
Art Studio	German	Physics*
Bacteriology*	Greek	Political Science
Botany*	History	Psychology*
Chemistry*	Italian	Rhetoric
Dramatic Art	Latin	Russian
Economics	Mathematics*	Sociology
English	Music	Spanish
French	Oriental Languages	Zoology*

A Bachelor of Science degree is offered in Biochemistry (see page 72), Genetics (see page 87), Physiology (see page 90).

**B. Interdepartmental Majors.** These programs are intended for students interested in broader scope than that provided by a departmental major. Interdepartmental major programs leading to a Bachelor of Arts degree are offered in:

- Afro-American (Black) Studies (see page 182)
- American Studies (see page 190)
- Biological Sciences (see page 215)
- Comparative Literature (see page 235)
- East Asian Studies (see page 244)
- International Relations (see page 335)
- Liberal Arts (see page 344)
- Linguistics (see page 345)
- Physical Sciences (see page 389)
- Religious Studies (see page 415)
- Russian Literature and History (see page 422)

The Biological Sciences and the Physical Sciences programs can also lead to a Bachelor of Science degree.

**C. Individual Majors.** The individual major is a program organized by the student himself in consultation with a dean in the College and/or faculty advisers who are expert in the requisite fields of interest. The individual major permits students to pursue a specific academic interest which, for sound academic reasons, cannot be accommodated within the framework of an existing major program. Involving two or more departments, this major may consist of not fewer than 45 nor more than 54 upper division units selected predominantly from Letters and Science teaching departments.

A student who wishes to undertake an individual major should request the appropriate forms, which include detailed instructions, from the Dean's Office, 150 Mrak Hall.

After the final proposal has been prepared with the assistance of advisers of the student's choice, it is submitted with faculty letters of recommendation to the Dean's Office. The proposal is reviewed and forwarded to the Faculty Committee on Individual Majors for evaluation and final action.

A student may not elect an individual major after the beginning of the final quarter of his junior year.

## **BACHELOR'S DEGREE CANDIDATES**

*Senior Degree Check.* At the beginning of his senior year, each student should request a *Degree Check* from the Dean's Office. A statement indicating any unfulfilled *University* and *College* degree requirements will be sent to the student. Information about progress in completing requirements in the *major* should be obtained by conferring with a faculty adviser authorized for the major program.

*Filing for Candidacy.* Each candidate for a degree must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to graduate. The filing deadlines are published on page 7 of this catalog.

## PLANNING THE PROGRAM

Before instruction begins each quarter, the student should prepare a tentative program of study and, if in need of academic counsel, meet with a faculty adviser to review his proposed program. The official study list must be filed with the Registrar according to the procedures described in the *Class Schedule*, available at the beginning of each quarter.

**Undeclared Status.** Entering freshmen and sophomores are officially designated as *Undeclared*. To ensure counseling by an appropriate academic adviser, however, each student is asked to indicate a field of interest or unofficial major while in undeclared status. (Preprofessional students see page 161.)

**Declaration of Major.** A student may declare his official major at the end of his freshman year; he must do so by the time he has completed 84 units. He obtains a Petition for Change or Declaration of Major at the departmental office of his major choice and secures approval for admission to the major program. (Biological and Physical Science majors report to the Dean's Office.)

### Study List Requirements.

#### 1. *Unit limitations (without special approval):*

12 units—minimum for all students (necessary to attain full-time student status);

17 units—maximum for freshmen and transfer students in first quarter of residence;

21 units—maximum for all Letters and Science students;

Included in minimum and maximum unit limitations—Subject A, other non-credit remedial courses, and repeated courses;

Not included in unit limitations—make-up work to remove incomplete grade.

Study lists of fewer than 12 units per quarter must be approved by the Dean of the College. Such study lists will be approved only on grounds of poor health, regular outside employment, or personal obligations, such as small children at home or illness in the family, which prevent a student from enrolling in a full program. Students requesting a study list of fewer than 12 units for health reasons must present certification from the Student Health Service. Employed students must present a letter from their employer indicating current and expected number of hours of employment throughout the quarter. A student who, because of financial necessity, is employed throughout the quarter for at least 20 hours a week may enroll for a minimum of 8 units. Other students must see a College dean regarding reasons for requesting a reduced program.

Students interested in undertaking a limited course load, who may be willing

to forego the privileges of regular student status, should investigate the advantages of enrolling in University Extension's Concurrent Enrollment Program.

2. *Limit on total accumulation of undergraduate units:*

To insure adequate advising of students who for sound educational reasons may wish to extend their undergraduate training beyond the usual duration, students who have accumulated more than 195 units may not register or file a study list without the Dean's approval.

3. *Change of Study List:*

*Adding courses.* During the first two weeks of classes each quarter and with the permission of the instructor a student may file a petition with the Registrar's Office to add a course to his study list. Thereafter, the Dean's permission is required as well. A \$3 administrative late fee is assessed for approved petitions.

*Dropping courses.* During the first five weeks of classes each quarter, a student may file a petition requesting to drop a course from his study list. The petition, noted by the instructor, is filed at the Registrar's Office. After the fifth week of classes, a student may drop a course, with the Dean's approval, only under exceptional, unforeseeable circumstances, e.g., personal illness (certified by the Student Health Service) or an unavoidable increase in hours of employment. Although each petition will be evaluated on its own merits, reasons generally regarded insufficient justification for dropping a course after the fifth week include: 1) lack of interest or motivation, 2) anticipation of substandard grades due to poor class attendance or time-budgeting problems, 3) inability to assess performance before the deadline. A \$3 administrative late fee is assessed for approved petitions.

**Faculty Advisers.** The purpose of the faculty adviser in the College of Letters and Science is to counsel the student on his overall program and to insure that he acquires a meaningful liberal education, makes normal progress toward completion of degree requirements, and undertakes an appropriate program of studies. The student should consult an adviser or the Dean of the College about any additional academic problems.

1. *Entering students who participate in one of the summer advising programs* are assisted in planning their fall quarter program by a temporarily assigned summer adviser. During the fall or subsequent quarters, students wishing academic advice should request adviser assignment in the department administering the major they intend to pursue. Offices are listed in the *Class Schedule*.

a. *Other entering lowerclassmen* are assigned advisers following the Letters and Science Assembly scheduled during Orientation Week at the beginning of each quarter.

b. *Other entering upperclassmen* report directly to the departmental office of their major during Orientation Week. (Biological and Physical Science majors report to the Dean's Office.)

2. *All new students* are encouraged to contact an adviser. During their first

three quarters in residence they are expected to consult an adviser frequently and discuss their proposed programs.

3. *Continuing students* having completed three quarters in residence in the College are no longer obligated to consult an adviser; they can elect to see an adviser when in need of counsel.

## ENTERING FRESHMEN

Because of the wide choice of subjects open to the Letters and Science student, a sample first-year program is not feasible. The entering freshman should, however, be able to plan his first-year program satisfactorily by keeping in mind the following points.

1. **After the Subject A requirement has been met**, most students should consider taking English 1 during their first year and English 2, 3, 4A, 4B, or 5 their second year in preparation for the English Composition Examination. The examination should be taken during the final quarter of the sophomore year or as soon as possible thereafter.

2. **The foreign language requirement** should be completed by the end of the first or second year, as program priorities permit. This is particularly important for students attempting to qualify for the University's Education Abroad Program (junior year abroad). It may be satisfied by examination or completion of language courses as follows:

- a. *Placement Examination*: A student with only high school preparation may validate his knowledge of a foreign language by earning a satisfactory score on this examination. (Further information given below.)
- b. *Course completion in high school* (tenth, eleventh or twelfth grades): earn a B average for one year's work beyond the second-year course level. This option must be validated by petition in the Dean's Office, 150 Mrak Hall.
- c. *Course Completion in College (or the equivalent)*: A.B. degree—12 units in one language. B.S. degree—as required in the major program.
- d. *Proficiency Examination*: A student who has not completed the required level language course, but assumes he has attained equivalent knowledge, may elect to satisfy the language requirement by passing this examination. For information consult the appropriate foreign language department.

3. **The Area Requirement in the humanities, natural sciences, and social sciences**, for students enrolled in an A.B. program, require a total of 52 units; in the B.S. program, 110 (see page 149 for the three Area Lists).

This area requirement is particularly important for the entering freshman who has not decided on a major. Careful consultation with his adviser and thoughtful selection from each of the three groups will help the student to determine his preference for a major. Entering freshmen who feel certain of their major field should consult the requirements of that major in planning their first-year program, as a first-year course may be a prerequisite for further studies in that field.



## FOREIGN LANGUAGE PLACEMENT EXAMINATION

A student electing to continue a language studied in high school must take the Foreign Language Placement Test in that language. The placement test does not yield unit credit; it only determines whether the requirement has been met or at which point in the elementary sequence he should enroll. Full academic credit is allowed for each foreign language course taken without regard to foreign language preparation in high school.

*A student with advanced standing credit in a language does not qualify to take the Placement Examination.* He should consult his Status Card, which is issued by the Dean's Office prior to admission to the College, for indication of further language study required.

Inquiries about the language requirement or the possibility of credit being withheld for duplication of advanced standing credit should be made at the Dean's Office, Room 150, Mrak Hall.

## PREPARATION FOR ADMISSION TO PROFESSIONAL SCHOOLS

The College of Letters and Science does not offer special preprofessional programs. A student who plans to prepare for a professional school undertakes a normal program leading to an A.B. or B.S. degree. Most courses required by a professional school are included in the requirements for the bachelor's degree; any additional courses needed may be taken as electives. The student should make himself aware of the requirements for his prospective professional school early in his career in order to plan a proper program (see page 167). Follow the procedures governing declaration of majors outlined on page 145.

## THE TEACHING CREDENTIAL

The teacher-training program is administered by the Graduate Division. Certain undergraduate courses, however, are required as preparation for the program. Students interested in obtaining the elementary or general secondary teaching credential should consult the appropriate adviser in the Department of Education as early as possible, preferably by the end of the freshman year (see also page 177).

## HONORS

### The Dean's Honors List

The Dean's Honors List includes the names of students having earned a minimum grade-point average of 3.3 during the preceding term. A study list of at least 12 units, exclusive of units taken on a Passed/Not Passed (or No Record) basis, is required. The list is posted quarterly in the foyer of Mrak Hall.

### Honors Programs

Special honors programs are available in connection with certain major programs. These are described in the introduction to the department's course offerings. Interested students should consult their major advisers.

**Baccalaureate Honors**

The awarding of honors at graduation is based on the following minimum criteria:

	Honors	High Honors	Highest Honors
	<i>Average of All College Work</i>		
	3.3	3.5	3.7
Total UC units completed	<i>Average of UC Work</i>		
45- 89	3.5	3.7	3.9
90-134	3.4	3.6	3.8
135 and over	3.3	3.5	3.7

Recommendation from the major department, requested by the Dean's Office, is also required for students eligible for highest honors.

**Awards for Academic Excellence**

In addition to eligibility for the University Medal (see page 35) graduating seniors with distinguished scholastic records in the College may be recommended by the faculty for the Herbert A. Young Letters and Science Medal. Academic excellence is the primary basis for choosing the recipient of this award.

**AREA REQUIREMENT LISTS**

The undergraduate courses in the subjects listed below will be accepted in fulfillment of the area requirement of the College. A maximum of 10 units of *special study* courses, 99 and 199, can be offered toward the area requirement; courses marked with an H, or numbered 48, 98, 198, 197T, 197TC, or 300-400 may not be counted.

Units in a *foreign language* may be offered toward satisfaction of the Humanities Requirement as follows: A.B. candidates—a maximum of 6 of the 12 units offered in satisfaction of the Foreign Language Requirement may be counted; B.S. candidates—all foreign language units.

**HUMANITIES**

**American Studies.** A.B.: Equally divide *maximum* of 16 units between Humanities and Social Sciences.

B.S.: 12 units allowed toward Social Sciences/Humanities requirement.

**Art.**

**Classics.**

**Comparative Literature.**

**Dramatic Art.**

**English.** All courses except 25 and 26 and *first* freshman-level course (i.e., English 1, 2, 3, 4A, 4B, or 5) com-

pleted. All subsequent courses in English counted toward humanities requirement.

**Foreign Language** (see above).

**History.**

**Linguistics.**

**Music.**

**Philosophy.**

**Religious Studies.**

**Rhetoric.**

**NATURAL SCIENCES**

- |  |  |
|--|--|
| <b>Animal Physiology.</b>  | <b>Entomology.</b> Accepted: 1, 10.  |
| <b>Anthropology.</b> Accepted: 1, 5, 150,<br>151, 152, 153, 154A, 154B, 155,<br>156. | <b>Genetics.</b>   |
| <b>Astronomy.</b>  | <b>Geography.</b> Accepted: 1, 3.  |
| <b>Bacteriology.</b>   | <b>Geology.</b>  |
| <b>Biochemistry and Biophysics.</b>  | <b>Mathematics.</b>  |
| <b>Biological Sciences.</b>  | <b>Physics.</b>  |
| <b>Botany.</b>   | <b>Physiology.</b>   |
| <b>Chemistry.</b>  | <b>Psychology.</b> Accepted: 1B, 108, 131,<br>150, 180A, 180B, 180G, 180K. |
|  | <b>Zoology.</b>  |

**SOCIAL SCIENCES**

- |   |   |
|---|---|
| <b>American Studies.</b> (see "Humanities"<br>above).   | <b>Geography.</b> All courses except 1, 3,<br>105, 161.                                     |
| <b>Anthropology.</b> All courses except 1,<br>5, 13, 150, 151, 152, 153, 154A,<br>154B, 155, 156, 195, 196. | <b>Political Science.</b>   |
| <b>Economics.</b> All courses except 12.  | <b>Psychology.</b> All courses except 1B, 108,<br>131, 150, 165, 180A, 180B, 180G,<br>180K. |
| <b>Education.</b> All courses except 114.   | <b>Sociology.</b> All courses except 46A,<br>46B, 46C, 106.                                 |

**Teaching Departments in College of Letters and Science**

- |  |                           |                             |
|--|---------------------------|-----------------------------|
| <b>Animal Physiology</b>               | <b>Education</b>          | <b>Philosophy</b>           |
| <b>Anthropology</b>                    | <b>English</b>            | <b>Physical Education</b>   |
| <b>Art</b>                             | <b>French and Italian</b> | <b>Physics</b>              |
| <b>Bacteriology</b>                    | <b>Genetics</b>           | <b>Political Science</b>    |
| <b>Biochemistry and<br/>Biophysics</b> | <b>Geography</b>          | <b>Psychology</b>           |
| <b>Botany</b>                          | <b>Geology</b>            | <b>Rhetoric</b>             |
| <b>Chemistry</b>                       | <b>German and Russian</b> | <b>Sociology</b>            |
| <b>Dramatic Art</b>                    | <b>History</b>            | <b>Spanish and Classics</b> |
| <b>Economics</b>                       | <b>Mathematics</b>        | <b>Zoology</b>              |
|  | <b>Music</b>              |                             |

A minimum of 54 upper division units (courses numbered 100-199) must be completed in courses offered by departments listed above or included on a list of courses available in the Dean's Office. Courses in Afro-American (Black) Studies, American Studies, Biological Sciences, Comparative Literature, Integrated Studies, Linguistics, Oriental Languages, and Religious Studies are included in all College requirements involving Letters and Science teaching departments. Military science units are acceptable only in the 30-unit limitation (see page 141).

**COLLEGE ENTRANCE EXAMINATION BOARD ADVANCED PLACEMENT EXAMINATION CREDIT**

Students earn 10 units credit toward the 180-unit bachelor's degree requirement for each CEEB Advanced Placement Examination satisfactorily passed during the junior year or senior year in high school. See chart below for details regarding course equivalences and breadth credit allowed toward graduation.

EXAMINATION	SCORE	UCD COURSE EQUIVALENCES*	CONTINUING COURSE	BREADTH CREDIT ALLOWED	REMARKS
English English	5, 4, 3	English 1 and 3		Humanities 4 units	No exemption from English Composition Examination.
<b>Foreign Languages</b>				<b>Humanities</b>	
French	5, 4, 3	French 6	French 30A or any upper division literature course.	4 units	The Foreign Language Requirement for the College of Letters and Science is satisfied by a score of 5, 4 or 3 on any language examination.
German	5, 4, 3	German 6A, 6B or 7	Any upper division course; German 101 strongly recommended.	4 units	
Latin 4	5, 4, 3	Latin 103	Determined by consultation with Classics adviser.	4 units	
Latin 5	5, 4, 3	Latin 102A	Determined by consultation with Classics adviser.	8 units	
Spanish	5, 4, 3	Spanish 6	Spanish 27A; 101A may be taken concurrently.	4 units	
<b>Humanities</b>				<b>Humanities</b>	
American History	5, 4, 3	History 17A, 17B		8 units	Satisfies American History and Institutions Requirement.
European History	5, 4, 3	History 4B, 4C		8 units	
<b>Natural Sciences</b>				<b>Natural Sciences</b>	
Biology	5, 4	Biological Sciences 1, Botany 2, Bacteriol- ogy 2, Zoology 2	Any upper division course or, by option, any Biological Sciences "2" course.	10 units	Student has option of taking Bacteriology 2, Botany 2 and Zoology 2 for full unit credit.
	3	Biological Sciences 1	Any Biological Sciences course except "10" series.	10 units	
Chemistry	5, 4, 3	Chemistry 1A, 1B	See "Remarks"	10 units	Credit for Chemistry 1A and 1B equivalence may serve as prerequisite to 1C with instructor's consent; 1A and/or 1B may, however, be taken for full credit.
Mathematics	AB 5, 4, 3	Mathematics 11, 21A	Mathematics 21B	10 units	
	BC 5, 4, 3	Mathematics 11, 21A, 21B	Mathematics 21C	10 units	
Physics	5	Physics 10 or 2A, 2B	Determined by consultation with Physics adviser.	10 units	For score of 5 or 4, credit may equate with Physics 4A, 4B or 4C, respectively. Credit for Physics "4" courses given only with consent of Physics adviser.
	4	Physics 10 or 2A	Determined by consultation with Physics adviser.	10 units	
	3	Physics 10		10 units	

\* Credit may not be earned in the University for courses which duplicate credit already allowed for advanced placement examinations as listed under *UCD COURSE EQUIVALENCES*. See exception for biology and chemistry under *REMARKS*.

## Summary Check List of Requirements for A.B. and B.S. Degrees:

(Read carefully details of requirements in all sections of the General Catalog.)

### University Requirements

- Subject A                       American History                       American Institutions

### College Breadth Requirements

#### Bachelor of Arts Degree

- English Composition Examination.
- Foreign Language: level of 12 units in one language.
- Natural Sciences, Social Sciences, Humanities: a minimum of 12 and a maximum of 20 in any one of the three areas.

#### Bachelor of Science Degree

- English Composition Examination.
- Natural Sciences: 90 units.
- Social Sciences, Humanities: a combined total of 52 units with 20 units in either area or in combination.

### Unit Requirements

180 units  
(Must include 75  
in a four-year  
institution.)

Must include at least 150 units in L & S Teaching Depts. or from approved List of non-L & S courses.

Must include at least 54 units in upper division courses in L & S Teaching Depts.

For A.B.:  
Must include 12 upper division units in L & S Teaching Depts. outside major department.

May include a maximum of 5 units of special study courses in any one quarter (99, 199).

May include a maximum of 9 units in courses numbered 300-499.

May include 30 units in courses outside L & S Teaching Depts. and not from approved List of non-L & S courses.

May include P.E. 5 and maximum of 6 units of P.E. 1.

### Major Requirements

Consult major adviser and appropriate departmental section of the *Catalog*.

### Scholarship Requirements

An average of at least 2.0 for all units undertaken in the University of California and for:

- All lower- and upper-division courses required for the four-year major program.
- All upper division courses required for the major program.

### Residence Requirement

In the University of California: At least three quarters.

In the College of Letters and Science:

1. 35 of the final 45 units.
2. 27 upper division units in courses offered in Letters and Science teaching departments, including 18 units in the major program.

SUMMARY OF STUDENT SERVICES

OFFICE OF THE DEAN OF THE COLLEGE, 150 MRAK HALL

The staff in this office assists students with questions concerning College requirements, scholarship (probation and disqualification), and other academic matters. Problems which cannot be resolved by staff assistants are referred to academic deans who are regularly available to students by appointment.

The staff also performs a number of regular functions:

1. It maintains a file of each student's academic record.
2. When a student transfers to Letters and Science from another institution, the Admissions Office determines the unit credit to be allowed for previous work; the College determines how the credit applies toward completion of breadth and unit credit for the bachelor's degree. A Status Card outlining this information is sent to each transfer student immediately prior to his enrollment.
3. It prepares a statement of remaining College requirements, on request, for senior students. (A student inquires about completion of major requirements with his faculty adviser or major department.)
4. It acts on petitions requiring Dean's approval; e.g., petitions for Declaration or Change of Major, Change of Study List (after established deadlines), Withdrawal, Readmission (on probation).
5. At the end of each quarter the deans review the records of all students who are subject to disqualification and recommend a student's dismissal from the College or continuation on probation.

## **SCHOOL OF LAW**

The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. The fall of 1972 will see the school enroll its seventh class.

The program of the school is designed to combine the best features of traditional legal education with the development of new interests and approaches necessary for training lawyers to meet the demands of the coming decades. The three-year curriculum includes not only instruction to develop proficient legal practitioners, but also courses that reflect the general interests of the Davis campus in the environment, natural resources, agriculture, urban problems, and state government.

In general, the School offers opportunities for in-depth study of an area of law in an individualized program of classroom work, research and writing, and experience in the community. The School also seeks to promote critical evaluation of law and legal institutions in a broad perspective that requires the integration of non-legal disciplines with professional legal education.

The School is accredited by the American Bar Association and has been admitted to membership in the Association of American Law Schools.

### **Preparation for the Study of Law**

No specific college major is required for admission to the School of Law, and there is no prescribed prelegal program. The individual student's college record and Law School Admission Test score must, of course, demonstrate that he is highly qualified for law study.

Prelegal students should plan a course of study that will give them a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Prelegal students should develop the ability to communicate easily, persuasively, and accurately; to understand people and institutions; to gather and weigh facts; and to solve problems and think creatively. It is most important that prelegal students obtain mastery of the English language. They should be able to read rapidly and with comprehension and to express themselves clearly, completely, and concisely, both orally and in writing.

For additional information, see the official *Pre-Law Handbook*, 1971-72 edition, published in October 1971 and prepared by the Law School Admission Test 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 most American law schools. It may be obtained at college bookstores or ordered from Educational Testing Service, Princeton, New Jersey 08540.

### **Requirements for Admission to the School of Law**

Applicants for admission to the professional curriculum of the School of Law, leading to the degree of Juris Doctor, must have received a bachelor's degree or an equivalent degree from a college or university of approved standing

prior to the time at which they begin their work in the School of Law. The applicant's college record must be of sufficiently high caliber to demonstrate that he is qualified for the study of law. The work of the last two college years will be considered more heavily than that of earlier years. Usually, the applicant's academic average will have to be substantially higher than a B+ (3.3) for him to be seriously considered for admission. *In addition*, the applicant will be measured by his score on the Law School Admission Test, which will usually have to be substantially higher than 600, and by his past accomplishments and potential for leadership.

All applications are reviewed by the Law School Admission Committee. Students are admitted only on a full-time basis and *only in September*.

### Law School Admission Test

All applicants are required to take the Law School Admission Test administered by the Educational Testing Service. Testing centers have been established for the convenience of applicants in all parts of the United States and in many foreign countries. Applicants are urged to take the test as early as possible, and in any event not later than December in the academic year prior to that in which they seek admission to the School.

Applicants should write to: Law School Admission Test, Educational Testing Service, Princeton, New Jersey 08540, to obtain application forms and information about the test and the location of testing centers.

### Admission Procedures

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 which will be supplied by the School and should be addressed to: Office of the Dean, School of Law, University of California, Davis, California 95616. *The application must be accompanied by a \$20 nonrefundable application fee* in the form of a check or money order made payable to The Regents of the University of California. The other schools of law affiliated with the University of California (excluding Hastings) may waive the application fee if notified, at the time of application, that the fee has been paid at Davis. The last date for filing completed application forms is March 1 of the year in which admission is sought (March 1, 1972, for admission in Fall 1972), but earlier filing is strongly recommended and will materially assist the School of Law Admissions Committee in its consideration of the application. No application will be considered if received in the Office of the Dean after March 1 of the year in which admission is sought.

2. The applicant must register with the Law School Data Assembly Service (LSDAS) no later than January 1 of the year in which admission is sought by completing and mailing the registration form supplied with each LSAT information packet. A transcript from each college or university attended should then be sent not to the School of Law but directly to: LSDAS, Educational Testing Service, Box 944, Princeton, New Jersey 08540.



The LSDAS will analyze the transcript and send a copy to the School of Law and others you designate on the registration form. As soon as they are available, the applicant should submit to the School of Law (*not* to LSDAS) supplementary transcripts covering any work completed *after* the initial registration with LSDAS. With rare exceptions, *no action will be taken* on any application until college grades are submitted through the first semester or quarter of the applicant's senior year. In some instances, no action will be taken until second quarter senior year grades are submitted. Successful applicants will be required to submit directly to the School of Law a final transcript, showing the award of a bachelor's degree.

3. The applicant must also provide two letters of recommendation from disinterested and responsible persons with whom the applicant recently studied while in college. These letters of recommendation should be sent directly to the School of Law and must be received by the Office of the Dean before the Law School Admission Committee can seriously consider the application.

4. The applicant should take the Law School Admission Test and request that his score be reported to the School of Law. Applicants are urged to take the LSAT as early as possible and in no event later than December of the academic year prior to that in which admission is sought.

5. Applicants accepted by the School of Law are simultaneously admitted to the Graduate Division of the University for the program leading to the degree of Juris Doctor. Applicants intending to pursue studies leading to other graduate degrees, or who wish to become candidates for a combined Degree Program, must make separate application to the Graduate Division of the University prior to commencing such studies.

### **Admission to Advanced Standing**

Applicants who have completed at least one year of work in another approved law school may in exceptional cases be admitted to advanced standing with credit for not more than one year of such work. Usually no more than five transfer students will be admitted to the relevant second-year class. No application for advanced standing will be considered until the Law School Admission Committee has received transcripts for all prior law school work.

Students who have been disqualified at another law school will not be admitted to this School of Law.

### **Professional Curriculum and Degree**

The course of study in the professional curriculum requires nine quarters 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 quarter.

Students who have been admitted to the School as candidates for the professional degree and who have completed satisfactorily the professional curriculum (126 quarter units are required) and the required period of resident study will be recommended for the degree of Juris Doctor.

The work of the first year is prescribed. This work provides the essential foundation for subsequent legal study and the satisfactory completion of the first-year courses is, in all cases, a prerequisite to courses of the second and third years.

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 in other accredited law schools may, with prior permission, be credited toward the units required for the professional degree but may not be counted as part of the required period of residence.

The courses of the professional curricula are listed on page 338.

### **Combined Degree Programs**

Students with interests in areas such as anti-trust, business, labor law, criminal law, or ecology may find a joint degree involving law and another discipline such as economics, business, sociology, or science attractive. In order to encourage this kind of study the School, in conjunction with other 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 Ph.D. programs as well.

Normally a Combined Degree Program will take at least three-and-a-half to four years. Students in the program will usually be able to earn twelve quarter hours of law school credit for work in the related discipline and normally can complete the combined degrees in less time than would be required for earning the two degrees separately. The student pursuing a Combined Degree Program will usually take the first year of the program entirely in the School of Law. During the remaining years he may divide his course work between the law school and the related discipline. The student must satisfy the admission requirements for both programs. Degree programs are presently available in combination with the Berkeley School of Business for the M.B.A. degree and with UCD departments for the M.A. degree in economics and sociology. The law school will seek to work out programs for students interested in other disciplines. Students interested in the Combined Degree Program may enroll at any time prior to the beginning of their third year in law school. Applicants for admission to the School of Law who are interested in pursuing a Combined Degree Program should so indicate on the School of Law admission form.

## **SCHOOL OF MEDICINE**

The School of Medicine will admit its fifth class to a course of professional instruction commencing fall quarter 1972.

The degree of Doctor of Medicine requires the satisfactory completion of a four-year course of study comprised of 15 quarters. Course work is conducted on the Davis campus and in nearby affiliated hospitals. The 650-bed Sacramento Medical Center is the major affiliated teaching hospital for the medical school.

The School is currently housed in interim facilities on the Davis campus. Planning for permanent facilities has reached an advanced stage and the permanent buildings will be constructed on the Davis campus on a 150-acre site dedicated to the Health Sciences.

### **Admission Policies**

The class entering in the fall of 1972 will be limited to 100 students selected on the basis of academic achievement and promise as well as personal characteristics which lead the Admissions Committee to feel the candidates will not only be able to complete satisfactorily the requirements of the medical curriculum, but will also become excellent practitioners of the profession of medicine. Factors taken into consideration include an applicant's scholastic record to date; his Medical College Admission Test performance; and reports of teachers, advisers, and interviewers with regard to his intellectual capacity, motivation, emotional stability, and personal dedication.

The majority of openings in each entering class will be awarded to students who are legal residents of the State of California; however, a few out-of-state students will be accepted. The Medical School also participates in the program of the Western Interstate Commission for Higher Education. In this program there are a number of states which do not offer professional graduate medical education within the state. Applicants from such states found eligible by both the School of Medicine and their own states are charged resident rather than non-resident tuition. Further information may be obtained by communicating with this Commission, whose address is University East Campus, 30th Street, Boulder, Colorado 80300.

Students from foreign universities will be considered on an individual basis by the Admissions Committee. Certain additional requirements apply to such applicants. Detailed information is available from the Admissions Office, School of Medicine.

The School of Medicine is fully cognizant of the need for increased opportunities in medical education for students from disadvantaged cultural and socioeconomic backgrounds. A Task Force comprised of faculty and students has been appointed to identify and advise students from educationally deprived backgrounds, to review all applications of disadvantaged students, and to select applicants for personal interviews by members of the Task Force Committee. Educationally disadvantaged applicants should follow the regular School of Medicine application procedures.

### **Transfer with Advanced Standing**

A few places will be available for students who wish to transfer into the third year of the curriculum. Students are not considered for transfer into the second or fourth year of the curriculum. Students who wish to apply for transfer should write directly to the Secretary of the Admissions Committee for applications. The deadline for receipt of these applications is December 31 of the year for which transfer is requested. The third-year class commences its work early in July.

Students applying from foreign medical schools are required to submit the results of part one of the examination given by the National Board of Medical Examiners.

### **Application Procedures**

Application forms will be available from the Medical School Admissions Office after July 1, of each year. All applications must be completed and submitted with the necessary supporting documentation no later than December 31, 1972, for the fall of 1973. Early return of the completed application will facilitate early processing, which is normally advantageous to the applicant. All applications and communications regarding admission should be addressed directly to the Secretary of Admissions, Admissions Office, School of Medicine, University of California, Davis, California 95616.

The application form must be accompanied by a nonrefundable application fee of \$20, a recent unmounted wallet-size photograph (optional), and a comprehensive report of the official Committee on Premedical Education of the college in which the applicant is presently enrolled (if such a Committee exists in his school) or two letters of recommendation from individuals who are able to give a meaningful appraisal of the applicant's qualifications. It is suggested that one of these be from a science instructor and one from a nonscience instructor. Applicants may be requested to authorize their student health service or personal physician to send pertinent health information to the Admissions Committee.

Applicants may be notified of the status of their application as early as October 15 of the year preceding that for which admission is sought. However, in some cases a decision may not be made until March of the following year. Every effort will be made to reach as early a decision as possible and to notify the applicant promptly.

A personal interview will normally be required before a student is offered a place in the class. Because of the large number of applicants it is not possible to interview each one, and for this reason interviews are at the invitation of the Admissions Committee. It is highly desirable that this interview take place at the Medical School. However, if this is impossible some applicants may be interviewed by special arrangement at some other location. Although it is the policy of the school to accept no student without an interview, the Committee reserves the right to take formal action without an interview on the basis of credentials submitted.

## Premedical Requirements

Arrangements for taking the Medical College Admission Test (MCAT) should be made at the institution at which the applicant is presently enrolled, and the Examining Board should be requested to forward the results to the Secretary of Admissions of this Medical School. Information about the MCAT can be obtained at your undergraduate college or directly from the Psychological Corporation, 304 East 45th Street, New York City 10017. It is desirable that the results of the MCAT be available at the time of the review of the applicant's qualifications. The Admissions Committee recommends that, if feasible, tests be taken in the spring prior to application since the results of the fall examination are not received by the Medical School until late November.

Applicants for admission to the professional curriculum must have satisfactorily completed a minimum of three years (90 semester units; 135 quarter units) of college level work in an accredited school in the United States or Canada. However, in most instances, completion of a four-year course of study leading to a bachelor's degree is recommended. A maximum of two years (60 semester units; 90 quarter units) of community college work may be credited toward this requirement.

Although a specific major in science is not necessary, the following course content at college level is required:

- a. English, one year or its equivalent.
- b. Biological Science, one year or its equivalent.
- c. General Chemistry, one year or its equivalent.
- d. Organic Chemistry, one year or its equivalent. If two or more undergraduate organic courses are offered, it is recommended that the applicant elect the more rigorous option.
- e. Physics, one year or its equivalent.
- f. Mathematics, through integral calculus.

Except in extraordinary circumstances, applications will be considered by the Admissions Committee only when the applicant's overall grade-point and science grade-point each average 2.5 or higher (on a scale where one credit hour of A = 4 points). In calculating grade-point averages, such courses as physical education and military science, and courses taken for graduate degrees, will be excluded. Grades of D in any of the required courses cannot be accepted.

Applications may be submitted on the basis of work completed plus work in progress which is to be completed before the beginning of the fall quarter. However, all academic requirements must be completed before registration.

Although the minimum scholastic requirements are stated in some detail, it should not be inferred that admission is assured each applicant who meets these requirements. In addition to a high level of academic competence many of the factors which determine success in pursuing a career in medicine are given full weight by the Admissions Committee in reaching its final decision.

## SCHOOL OF VETERINARY MEDICINE

The degree Doctor of Veterinary Medicine may be obtained by pursuing a course of study requiring a minimum of six years. The final four years must be spent in the professional veterinary medical curriculum.†

Students planning a career in veterinary medicine should consider broadening their educational experience by completing the baccalaureate degree before applying to the professional school.\*

### Preveterinary Medical Requirements

Students must complete a minimum of 90 quarter units (60 semester units) of college work including the required courses listed in the preveterinary medical curriculum (page 162) before they will be admitted to the School of Veterinary Medicine. Preveterinary medical students, in addition to satisfying the preprofessional course requirements, should plan their program so they can obtain a baccalaureate degree in four years. The School of Veterinary Medicine will accept the Passed/No Record option (subject to general campus and individual school and college requirements) only in courses taken under the restricted electives in social sciences and humanities and the additional electives in social sciences, humanities, or agriculture.

Many students who enter veterinary medical school as freshmen are already strongly motivated toward some highly specialized field of veterinary medicine such as food-animal disease control, public health, laboratory animal medicine, exotic animal medicine, or biomedical research. To increase their breadth of preparation for a particular field of endeavor, preveterinary medical students are strongly urged to include in their elective programs courses that will provide additional background for the fields in which they may be interested. In order to obtain more information and guidance as to programs, such students should contact an adviser representing one of these special areas through the Dean's Office in the School of Veterinary Medicine. For example, a veterinarian engaged in food-animal practice will be largely employed as a herd health consultant or manager and will devote more time to improving the health and productivity of animals than to treating the sick. Thus, a preveterinary student interested in this field would be encouraged to include courses that provide an additional background in nutrition, food-animal production, farm management, and agricultural economics. In the area of zoo and wildlife medicine, the preveterinary medical student would be urged to select courses in evolution, genetics, animal ecology, and animal behavior. For the field of space medicine, courses in computer techniques, mathematics, and electronics would be highly desirable.

### Application

Students are admitted to the School of Veterinary Medicine in the fall of each year. Application forms may be obtained after August 15 prior to the year in

\* For additional information prospective students should write the Associate Dean of Student Services, School of Veterinary Medicine, University of California, Davis 95616.

† For course listings for the School of Veterinary Medicine, refer to page 164.

which the student would like to be accepted, from the Admissions Office, School of Veterinary Medicine, University of California, Davis 95616. The completed application must be filed with the School by November 1 in order to be considered for the fall of the following year. Students may apply before completing all the requirements. However, all required courses must be completed prior to June 15 of the year for which an applicant wishes to be admitted. Along with the application, an outline showing plans for completion of these required courses must be submitted. *Applications lacking this information will not be processed.*

### **Admission to the School of Veterinary Medicine**

Enrollment is limited, and applicants are selected primarily on the basis of scholarship with particular emphasis placed on achievement in required science courses. In addition, candidates should have sufficient experience with animals and some aspect of the veterinary medical profession to justify their decision to pursue a lifetime career in veterinary medicine. Men and women are considered on an equal basis. Applicants will be notified as soon as possible of their admission status.

Scholastic achievement, particularly in the required courses, is a very important criteria for admission to the School of Veterinary Medicine. Preveternary medical students are, therefore, cautioned to use the Passed or No Record option as sparingly as possible.

The School of Veterinary Medicine at the University of California participates in the student program administered by the Western Interstate Commission for Higher Education (WICHE). Students residing in western states without a school of veterinary medicine who wish to participate in this program must be certified by their home state. For addresses of state certifying officers, write to the Western Interstate Commission for Higher Education, University East Campus, 30th Street, Boulder, Colorado 80300.

### **After Admission**

After admission to the School of Veterinary Medicine, the student completes a four-year professional curriculum leading to the degree Doctor of Veterinary Medicine. At the end of the first two years of the professional curriculum, students who do not hold a baccalaureate are eligible to receive a Bachelor of Science degree in Veterinary Science.

### **Preveternary Medical Curriculum**

Applicants for admission to the School of Veterinary Medicine must complete:

1. Mathematics through trigonometry\* ; Subject A; and American History and Institutions.
2. At least 90 quarter units (or 60 semester units) of credit in the University of California or other accredited institution, including the prescribed subjects listed below.

\* Should be completed in high school.

3. Subject Requirements:	<i>Quarter Units</i>
Chemistry (general, qualitative, organic, and quantitative) . . . . .	25
Genetics . . . . .	3
Physics (general) . . . . .	9
Biology, zoology, embryology . . . . .	16
English composition and additional English or rhetoric . . . . .	8
Restrictive electives in social sciences and humanities* . . . . .	17
Additional electives in social sciences, humanities or agriculture . .	12
	90

Students completing the preveterinary medical requirements in an institution other than University of California, Davis, are urged to check carefully the catalog of their college to be sure they are taking courses comparable in content.

**Plan of Study**

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B, 1C . . . . .	5	5	5
English 1 and additional English or rhetoric . . . . .	4	4	-
Biological Sciences 1 . . . . .	-	-	5
Electives . . . . .	6	6	5
	15	15	15

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Physics 2A, 2B, 2C . . . . .	3	3	3
Chemistry 8A, 8B, 5 . . . . .	3	3	4
Genetics 100A . . . . .	-	3	-
Zoology 2 . . . . .	6	-	-
Zoology 100 (vertebrate embryology) . . . . .	-	-	5
Electives . . . . .	3	6	3
	15	15	15

**Requirements for the Degree Doctor of Veterinary Medicine**

1. The candidate for the degree Doctor of Veterinary Medicine must have completed the general University requirements for a baccalaureate degree (pages 33-35).

2. He must possess good moral character.

3. He must have studied veterinary medicine for the equivalent of twelve quarters of twelve weeks each. The last six quarters must have been spent in the University of California School of Veterinary Medicine.

4. He must maintain a grade-point average of 2.0 (a C average), computed on the total of all courses taken subsequent to his admission into the School.

5. He must have completed the required work, satisfactorily fulfilled all special requirements, and received throughout the entire veterinary medical curriculum satisfactory grades as determined by the Faculty of the School.

\*Art, anthropology, economics, foreign languages, geography, history, music, philosophy political science, psychology, sociology, and/or additional English, rhetoric, and mathematics.



## Plan of Study

<i>First Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>		
Anatomy 140 . . . . .	4	Anatomy 155 . . . . .	2	Anatomy 160 . . . . .	3
Anatomy 150 . . . . .	2	Anatomy 156 . . . . .	2	Physiological Sciences	
Anatomy 151 . . . . .	4	Anatomy 157 . . . . .	2	123 . . . . .	5
Physiological Sciences		Physiological Sciences		Physiological Sciences	
101A . . . . .	4	101B . . . . .	3	140B . . . . .	5
Physiological Sciences		Physiological Sciences		Physiological Sciences	
102A . . . . .	1	102B . . . . .	2	141B . . . . .	2
		Physiological Sciences		Electives . . . . .	3
		140A . . . . .	5		
		Physiological Sciences			
		141A . . . . .	1		
	—		—		—
	15		17		18
<i>Second Year</i>					
Pathology 122A . . . . .	5	Epidemiology and		Anatomy 180 . . . . .	4
Physiological Sciences		Preventive Medicine		Clinical Sciences 103 .	4
124 . . . . .	4	140 . . . . .	2	Pathology 122C . . . . .	4
Veterinary		Pathology 122B . . . . .	5	Veterinary	
Microbiology 120 .	2	Veterinary		Microbiology 125 .	5
Veterinary		Microbiology 122 .	4		
Microbiology 121 .	3	Veterinary			
Nutrition 109 . . . . .	3	Microbiology 123 .	3		
		Veterinary			
		Microbiology 124 .	2		
	—		—		—
	17		16		17
<i>Third Year</i>					
Clinical Pathology 201	3	Epidemiology and		Clinical Pathology 202	3
Clinical Sciences 204A	3	Preventive Medicine		Clinical Sciences 204C	3
Clinical Sciences 210A	1	208 . . . . .	4	Clinical Sciences 210C	1
Clinical Sciences 220 .	4	Clinical Sciences 204B	4	Clinical Sciences 222 .	5
Clinical Sciences 230 .	6	Clinical Sciences 210B	1	Epidemiology and	
		Clinical Sciences 221 .	5	Preventive Medicine	
		Clinical Sciences 260 .	2	240 . . . . .	3
				Epidemiology and	
				Preventive Medicine	
				250 . . . . .	2
	—		—		—
	17		16		17
<i>Fourth Year</i>					
Clinical Pathology		Clinical Pathology		Clinical Pathology	
295A . . . . .	1	295B . . . . .	1	295C . . . . .	1
Clinical Sciences 204D	5	Clinical Sciences 204E	3	Clinical Sciences 204F	3
Clinical Sciences 250A	8	Clinical Sciences 250B	8	Clinical Sciences 250C	7
Pathology 295A . . . . .	1	Clinical Sciences 270 .	1	Pathology 295C . . . . .	1
Veterinary		Pathology 295B . . . . .	1	Veterinary	
Microbiology 295A .	1	Veterinary		Microbiology 295C .	1
		Microbiology 295B .	1	Electives . . . . .	5
		Electives . . . . .	3		
	—		—		—
	16		18		18

## Requirements for the Degree Bachelor of Science

Upon recommendation of the Faculty of the School of Veterinary Medicine the degree Bachelor of Science with a major in Veterinary Science is granted to students in the School of Veterinary Medicine who do not hold a baccalaureate and who:

1. Satisfy the general University requirements (pages 33-35).
2. Complete in the School of Veterinary Medicine all courses prescribed in the first two years of the professional curriculum. Exceptions may be made to students admitted in advanced standing.

## Admission in Advanced Standing

An applicant requesting admission to advanced standing in the School of Veterinary Medicine may be accepted under the following conditions:

1. He must furnish evidence that he was eligible for admission to the first quarter of the School of Veterinary Medicine.
2. He must show that he has satisfactorily completed courses equivalent in kind and amount to those given in the School of Veterinary Medicine in the quarter or quarters preceding that in which admission is desired.
3. He may be required to pass examinations in any or all subjects for which credit is asked.

## Graduate Study

The graduate study program of the School of Veterinary Medicine provides varied opportunities for advanced professional training and for launching careers in research.

## Master of Preventive Veterinary Medicine Program

Applicants must hold the degree Doctor of Veterinary Medicine or equivalent degree from an accredited school of veterinary medicine and be recommended for admission by the faculty committee in charge of the program. Candidates for the degree must satisfactorily complete in residence a minimum of 36 quarter units of approved course work. The program, consisting of a group of required core courses and optional electives, is scheduled over a 12-month period beginning in August of each year. Admission is limited to the beginning date of the program each year. Specific fields of emphasis are epidemiology, medical statistics, information retrieval and analysis, and disease control and eradication. Options are also available for specialization in food hygiene, and in other veterinary medical areas related to preventive veterinary medicine. The program commences with 5 weeks of instruction in Elementary Statistics prior to the beginning of the fall quarter and is completed after a 10-week period of research and field studies subsequent to the completion of the spring quarter. Inquiries regarding the program should be directed to the Office of the Dean, School of Veterinary Medicine, University of California, Davis 95616.

## Master of Science and Doctor of Philosophy

General information regarding these degrees will be found in the *Announcement of the Graduate Division* which may be obtained from the Graduate Divi-

sion at Davis. Additional detailed information may be obtained by writing to the Chairman of the department in which the candidate wishes to study.

## PROFESSIONAL SCHOOL REQUIREMENTS AND PREPARATION

Eligibility for admission to one of the University's professional schools or curricula is contingent upon the successful completion of an undergraduate program of preprofessional training of 2 to 4 years duration (depending upon unit requirements for specific schools).

Announcements describing admission and course requirements for a particular school are available upon request by writing to the school of your choice in care of the appropriate University campus (see legend and addresses below). *Professional schools and curricula requiring 2 to 3 years of undergraduate preparation:*

- School of Business Administration (B)
- School of Criminology (B)
- Curriculum in Cytotechnology (SF)
- Curriculum in Dental Hygiene (SF)
- Schools of Dentistry (LA, SF)
- School of Engineering (I)
- School of Engineering and Applied Science (LA)
- School of Forestry and Conservation (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)
- School of Public Health (LA, B)
- School of Veterinary Medicine (D)

*Professional schools requiring a bachelor's degree in appropriate field of study for admission:*

- Graduate Schools of Administration (I, R)
- School of Architecture and Urban Planning (LA)
- Graduate Schools of Business Administration (B, LA)
- Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)

Preparation for teaching credentials is available as follows:

- Kindergarten-Primary (LA, SB)
- Elementary Teaching (B, D, I, LA, R, SB, SC)
- Secondary Teaching (B, D, I, LA, R, SB, SC)
- Special Education (R)
- Special Secondary (D, SB)
- Junior College Teaching (B, LA, R, SB)
- Pupil Personnel Services (B, SB)
- School Librarianship (B, LA)
- Special Services (LA, SB)
- Supervision (B, LA)
- Administration (B, LA)

Graduate School of Journalism (B)  
 Schools of Law (B, D, LA)  
 Hastings College of the Law (SF)  
 School of Librarianship (B)  
 School of Library Service (LA)  
 Graduate School of Public Affairs (B)  
 School of Public Health (LA, B)  
 Schools of Social Welfare (B, LA)  
 Scripps Institution of Oceanography (SD)

*Legend and addresses of above schools:*

- (B) University of California, Berkeley, California 94720
- (D) University of California, Davis, California 95616
- (I) University of California, Irvine, California 92664
- (LA) University of California, Los Angeles, California 90024
- (R) University of California, Riverside, California 92502
- (SD) University of California, San Diego, La Jolla, California 92037
- (SB) University of California, Santa Barbara, California 93106
- (SC) University of California, Santa Cruz, California 95060
- (SF) University of California, San Francisco, California 94122

Direct inquires about schools and curricula in San Francisco (except Hastings College of the Law) in care of: Office of Student Admission.

**Preprofessional Training**

Preprofessional programs do not lead to a bachelor's degree. Since professional schools cannot accommodate all qualified applicants, students should prepare themselves for alternate careers. Hence, students 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, art, etc., can be equally acceptable. Law schools, in particular, do not prescribe any specific major program. Equal consideration is given 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 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 more detailed information is*

*needed.* A list of general reference books which may be of interest is presented at the conclusion of this section.

### **Business Administration**

*Preparation for study.* Consult school announcement and Economics Department Office, Room 380, Academic Office Building III, Davis, phone 752-0741.

### **Forestry**

*Preparation for study.* Consult this Catalog, pages 119-122 and school announcement.

*Preforestry advisers.* E. H. Stanford, Department of Agronomy and Range Science, Room 267, Hunt Hall, Davis, phone 752-1702 or 752-1703 and Jack Major, Botany Department, Room 245, Animal Science, phone 752-0621 or 752-0617.

### **Law**

*Preparation for study.* Consult this Catalog, page 154, and school announcements.

*Prelaw adviser for counseling about general law school admission requirements, exclusive of program planning.* C. E. Jacobs, Department of Political Science, Room 271, Voorhies Hall, Davis, phone 752-2637 or 752-0966.

*School of Law, Davis.* Consult this Catalog, pages 154-157. *Announcement of the School of Law*, and Dean's Office, Room 1011, Martin Luther King, Jr. Hall, phone 752-0243.

### **Medicine**

*School of Medicine, Davis.* Consult this Catalog, pages 158-160. For more detailed information contact the Office of Student Affairs, School of Medicine, Davis, phone 752-3171.

### **Veterinary Medicine**

*Preparation for study.* Consult this Catalog, pages 162-163 and Dean's Office, College of Agricultural and Environmental Sciences, Room 228, Mrak Hall, Davis, phone 752-0107, or 752-0108.

*School of Veterinary Medicine, Davis.* Consult this Catalog, pages 161-166, school announcement, and Office of the Assistant Dean-Student Services, Room 1024, Haring Hall, Davis, phone 752-1383.

### **Allied Health Sciences**

Consult Mary Fenley (Mrs.), Office of Allied Health Sciences, School of Medicine, Davis, phone 752-0230, regarding the curricula listed below. Since requirements are continually being revised, it is important to contact her for up-dated admission information.

It should be noted that preparatory courses for the following programs may be taken on this Campus; final degree work, however, is not available at Davis

at the present time with the exception of 1) Medical Technology and 2) Dietetics and Nutrition.

Dental Hygiene	Nursing
Dentistry	Occupational Therapy
Dietetics and Nutrition	Optometry
Environmental Health	Pharmacy
Health Care Administration	Physical Therapy
Health Education	Rehabilitation Counseling
Medical Illustration	Social Work
Medical Librarianship	Speech Therapy and Pathology
Medical Technology	(All other health-related fields)

### Admission Requirements

*Curriculum in Dental Hygiene, San Francisco.* Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B, 8A, 8B.
- c. Biology, one year with laboratory (12 units).
- d. Psychology 1A or 10, and one additional psychology course (8 units).
- e. Social sciences, humanities or foreign language: 30 units must be selected from these fields.

Strongly recommended: vertebrate zoology.

*School of Dentistry, San Francisco.* Minimum of 135 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B, 1C, plus 8 units of organic chemistry.
- c. Physics 2A, 2B, 2C, 3A, 3B, 3C.
- d. Biology, one year with laboratory (12 units).
- e. Psychology (8 units).
- f. Humanities, social sciences or foreign language: 16 units must be selected from these fields.

Strongly recommended: biochemistry, embryology, comparative vertebrate anatomy, genetics, statistics, and vertebrate zoology.

*Curriculum in Medical Technology.* Preparation for graduate training in Medical Technology can be accomplished by completing the regular undergraduate major program in any natural science, to include at least:

- a. Chemistry: 24 units including 1A, 1B, 1C; 8A, 8B, or 5.
- b. Biological sciences: 24 units including one course in microbiology.
- c. Mathematics or physics: one course.

*School of Nursing, San Francisco.* Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A, 1B.
- c. Human Anatomy 102, 102L.
- d. Physiology 2-2L or 101-101L.
- e. Psychology 1A or 10.
- f. Sociology 1 or 3.

g. Humanities: 8 to 10 units (may include ethnic studies or foreign language).

Strongly recommended: Chemistry 8A, 8B, Bacteriology 2, 3, Anthropology 2, and additional ethnic studies courses.

*School of Optometry, Berkeley.* Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Mathematics 11 or 16A.
- c. Mathematics 13 or Bacteriology 2.
- d. Physics 2A, 2B, 2C, 3A, 3B, 3C.
- e. Psychology 1A or 10.
- f. Biology or zoology, one year.
- g. Chemistry 1A, 1B, 8A, 8B.

*School of Pharmacy, San Francisco.* Minimum of 90 quarter units, including:

- a. English 1, 3.
- b. Chemistry 1A-1B-1C and 5 or 4A-4B-4C.
- c. Physics 2A, 2B, 2C, 3A, 3B, 3C.
- d. Mathematics 16A, 16B, 16C.
- e. Biology, one year integrated biological studies including invertebrate and vertebrate zoology.

*Curriculum in Physical Therapy, San Francisco.* Minimum of 135 quarter units, including:

- a. English 1, 3.
  - b. Chemistry 1A, 1B.
  - c. Physics 10; Physics 2A, 2B, 3A, 3B are recommended.
  - d. Psychology 168.
  - e. Foreign language: 16 units in one language. High school work may be counted at the rate of 4 quarter units per year in the same foreign language.
  - f. Physiology 2, 2L; Human Anatomy 102, 102L.
  - g. Humanities: 16 units.
  - h. Social sciences: 16 units.
- Strongly recommended: courses in physical education.

### Reference Books

The following books are available in the Reference Room of the University Library, the Health Sciences Library, or the Office of Allied Health Sciences.

*American Universities and Colleges*, edited by the American Council on Education.

*Admission Requirements of American Dental Schools*, published by the American Association of Dental Schools.

*Admission Requirements of American Dental Hygiene Schools*, published by the American Dental Hygienists' Association.

*Medical School Admission Requirements U.S. and Canada*, published annually by the Association of American Medical Colleges.



## GRADUATE DIVISION

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 Universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

### Advanced Degrees

On the Davis campus the following advanced degrees are offered: Master of Arts, Master of Fine Arts, Master of Science, Master of Education (in Agricultural Education), Master of Engineering, Juris Doctor, Master of Preventive Veterinary Medicine, Candidate in Philosophy, Doctor of Engineering, Doctor of Veterinary Medicine, Doctor of Medicine, and Doctor of Philosophy.

Majors for graduate study and the advanced degrees offered in each are shown below:

Agricultural Chemistry (M.S., Ph.D.)	Engineering (M.Eng., D.Eng., M.S., Ph.D.)
Agricultural Economics (M.S., Ph.D.)	English (M.A., Ph.D.)
Agricultural Education (M.Ed.)	Entomology (M.S., Ph.D.)
Agricultural Science and Management (M.S.)	Food Science (M.S.)
Agronomy (M.S.)	French (M.A., Ph.D.)
Anatomy (M.S., Ph.D.)	Genetics (M.S., Ph.D.)
Animal Science (M.S.)	Geography (M.A., Ph.D.)
Anthropology (M.A., Ph.D.)	Geology (M.S., Ph.D.)
Art (M.F.A.)	German (M.A., Ph.D.)
Atmospheric Science (M.S., Ph.D.)	History (M.A., Ph.D.)
Avian Sciences (M.S.)	History of Art (M.A.)
Biochemistry (M.A., Ph.D.)	Horticulture (M.S.)
Biomedical Engineering (M.S., Ph.D.)	International Agricultural Development (M.S.)
Biophysics (Ph.D.)	Irrigation (M.S.)
Botany (M.S., Ph.D.)	Law (J.D.)
Chemistry (M.S., Ph.D.)	Linguistics (M.A.)
Child Development (M.S.)	Mathematics (M.A., Ph.D.)
Classics (M.A.)	Medicine (M.D.)
Comparative Pathology (M.S., Ph.D.)	Microbiology (M.A., Ph.D.)
Comparative Pharmacology and Toxicology (M.S., Ph.D.)	Music (M.A.)
Consumer Science (M.S.)	Nutrition (M.S., Ph.D.)
Dramatic Art (M.A., M.F.A., Ph.D.)	Philosophy (M.A., Ph.D.)
Ecology (M.S., Ph.D.)	Physical Education (M.A.)
Economics (M.A., Ph.D.)	Physics (M.A., Ph.D.)
Education (M.A.)	Physiology (M.S., Ph.D.)
Endocrinology (M.A., Ph.D.)	Plant Pathology (M.S., Ph.D.)

Plant Physiology (M.S., Ph.D.)	Russian (M.A.)
Political Science (M.A., Ph.D.)	Sociology (M.A., Ph.D.)
Preventive Veterinary Medicine (M.P.V.M.)	Soil Science (M.S., Ph.D.)
Psychology (M.A., Ph.D.)	Spanish (M.A., Ph.D.)
Range Management (M.S.)	Vegetable Crops (M.S.)
Rhetoric (M.A.)	Veterinary Medicine (D.V.M.)
	Zoology (M.A., Ph.D.)

This list changes frequently as graduate work expands into new areas of study. Prospective students seeking further information should consult the Graduate Division. General requirements for degrees are published in the *Announcement of the Graduate Division*. The specific requirements are available from the office of the department concerned.

Group majors, those which are sponsored by more than one department, are listed below. If a student is interested in one of these he should write to the group chairman for more information.

- Agricultural Chemistry—Donald G. Crosby, Ph.D., Chairman, 109 Environmental Toxicology
- Agricultural Science and Management—William J. Flocker, Ph.D., Chairman, 283 Hunt Hall
- Anatomy—Antonio Zappala, M.D., Chairman, 101 Temporary Building 171
- Atmospheric Science—John J. Carroll, III, Ph.D., Chairman, 2052 Bainer Hall
- Avian Sciences—Daniel W. Peterson, Ph.D., Chairman, 209 Asmundson Hall
- Biochemistry—Eric E. Conn, Ph.D., Chairman, 578 Hutchison Hall
- Biomedical Engineering—G. Worden Waring, Ph.D., Chairman, Temporary Building 169
- Biophysics—Richard S. Criddle, Ph.D., Chairman, 555 Hutchison Hall
- Botany—Herbert B. Currier, Ph.D., Chairman, 162 Robbins Hall
- Child Development—Glenn R. Hawkes, Ph.D., Chairman, 239 Mrak Hall
- Comparative Pathology—Thomas L. Volk, M.D., Chairman, 1146C Med Surge I
- Comparative Pharmacology and Toxicology—Stuart A. Peoples, M.D., Chairman, 2147 Haring Hall
- Consumer Science—Howard G. Schutz, Ph.D., Chairman, 160 Everson Hall
- Ecology—R. Merton Love, Ph.D., Chairman, 255 Hunt Hall
- Endocrinology—Thomas C. Lee, Ph.D., Temporary Building 139
- Engineering—Warren H. Giedt, Ph.D., Chairman, 2006 Bainer Hall
- Food Science—W. D. Brown, Ph.D., Chairman, Temporary Building 189
- Genetics—Robert W. Allard, Ph.D., Chairman, 201B Hutchison Hall
- Horticulture—Dillon S. Brown, Ph.D., Chairman, 1043 Wickson Hall
- International Agricultural Development—Lynn D. Whittig, Ph.D., Chairman, 167 Hoagland Hall
- Linguistics—Wayne C. Harsh, Ph.D., Chairman, 111 Sproul Hall
- Microbiology—Robert E. Hungate, Ph.D., Chairman, 278 Hutchison Hall
- Nutrition—Quinton R. Rogers, Ph.D., Chairman, 2166 Haring Hall

Physiology—Jerry R. Gillespie, D.V.M., Ph.D., Chairman, 1024 Haring Hall

Plant Physiology—Roger J. Romani, Ph.D., Chairman, 2039 Wickson Hall

Preventive Veterinary Medicine—Walter W. Saddler, D.V.M., M.P.H., Chairman, 2079 Haring Hall

Range Management—R. Merton Love, Ph.D., Chairman, 255 Hunt Hall

Soil Science—Duane S. Mikkelsen, Ph.D., Chairman, 109 Hunt Hall

### Admission Standards

Students seeking admission to graduate status at the University of California must hold a bachelor's degree or its equivalent from an institution of acceptable standing. The program of preparation should be substantially equivalent in both the distribution of academic subject matter and in scholarship achievement to the requirements for a comparable degree at the University of California. Applications for admission are evaluated in terms of scholastic qualifications and formal preparation for the graduate field of study.

The Dean of the Graduate Division may deny an applicant admission if his scholastic record or his undergraduate program of study is judged inadequate as a foundation for advanced academic or professional study. This procedure applies to all applicants, whether they come from schools or colleges within the University of California or elsewhere. Departments may have special requirements for admission to graduate status, and some departments and schools require an additional application for admission to their advanced-degree program.

### Application for Admission

Students seeking admission to the University of California, Davis, for graduate work may obtain application forms by writing to the Dean of the Graduate Division, University of California, Davis 95616. Applications must be on file no later than *June 1* for the fall quarter, *October 1* for the winter quarter, and *January 1* for the spring quarter, but early filing, preferably six to twelve months prior to the date of registration, is strongly recommended. The application must be accompanied by a money order or a bank draft for \$20 made payable to The Regents of the University of California. *This fee is not refunded under any circumstances.* In cases where complete records are filed later than the above dates, the student's registration may be delayed, thus making him liable for the late registration fee of \$25, or he may not even be allowed to register. If registration is delayed, the student must obtain a Permit to Attend Classes from the Office of the Registrar.

Official transcripts of record covering all college and university work completed to date, together with official evidence of degrees conferred, should accompany or immediately follow the application. A separate original and official record must be presented from each institution previously attended. **Transcripts of students' records and all other official credentials are retained in the files of the Office of the Dean of the Graduate Division.** In addition to having the records sent to this office, the student must have in his possession an of-

ficial record for his use in conference with departments and for other purposes here. The Graduate Division office copy may not be borrowed.

Students wishing to apply for the programs leading to the Standard Teaching Credential in Education and to the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, and Master of Preventive Veterinary Medicine must file applications directly with the appropriate departments or professional schools.

## **Reentry**

Persons formerly registered in a regular session as graduate students who wish to return must apply for reentry and pay the Reentry Application Fee of \$20 at least six weeks before the beginning of the quarter in which they wish to enroll. The Application for Reentry may be obtained from the Graduate Division. Transcripts of records covering all work undertaken since the student was last registered in graduate status at Davis must be presented along with the Reentry Application.

## **International Students**

Applicants for admission to the Graduate Division on credentials from universities and colleges in foreign countries are advised to make their initial inquiry no later than six months before the date of intended enrollment to permit processing of their records.

Students whose undergraduate preparation has been in a language other than English should furnish positive evidence that their command of both spoken and written English will permit them to profit by the instruction offered. A score report from the Test of English as a Foreign Language (TOEFL), which is administered by the Educational Testing Service for the College Board, is recommended for meeting this requirement. This test is given at many testing centers abroad three times a year, and full information is available from the Educational Testing Service, Princeton, New Jersey 08540. A number of other tests given by authorized examiners abroad are also acceptable. These include the Michigan Test (English Language Institute Test, University of Michigan), the interview reports supervised by the directors of the Institute of International Education overseas office, and the American University Language Center (AULC) Test.

On arrival all international students take the special University examination in English. Those who do not pass are assigned to remedial courses. Even though the student has been admitted, his registration may be deferred until he acquires an adequate command of English.

## **Graduate Study Without an Advanced Degree Objective**

A student who does not wish to become a candidate for a higher degree may be admitted to a specified field of study for course work only. A program, which requires the approval of the Dean, must have a definite scholarly or professional purpose. The scholastic requirements for admission are the same as for those who are candidates for degrees.

### **Program of Study**

When the student reports to his department or group, he will be assigned to the appropriate adviser, who will plan with him his program of study. This will depend to some degree on the undergraduate training, and the student may be assigned to undergraduate courses to remove deficiencies.

Each student must satisfy the degree requirements as published in the *Announcement of the Graduate Division*. The program in an area of study, as established by the department or group and approved by the Graduate Council, often includes a core of required courses, but considerable flexibility is permitted to suit the individual student's 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**

A graduate student registered on any campus of the University may become an Intercampus Exchange Student with the approval of his graduate adviser, the chairman of the department or group in which he wishes to study on the host campus, and the Dean of the Graduate Division on both the home and the host campus. The Intercampus Exchange Student has library, infirmary, and other student privileges on the host campus but is considered as a graduate student in residence on his home campus. The grades obtained in courses on the host campus are transferred to his home campus and entered on his official record. Forms for application for the intercampus exchange may be obtained at the office of the Dean of the Graduate Division. In order to avoid the \$25 late fee penalty, these forms should be filed with the home campus Graduate Division six weeks prior to the beginning of the quarter in which the student wishes to take advantage of this program.

### **Fellowships, Assistantships, and Loans**

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the bases of scholarship and promise of outstanding academic and professional contribution. Applicants planning to enter in a fall quarter and wishing to be considered for a fellowship or graduate scholarship must file the combined application for Admission and Fellowship no later than January 15 of the year preceding the fall quarter to be attended. These applications are considered only once a year; therefore students entering subsequent to a fall quarter cannot be considered. Students continuing in graduate status at Davis must file an application for fellowship and graduate scholarship for continuing students with their major department or graduate group chairman on or before January 15. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, Room 252 Mrak Hall.

Teaching assistantships and research assistantships are available in many departments, and interested students should inquire at the office of the department in which they wish to study.

Certain departments may be authorized to offer a limited number of trainee-

ships under the National Institute of Health. For these the student may write directly to the department. Information regarding Graduate Fellowships supported by various other federal agencies is available at the Graduate Division.

Application for loan funds for graduate students should be addressed to the Office of Financial Aid. (See page 42.)

### **Teacher Credential Program**

Programs leading to a Standard Teaching Credential with specialization in elementary teaching and in secondary teaching are offered under the jurisdiction of the Graduate Division. Graduate students who are prospective candidates for advanced degrees may take special professional courses and qualify for the junior college credential.

The curricula for teacher education are offered by the Department of Education and the Department of Applied Behavioral Sciences, and interested students should obtain detailed information at either department. The courses in professional education required for the credential are specified in this catalog under departmental listings of courses on instruction (see pages 186 and 250). Subject-matter requirements for the teaching major and minor are specified with departmental offerings.

Only students who have completed the bachelor's degree are eligible, and they must be admitted to the program by the Graduate Division. The student must maintain a scholarship record of 2.75 or better in all graduate work undertaken. Application for the 1973-74 program should be made to Room 174, Academic Office Building III, for the Department of Education, and the Graduate Division for the Department of Applied Behavioral Sciences, before January 1, 1973. Exceptions to this rule for those in the Department of Education are made only at the discretion of the Head of Teacher Education.

Since the requirements for the credential are set up both by the State Department of Education and by the University, all students who intend to work for the credential are urged to consult the adviser in one of the departments named above early in their undergraduate career (preferably by the end of their freshman year).

Curricula are offered which lead to the Standard Teaching Credential with a specialization in elementary teaching or in secondary teaching and to the secondary credentials required for teaching classes reimbursed under the National Vocation Acts. Two routes for obtaining each type of credential are available: a student-teaching program (the usual route) and an internship program (limited in enrollment). Application for the intern program should be made to the department early in the senior year.

The course offerings listed in this catalog are subject to change without notice

## Courses of Instruction

### Explanatory Note

*Academic Credit.* Academic work at the University is measured by "units of credit," which determine the amount of time a student has formally devoted to a given subject. In conjunction with the letter grade conferred by the instructor, units of credit give the student and those interested in his career a reasonably accurate evaluation of his progress in various subjects. Units of credit make it possible for a student to assemble a course program for a given term that meets the minimum requirements for a course load while reflecting his special interests. Units of credit also make it possible for students to transfer from one campus or university to another without undue difficulty.

*Relation of Units of Credit to Course Procedure.* The time-honored rule adopted by most colleges and universities is the so-called "Carnegie unit," which assigns one unit of credit for three hours of work by the student per week. The standard distribution of this work is one hour of lecture or discussion presided over 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 assigned for one unit of credit. In most courses at the Davis campus 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 are authorized for increased credit on the stipulation that more demanding assignments are to be laid down by the instructor. Students should inquire of the instructor, at least by the first class meeting, what the course will involve in the way of outside reading, term papers, problem sets, field trips, and the like, for these are not always spelled out completely in the *Catalog* (this applies to all courses but is particularly urgent in the case of 4 or 5 unit courses). In this way, the student will be able to plan his work more systematically.

*Course Designations.* Class hours are published each quarter in the *Class Schedule* and room numbers are given in the *Class Schedule and Room Directory*.

The quarter in which a course is 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 (June to August) which is for students in the School of Medicine only; and Summer (extra session). When a course is listed to be offered in even-numbered years or odd-numbered years, the year involved would be that in which the quarter occurs (e.g., fall quarter 1972 would be an even-numbered year and winter and spring quarters 1973 would be odd-numbered years).

A course number followed by two or three letters from the first part of the alphabet (for example, Mathematics 131A-131B-131C) is continued through three successive quarters, ordinarily from September to June; occasionally, however, a course of two quarters may begin in the Winter Quarter. The first quarter course listed in this way is 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 100A and Economics 100B), the A course is not prerequisite to B unless it is specifically mentioned in the listing of the B course.

*Prerequisites.* Prerequisites for courses should be noted carefully: the responsibility for meeting these prerequisites rests mainly on the student. Certain classes are restricted to a limited number of students, and for these classes it is especially important that the student should have the prerequisite courses by the time the course begins. Otherwise he may find himself displaced by a student who does have the necessary prerequisites. If a student can demonstrate that his preparation is equivalent to that given by the prerequisites specified, these prerequisites may be waived for this student by consent of the instructor.

*Level of Courses.* Freshmen and sophomores are not encouraged to take upper division courses (i.e., those numbered 100-199).

*Special Study Courses.* The regulations of the Academic Senate limit to 5 the number of units of "Special Study" courses that a student may take in a given quarter. On the Davis campus, courses with the following numbers presently fall into this category: 98, 99, 194H, 198, and 199.

A student who finds that he shares with an instructor an academic interest that cannot be accommodated within the formal course structure may find it possible to arrange one of these independent study courses. A special study form may be obtained from the instructor who agrees to give such a course: these proposals must be approved by the Chairman of his department, and are subject to review by the appropriate committees of the Academic Senate. Courses numbered 98 ("Directed Group Study") and 99 ("Special Study for Undergraduates") are for lower division students only. Courses numbered 198 ("Directed Group Study") and 199 ("Special Study for Advanced Undergraduates") are open only to upper division students who have completed 84 or more units toward the bachelor's degree and who are judged to have an adequate background in the subject proposed for special study (in Special Study courses, the subject matter proposed must fall within the instructor's professional competence). It is expected that the amount of effort proposed in Special Study courses will at least equal that required for a regular course of the corresponding unit value.

Some departments offer special Honors courses (194H). Students who are interested in such courses should consult the Chairman of the department concerned.

*Independent Study Program.* The Independent Study Program is intended to provide 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. Under the current system of numbering courses, a program qualifying as Independent Study will consist of one or more courses in the 190-199 series, adding up to a quarter's work. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the activities carried on by a student during an independent study quarter. Regularly offered formal courses will therefore be acceptable as a part of such a program only if they



clearly fit its theme, and contribute something essential toward the realization of its objectives. Under no circumstances is the program to be considered merely a device to raise existing ceilings on variable-unit courses.

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 with whose help and approval a detailed plan is developed; 3) complete a project proposal form, obtained from the dean in each college, and submit it to the Independent Studies Board either directly or through the dean's office. Deadlines will be two weeks prior to the final preenrollment date in the quarter preceding the proposed independent study quarter (see page 7); 4) completion or other termination of the project is to be reported to the Independent Studies Board, which may request such documentation as was provided for in the project proposal.

For further information contact a member of Independent Studies Board. Membership list may be obtained through the deans of the colleges.

*Work-Learn Programs.* Students may undertake a work-learn activity under new courses in the College of Agricultural and Environmental Sciences (Work-Learn 192) and College of Engineering (Engineering 92 and 192). Other courses are found under departmental listings (see Rhetoric, Political Science, Applied Behavioral Sciences, and Family Practices). For further information consult your adviser or the Campus Work-Learn Center.

*Tutorials.* There are some opportunities for students to tutor in their major subject while currently enrolled as undergraduates. Information concerning these tutorial courses (numbered 197T or 197TC) may be obtained from the office of Departments that offer them.

*"Faculty 48" courses* offer an opportunity for a professor or lecturer to lead the exploration of a subject with a group of interested students. The subject matter may be broad in scope or relatively narrow and specialized: in either case it need not fall within the instructor's official field. These courses are authorized by the Davis Division Committee on Courses of Instruction for one time only; announcements of 48 courses do not, therefore, appear in the *Catalog* but are given in the *Class Schedule* for each term.

*Graduate courses.* Graduate courses (numbered 200–299) are open only to students who have adequate preparation; admission is subject to the approval of the instructor in charge.

*Professional teacher-training courses* in the Department of Education and courses in other departments that are specially intended for teachers or prospective teachers are numbered 300–399.

*Professional courses* in departments other than the Department of Education are numbered 400–499.

*Extra-session courses.* Extra-session courses (laboratory, field, or other individual work done out of session 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.

**University Extension courses.** Simultaneous enrollment in resident courses and in extension courses is permitted only upon approval by the appropriate dean or study-list authority.

**Concurrent Courses.** Where classroom space and the instructor's permission is available, enrollment may be granted to University Extension students in courses offered on the Davis campus for regularly admitted and registered students. Such work may be used for admission consideration and for degree recognition.

**Summer Session courses.** Regularly enrolled students or students planning to enroll for the fall quarter can receive credit toward their degrees in Summer Session courses.

**Credit for summer session work at other schools.** 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. However, assurance that such credit will be accepted can be given only after the courses have been completed. Students should arrange to have the transcripts of their summer session grades sent to the Registrar for evaluation.

**Flexibility.** Opportunities for interdisciplinary programs tailored to the individual student's educational objectives are offered by the individual major in the College of Agricultural and Environmental Sciences (p. 66), the College of Engineering (p. 137) and the College of Letters and Science (p. 144).

## **SYMBOLS**

The following numerical footnotes and their accompanying symbols are used throughout the course section:

- <sup>1</sup> Absent on leave, 1972-73.
- <sup>2</sup> Absent on leave, fall quarter 1972.
- <sup>3</sup> Absent on leave, winter quarter 1973.
- <sup>4</sup> Absent on leave, spring quarter 1973.
- \* Not to be given, 1972-73.
- † Not to be given, fall quarter 1972.
- ‡ Not to be given, winter quarter 1973.
- § Not to be given, spring quarter, 1973.

**AFRO-AMERICAN AND BLACK STUDIES**Edward D. Turner, Ph.D., *Chairman of the Program*

Committee Office, 103 TB-115

**Committee in Charge:**Albert J. McNeil, M.S. (*Music*)James J. Murphy, Ph.D. (*Rhetoric*)Edward D. Turner, Ph.D. (*Psychology*)

The Afro-American and Black Studies Program provides opportunity for interested students to pursue a thorough study of Black people. In addition to the Black Studies courses, the Program includes course offerings from the departments of Anthropology, History, Political Science, and Sociology. However, courses relevant to the Program are also offered in Applied Behavioral Sciences, Dramatic Art, Economics, Music, Rhetoric, and Psychology. The Program allows and encourages flexibility in order to cater to the interests of the individual student. Each student, however, is required to select an *area of emphasis* to satisfy the requirements for a major leading to a Bachelor of Arts degree in Black Studies. This area of interest should be discussed with and approved by the Black Studies Committee. Interested students should contact the Black Studies office (telephone 752-1549) for adviser appointments.

Additional courses are being developed as part of a *new* proposed major in Afro-American Studies which will emphasize the tracing of Black culture through the transmigration of Black people from West Africa throughout the Western Hemisphere.

**The Major Program**

Lower Division Courses.—Required: Anthropology 1 or Biological Sciences 10 or Genetics 10; Anthropology 2 or Geography 2; History 4A, 4B, 4C; Music 28; Sociology 30A-30B-30C. Recommended: Applied Behavioral Sciences 47, Geography 11.

Upper Division Courses.—Required: 36 units

of upper division courses to be approved by the Committee. At least 12 of these units must be from the student's area of emphasis. Upper division courses may be selected in consultation with the Committee, although the following courses may be recommended: Anthropology 102, 103B, 139A, 139B, 140, 148, 152, 153; Applied Behavioral Sciences 151A-151B-151C, 160; Asian American Studies 110; Black Studies 101; Economics 125A-125B; History 102M, 160, 175A-175B, 176A-176B; Political Science 101, 146A-146B, 151, 152, 174, 178; Psychology 145, 147A, 198; Sociology 118, 140, 143, 144.

**Teaching Major.**—Requirements for the teaching major are the same as for the major in Afro-American and Black Studies with the addition of course 10.

**Teaching Minor.**—A minimum of 30 units (including course 10) in the Afro-American and Black Studies curriculum.

**Subject Representative:** Mr. Turner.

**Black Studies****Lower Division Courses****1. Introduction to Black Studies. (4) I, III.**

Lecture—4 hours. Prerequisite: Sociology 1 or Anthropology 2; History 27A-27B or History 17A-17B; Psychology 1C. Problems and Methodology in Black Studies. Mr. Irby

**2. The Ancestral Homeland. (4) II, III.**

Lecture—4 hours. Prerequisite: course 1. Basic ecology, population, social organization, and remnant culture of West Africa before, during and after colonialism. Mr. Irby

**10. General Black Studies. (4) I, II.**

Lecture—4 hours. Survey of the field of black studies. For students who do not plan to major in black studies. Mr. Irby

**AGRICULTURAL CHEMISTRY (A Graduate Group)**Donald G. Crosby, Ph.D., *Chairman of the Group*

Group Office, 109 Environmental Toxicology

**Graduate Courses****290. Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. The course is designed to provide the individual student with an opportunity to organize, present orally, and defend a concept within a body of knowledge of importance to the area of agricultural chemistry. The Staff (Mr. Crosby in charge)

**298. Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. The chem-

istry and biochemistry of foods, nutritional chemicals, pesticides, and other special topics as they apply to agricultural chemistry.

The Staff (Mr. Crosby in charge)

**299. Research. (1-12) I, II, III, (Summer).**

Arrangements should be made well in advance with a member of the Group in Agricultural Chemistry. The Staff (Mr. Crosby in charge)

**Related Courses:** See Food Science and Technology 250A-250B, 250C, 251A-251B, 251C.

**AGRICULTURAL ECONOMICS—See Also Consumer Economics**

## AGRICULTURAL ECONOMICS

*Major Advisers.*—See *Class Schedule* listing.

*Major Program and Graduate Study.*—See pages 67 and 172. Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

*Note.*—Each course (includes lower division, upper division, and graduate courses) is listed under one of the following groups:

- a) Production and Marketing Management
- b) Economic Theory
- c) Research Methods and Quantitative Analysis
- d) Economic Policy and Institutions
- e) Natural and Human Resource Development
- f) Individual and Directed Study Courses

### a) PRODUCTION AND MARKETING MANAGEMENT

#### 1. Economic Basis of the Agricultural Industry.

(4) II.

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. Mr. Snyder.

#### 18. Business Law. (4) I.

Lecture—4 hours. Prerequisite: sophomore standing. Introduction to law; contracts, sales, and agency. Mr. McGahan

#### 49. Field Practice. (1) III.

Field trip during fall Orientation Week to observe aspects of the production, processing, handling, and distribution of agricultural products. To be given between winter and spring quarters. Considered a spring quarter course for preenrollment. (Passed/Not Passed grading only.) Mr. Foytik

#### 112. Fundamentals of Business Organization. (4) I.

Lecture—4 hours. Principles and practices of business organization; goals; financial and personnel requirements; selection of form of organization—single ownership, partnership, corporation, and cooperative—to facilitate attainment of goals; taxation, industry structure; legal, political, and social problems.

#### 113. Fundamentals of Business Management. (4) II.

Lecture—4 hours. Recommended: course 112. Management principles and their application to all forms of business including cooperatives; the planning function; procurement, sales, finance, and personnel; case studies of agriculturally related businesses. Mr. Garioian

#### 114. Production Management. (4) III.

Lecture—4 hours. Recommended: course 113. Principles and procedures for the efficient use of resources in processing and handling of agricultural products; plant layout; work scheduling; inventory control; coordination of production and sales; location. Mr. Foytik

#### 117. Managerial Accounting. (4) III.

Lecture—4 hours. Prerequisite: Economics 11B; course 112 recommended. Basic concepts of accounting as a managerial tool; procedures for financial reporting; systems and internal control; cost accounting; budgeting; interpretation of administrative reports. Mr. Johnson, Mr. Moore

#### 130. Agricultural Marketing. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or equivalent. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing. Mr. Carman

#### 140. Farm Management. (5) III.

Lecture—4 hours; laboratory—2 hours. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business. Mr. Hedges

#### 145. Farm and Rural Resources Appraisal. (3) I.

Lecture—3 hours; one field trip. Principles of farm and ranch appraisal; land utilization in relation to problems of development and valuation. Mr. Johnston

#### \*160. Advanced Agricultural Marketing. (3) III.

Lecture—3 hours. Recommended: course 155. The marketing firm in its economic context: market structures; pricing and price policies; empirical demand analysis; marketing cost and efficiency; public policies toward marketing. Mr. Carman

#### \*170. Advanced Farm Management. (3) III.

Lecture—3 hours. Prerequisite: course 155 or equivalent. The farm firm in its economic context: resource and enterprise combinations; size of firm; uncertainty considerations; replacement policies; demand for inputs; nonfarm influences. Mr. Paris

#### 257. Production Planning and Market Analysis. (3) II.

Lecture—3 hours. Quantitative analysis of production systems by statistical, economic, and engineering methods; sales analysis for the in-

\* Not to be given, 1972-73.

dividual firm; problems of investment, location, scale of operations. Mr. King

### 260. Administrative Organization and Policy Formation. (3) II.

Lecture—3 hours. Concepts and techniques of administration in the business firm; formulation and implementation of management goals; planning, procuring, organizing, and controlling physical factors and personnel. Mr. Logan

#### b) ECONOMIC THEORY

### 100A. Economic Analysis in Agriculture. (3) I.

Lecture—3 hours. Prerequisite: Economics 1A, 1B; Mathematics 16A (may be taken concurrently). Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition. Mr. Carman

### 100B. Economic Analysis in Agriculture. (3) II.

Lecture—3 hours. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition. Mr. Logan

### 100C. Economic Analysis in Agriculture. (3) III.

Lecture—3 hours. Prerequisite: course 100B or equivalent. Theory of regional specialization, location, and trade for agricultural products; general economic equilibrium. Mr. King

### 200A. Microeconomic Theory. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or consent of instructor. Theory of the Firm under Perfect Competition; programming and dynamic models of the firm. (Same course as Economics 200A.) Mr. French

### 200B. Microeconomic Theory. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A and Mathematics 16B or consent of instructor. Static and dynamic consumer behavior, imperfect competition, market and multi-market equilibrium, introduction to welfare economics and externalities. (Same course as Economics 200B.) Mr. Kaneda, Mr. Sosnick

### 200C. Microeconomic Theory. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103 and 200B. Linear economic systems, the static Leontief system, competitive general equilibrium, welfare economics, comparative statics and risk. (Same course as Economics 200C.) Mr. Lianos

#### c) RESEARCH METHODS AND QUANTITATIVE ANALYSIS

### 103. Theory of Economic Optimization. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B; mathematics 16A, 16B. Analytics of economic optimizing behavior for consumers and firms, using linear algebra, partial differentiation, quasi-concave functions, and the Kuhn-Tucker theorems. (Same course as Economics 103.) Mr. Rausser

### 106A. Quantitative Methods in Agricultural Economics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 13 or equivalent. Statistical methods for analyzing quantitative agricultural economics data: descriptive statistics, probability, hypothesis testing, statistical inference, and sampling. Mr. Rausser

### 106B. Quantitative Methods in Agricultural Economics. (3) III.

Lecture—3 hours. Prerequisite: course 106A or equivalent. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis. Mr. Foytik

### 155. Quantitative Analysis for Business Decisions. (3) I.

Lecture—3 hours. Prerequisite: course 106A; Mathematics 16A. Introduction to selected topics in operations research, including mathematical programming, applied decision theory, game theory, and inventory models. Mr. French

### 190A-190B. Senior Research Project. (2-2) I-II, II-III.

Supervised individual research. The research report begun in 190A will be revised and completed in 190B. (Deferred grading only, pending completion of the sequence.)

A: I. Mr. Fuller, II. Mr. Paris;  
B: II. Mr. Fuller, III. Mr. Paris

### \*210. Econometric Methods. (4) III.

Lecture—4 hours. Prerequisite: Mathematics 130B and a course in linear algebra. Statistical models and their use in estimation of economic relationships; single and multiple equation systems. (Same course as Economics 240A.) Mr. Rausser

### 211. Advanced Econometrics: Theory. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210; Mathematics 131A, 131B, 131C recommended. Multivariate analysis, specification analysis, simultaneous equation models, identification, estimating methods, small sample properties. (Same course as Economics 240B.) Mr. Rausser

### \*212. Advanced Econometrics: Applications. (3) II.

Lecture—3 hours. Prerequisite: course 210.

\* Not to be given, 1972-73.

Time series analysis and distributed lags, pooling of time series and cross-section data, Bayesian analysis, applications for prediction and policy. (Same course as Economics 240C.)

Mr. Rausser

**253. Linear Programming Analysis of Operational Problems. (3) II.**

Lecture—3 hours. Linear programming methods with application to production, consumption, transportation, transshipment, and assignment problems; recursive and multiperiod programming, problems of aggregation and planning with limited information.

Mr. Paris

**254. Quantitative Analysis of Operational Problems. (3) III.**

Lecture—3 hours. Nonlinear and dynamic programming methods with application to production, consumption, inventory, replacement market equilibrium and competitive decision problems.

Mr. Paris

**255. Systems Analysis and Simulation. (3) III.**

Lecture—3 hours. Dynamic model formulation and computer simulation of economic systems.

Mr. French

**280. Analysis of Research in Production Economics. (3) I.**

Lecture—3 hours. Current problems and methods of analysis in agricultural production economics research. Emphasizes both firm and industry.

Mr. Carter

**281. Economic Analysis of Demand and Trade. (3) II.**

Lecture—3 hours. Models and methods of analysis of demand, interregional trade, and location in the agricultural economy.

Mr. King

**d) ECONOMIC POLICY AND INSTITUTIONS**

**120. Agricultural Policy. (3) III.**

Lecture—3 hours. Analytical treatment of recent and current economic problems and governmental policies and programs affecting American agriculture.

Mr. Snyder

**125. Comparative Agriculture. (4) II.**

Lecture—4 hours. The agriculture of the principal countries of the world, with special reference to the influence of food supply upon the development of man.

Mr. Hedges

**221. Agricultural Policy in Developed Countries. (3) I.**

Lecture—3 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies relating to production, marketing, price, income, rural poverty, and resource adjustment; international trade policies for temperate zone agricultural commodities.

Mr. Fuller

**222. Agricultural Policy and Planning in Developing Countries. (3) III.**

Lecture—3 hours. Agriculture in the structure of developing nations; its role in economic development; historical experience and theoretical models; agricultural and national planning; sectoral policies relating to prices, inputs, productivity, and marketing; international inputs into agricultural development; case studies.

Mr. Hansen

**250. Institutional Setting for Agricultural Business. (3) I.**

Lecture—3 hours. Study of economic and social influences of the institutional environment on agriculture-related industries; historical development and present structure of the American economy; governmental activities; financial aspects; labor problems.

Mr. Sosnick

**e) NATURAL AND HUMAN RESOURCE DEVELOPMENT**

**147. Natural Resource Economics. (3) I.**

Lecture—3 hours. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public policy issues.

Mr. Johnston

**148. Economic Planning for Regional and Resource Development. (3) II.**

Lecture—3 hours. Relation of resources to economic growth, including regional problems; planning economic development with particular emphasis on resource use in agriculture; selected resource development programs in the United States and certain foreign countries, including land reform experiences.

Mr. Snyder

**150. Agricultural Labor. (3) I.**

Lecture—2 hours; discussion—1 hour. Problems, attitudes, and characteristics of agricultural employers, employees, and labor contractors. Impact of mechanization; determinants of productivity; wage levels and structures; evolution and efficiency of the labor market; placement and supervision; off season and in season unemployment; organization and conflict; relevant legislation.

Mr. Sosnick

**176. Economic Analysis in Resource Use. (3) III.**

Lecture—3 hours. Prerequisite: Economics 1A, 1B; course 100B or equivalent recommended. An analytical treatment of resource use problems, including public policy issues; economic productivity and natural resources; determinants, principles, and patterns of natural resource use; resource conservation; land tenure problems and policies.

Mr. Hansen

**283. Analysis of Research in Natural Resource Economics. (3) III.**

Lecture—3 hours. Scope and disciplinary context of natural resource economics. Recent problems affecting policy and use planning including efficiency and welfare criteria, technological externalities, public goods, extramarket goods, indivisibilities, and intertemporal problems; benefit cost analysis and public and private investment criteria. Mr. Johnston

**f) INDIVIDUAL AND DIRECTED STUDY COURSES****98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Carter in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Carter in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Carter in charge)

**AGRICULTURAL EDUCATION**

*Major Advisers.*—See *Class Schedule* listing.

*Secondary Credentials—Agriculture:* Mr. Juergenson, 204E Walker Hall.

*Secondary Credentials—Homemaking:* Mrs. Adams, 203B Walker Hall.

*Junior College Credentials—Agriculture:* Mr. Juergenson, 204E Walker Hall.

*Major Program and Graduate Study.*—See pages 68 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Upper Division Courses****160. Vocational Education. (3) III.**

Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics, and industry. Mr. Thompson

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Thompson in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

**Graduate Courses****290. Seminar. (2) I, II, III.**

Discussion—2 hours. Reports and discussions

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: junior or senior standing and consent of instructor. Limited to students with adequate preparation in Agricultural Economics. The Staff (Mr. Carter in charge)

**298. Directed Group Study. (1-5) I, II, III.**

Advanced study in various subjects through special seminars on topics to be selected each year, informal group studies of special problems, or group research on problems for analysis and experimentation. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Carter in charge)

**299. Individual Study. (1-12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Carter in charge)

**299D. Special Study for Doctoral Dissertation.**

(1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Carter in charge)

*Related Courses:* see Environmental Planning and Management 110; Environmental Studies 12, 102, 160, 168; Consumer Economics.

of topics of interest in the fields of agricultural education, home economics education, agricultural extension, and adult education. (Satisfactory/Unsatisfactory grading only.) Mr. Thompson, Miss Regan

**299. Research. (1-6) I, II, III.**

Research in agricultural education, home economics education, vocational education, agricultural extension, or adult education.

The Staff (Mr. Thompson in charge)

**Supervised Teaching Courses****320A. Introduction to Teaching. (1) I, II, III.**

Lecture—1 hour. Observations and participation in some form of public school work.

Mr. Juergenson

**320B. Instructional Materials and Procedures. (3) III.**

Lecture—2 hours; laboratory—3 hours. Introduction to the materials and procedures used in teaching. Use of audio-visual, radio and other teaching aids. Preparation of teaching materials; collecting, organizing, processing, and evaluating community resources. Mr. Juergenson

**320C. Supervised Teaching. (12) I, II, III.**

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in agriculture.

Mr. Juergenson



**320E. Curriculum and Instruction Procedures.**

(3) I, II, III.

Discussion—3 hours. Prerequisite: all students enrolled in course 320E must enroll in

320C concurrently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching. Mr. Juergenson

**AGRICULTURAL ENGINEERING—See also Engineering: Agricultural**  
**AGRICULTURAL ENGINEERING**

All courses listed here are in the process of being changed to Agricultural Engineering Technology and Consumer Technology. Please see your adviser or Mr. J. R. Goss, Chairman, Department of Agricultural Engineering for information on approved changes. Courses listed here are in the College of Agricultural and Environmental Sciences and are intended primarily for students not majoring in Engineering. For course offerings in the College of Engineering, see page 256. For the Bachelor of Science major program and graduate study (College of Engineering) see pages 118 and 172.

**Lower Division Courses**

**10. Machines, Systems and Man in Agriculture.**

(3) II.

Lecture—2 hours; laboratory, tutorial laboratory and field trips—3 hours. The role of engineering in agriculture, with emphasis on current problems in food production and processing such as residue management, new machinery developments, and effects of mechanization on agricultural labor. Intended for students not majoring in engineering. Mr. Burkhardt, Mr. Dobie

**98. Directed Group Study for Lower Division Students. (1-5) I, II, III.**

The Staff (Mr. Goss in charge)

**99. Special Study for Lower Division Students. (1-5) I, II, III.**

The Staff (Mr. Goss in charge)

**Upper Division Courses**

**100. Social Implications of Mechanization in Agriculture. (3) II.**

Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. The roles of rural manpower and mechanization in the production of food and fiber. Pressures for mechanization and social implications of the resulting developments. Technological considerations in developing machines. Human benefits and stresses resulting from increased levels of mechanization. Mr. O'Brien

**101. Machinery Systems in Food Production. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Planning and operating economic machinery systems for the application of energy to the tasks of agricultural production and pro-

cessing. Emphasis on overall systems coordination and evaluation, machinery-labor-economics relationships, and energy resource utilization. Mr. Chancellor

**103. Engines for Automotive, Agricultural, Residential and Recreational Use. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction, operation, performance, and utilization. Engine fuel resources and properties of fuel, lubricants, and engine exhaust. Fuel combustion, carburetion, and electrical systems. Intended for students not majoring in engineering. Mr. Burkhardt

**104. Agricultural Machinery. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Principles of construction, operation, selection, and utilization of equipment for tillage, planting, harvesting, and the application of agricultural chemicals. Mr. Kepner

**105. Farm Structures. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Functional and structural design of unified physical plants for livestock production and other enterprises; principles of feed mills, materials conveying, water and electrical systems, feed storage; labor-efficiency studies; materials for and design of beams, columns, trusses, and tanks. Mr. Albright

**107. Agricultural Meteorology. (3) I.**

Lecture—3 hours. Prerequisite: Geography 1 or 3 or consent of instructor. Daytime radiation intensities, nocturnal heat losses, climatic elements over different ground cover and terrain. Modification of microclimate by sheltering, frost-protection devices, and windbreaks. Probabilities of temperatures, rainfall, and climatic hazards to agriculture (risk figures). Mr. Schultz

**110. Physical Aspects of Insect, Fungus and Weed Control. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Use and effectiveness of chemicals and biological materials in plant protection systems; hazards to health, crops, and wildlife. Atomization, transport and deposit; aerial and ground application: liquid and dry formulation; regulations and economics. Mr. Yates



**198. Directed Group Study.** (1-5) I, II, III.  
Prerequisite: consent of instructor.  
The Staff (Mr. Goss in charge)

**199. Special Study for Advanced Undergraduates.**  
(1-5) I, II, III.  
The Staff (Mr. Goss in charge)

**Graduate Courses**

**298. Group Study.** (1-5) I, II, III.  
The Staff (Mr. Goss in charge)

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

**Professional Courses**

**\*314A. Agricultural Engineering Problems and Techniques for Teachers.** (3) II.  
Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and

repair of agricultural structures, machinery, and utilities. Offered in even-numbered years.

**314B. Agricultural Engineering Problems and Techniques for Teaching.** (3) II.  
Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in odd-numbered years.  
Mr. Garrett

**317. Problems in Teaching Farm Mechanics.** (4) II.  
Lecture—2 hours; laboratory—6 hours. Prerequisite: 12 units in Agricultural Engineering, including courses 314A, 314B; Physics 2B or 4B. Demonstrations of and practice in the methods of teaching farm mechanics in secondary schools. School-shop planning including the selection, arrangement, and management of equipment. Curriculum planning, including the relation of teaching materials, references, and visual aids.  
Mr. O'Brien

**AGRICULTURAL PRACTICES**

Harry O. Walker, Ed.D., *Chairman of the Department*  
Department Office, 105 TB-10

The Department of Agricultural Practices administers the College of Agricultural and Environmental Sciences work-experience and internship programs. Students who would like to enrich their educational programs through supervised work-experience should visit the Agricultural Practices office. Opportunities are available in all of the career possibilities (see section on the Majors) for which the College prepares its students.

**Lower Division Courses**

**49A. Field Equipment Operation.** (1) I, III.  
Laboratory—3 hours. Prerequisite: consent of instructor. Theory and operation of the major types of field equipment, wheel and track-type tractors used in agriculture, forestry, and natural resource management. Essentials of safe equipment operation, the fundamentals of preventive maintenance, field adjustments and

trouble shooting are presented. (Passed/Not Passed grading only.)  
Mr. Hanna

**49B. Field Equipment Maintenance.** (1) II.  
Laboratory—3 hours. Prerequisite: consent of instructor. Theory of operation and maintenance principles for internal combustion engines, power trains, hydraulic and pneumatic controls. Introduction to arc and acetylene welding, the care and use of basic hand and shop tools. (Passed/Not Passed grading only.)  
Mr. Hanna

**99. Special Study for Undergraduates.** (1-3) I, II, III.  
Laboratory—3-9 hours. Prerequisite: consent of instructor. Directed study concurrent with selected work-experience opportunities in the technical and/or professional phases of agriculture production, business and research, natural resource management, applied social and behavioral sciences.  
The Staff (Mr. Walker in charge)

**AGRICULTURAL SCIENCE AND MANAGEMENT**

*Major Advisers.*—See *Class Schedule* listing.  
*Major Program and Graduate Study.*—See pages 69 and 172.

Questions pertaining to the following courses should be directed to the instructor or the

Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Upper Division Courses**

**190. Proseminar in Agricultural Science and Management.** (1) I, II, III.  
Seminar—1 hour. Prerequisite: senior standing in Agricultural Science and Management or

\* Not to be given, 1972-73.

consent of instructor. Reports and discussion of current developments in the agricultural industry. (Passed/Not Passed grading only.)

The Staff (Mr. Carroll in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Discussion—1-5 hours. Prerequisite: senior standing. Selected topics relating to application of science and management techniques to problems of the agricultural industry.

The Staff (Mr. Carroll in charge)

## AGRONOMY AND RANGE SCIENCE

*Related Undergraduate Majors and Graduate Study.*—See pages 91, 92, and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Upper Division Courses

**100. Science and Technology of Field Crop Production. (3) I.**

Lecture—3 hours. Prerequisite: six units of plant science, botany, and/or biology, or consent of instructor. Fundamentals of field crop production and solving agronomic problems using ecological, physiological, and genetic principles. Recommended for non-majors in agronomy. Mr. Peterson

**111. Cereal Crops of the World. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: 6 units of plant science, botany, and/or biology, or consent of instructor. Contribution of cereal crops to man's development; adaptation, production, utilization, and factors determining quality of wheat, oats, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements. Mr. Schaller

**112. Forage Crop Ecology. (3) III.**

Lecture—3 hours. Prerequisite: Botany 2 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. Mr. Raguse

**112L. Forage Crops Ecology Laboratory. (1) III.**

Laboratory—3 hours. Prerequisite: course 112. Laboratory work in forage crop ecology to supplement course 112. Mr. Raguse

**113. Fiber, Oil, and Sugar Crops in a Changing World. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: 6 units of plant science, botany and/or biology, or consent of instructor. Industrial crops as world resources of food, feed, fiber, and con-

### Graduate Courses

**290. Seminar. (1) I.**

Seminar—1 hour.

The Staff (Mr. Carroll in charge)

**298. Group Study. (1-5) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Carroll in charge)

**299. Research. (1-6) I, II, III.**

The Staff (Mr. Carroll in charge)

sumer goods. The relationship of crops to their physical and biotic environment, technological changes, socioeconomic and political forces that shape crop production, and utilization practices. Mr. Mikkelsen

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Knowles in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: 6 upper division units of agronomy. The Staff (Mr. Knowles in charge)

### Graduate Courses

**205A-205B. Design, Analysis, and Interpretation of Experiments. (3-3) II-III.**

Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing in Plant Science, Mathematics 13; an elementary knowledge of FORTRAN or ALGOL recommended. The planning and analysis of field and laboratory experiments with emphasis on the biological interpretation of results. Mr. Qualset, Mr. Williams

**210. Agricultural Research Planning and Management. (3) II.**

Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing in any agricultural field of study and consent of instructor. An analysis of the problems of planning, managing, evaluating and utilizing agricultural research to promote agricultural development. Mr. Peterson

**221. Advanced Plant Breeding. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113. Advanced topics in plant breeding. Genetic diversity and centers of origin of cultivated plants, mating systems in plants, polyploidy, host-pathogen relationships, role of mutagens in plant breeding, and other topics of current interest. Mr. Stanford

**\*222. Quantitative Genetics and Plant Improvement. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113; Genetics 105; or consent of instructor. The genetic forces affecting populations. Formulation of breeding plans

based on principles of population and quantitative genetics. Offered in even-numbered years.

Mr. R. W. Allard

### 223. Selection Theory in Plant Breeding. (3) II.

Lecture—2 hours; discussion—3 hours. 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.

Mr. Jain, Mr. Qualset

### 230. Advanced Population Biology. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 103; recommended—a basic course in ecology (Botany 117, Zoology 125, etc.). The dynamics of growth and evolution of populations. Genetic and ecological aspects of population regulation and integration. Natural selection within and among populations. Intra- and interspecific competition. Community structure and diversity.

Mr. Jain

### 231. Advanced Topics in the Ecology of Crop Plant Communities. (3) II.

Lecture—3 hours. Prerequisite: Plant Science 101 or consent of instructor. Analytical models and quantitative description of the structure

and dynamics of field crop communities in relation to interplant competition, population functions and environmental adaptation.

Mr. Laude

### 232. Advanced Topics in the Physiology of Crop Plants. (3) I.

Lecture—3 hours. Prerequisite: Plant Science 102 or consent of instructor. Physiological aspects of vegetative and reproductive growth of field crop plants in relation to their field behavior.

Mr. Huffaker

### 290. Seminar. (1) I.

The Staff (Mr. Knowles in charge)

### 298. Group Study. (1-3) I, II, III.

Directed study in the areas of plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff (Mr. Knowles in charge)

### 299. Research. (1-9) I, II, III.

Original research involving plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff (Mr. Knowles in charge)

Related Courses: see Plant Science and Range Management.

## AMERICAN STUDIES

Robert A. Wiggins, Ph.D., *Chairman of the Program*  
Program Office, 822 Sproul Hall

### Committee in Charge:

William G. Davis, Ph.D. (*Anthropology*)  
Ted W. Margadant, Ph.D. (*History*)  
Jay E. Mechling, Ph.D. (*American Studies*)  
Brom Weber, Ph.D. (*English and American Studies*)  
Robert A. Wiggins, Ph.D. (*English*)

### Faculty:

#### Professor:

\*Brom Weber, Ph.D. (*English and American Studies*)

#### Associate Professor:

\*Robert Merideth, Ph.D.

#### Assistant Professors:

Jay E. Mechling, Ph.D.  
David S. Wilson, Ph.D. (*English and American Studies*)

Major Advisers.—Mr. Merideth, Mr. Mechling.

American Studies, a major in which leads to the Bachelor of Arts degree, involves the inter-

disciplinary study of American culture past and present, with attention to cross-cultural study so as to provide a basis for comparative analysis and evaluation. The major consists of a core of interdisciplinary courses which, taken in conjunction with an upper division "disciplinary" or "problem" or "cross-cultural" emphasis, as well as additional courses in both the methodology of cultural study and the data of American culture—from departments in the humanities and arts, the social sciences, and the natural and applied sciences—will enable the student to obtain a coherent understanding of the cultural heritage and problems of the United States. The program bridges disciplinary, departmental, and other specialized boundaries of inquiry and knowledge in order to develop a fully ecological view of the American and of the complex sociobiophysical environment to which he is obliged to adapt as an individual. The major prepares students for professional careers requiring a knowledge of American culture in teaching, industry, business, and government; for special

\* Absent on leave, fall quarter 1972.

\* Absent on leave, spring quarter 1973.

training in such fields as Law, Library Science, Journalism, and Social Work; and for graduate study in American Studies and the disciplines in which students may complete the equivalents of departmental majors. Since each student's program is individually designed in accordance with the emphasis he elects, early consultation with an adviser in American Studies is strongly recommended for potential majors with regular advising conferences thereafter.

For admission to the Upper-Division Major.—Required: at least one course from the American Studies 1 sequence (1A, 1B, 1C, 1D) and American Studies 45; an understanding of theories of culture, of American history, and of social structure and processes such as would be expected with successful completion of Anthropology 2, History 17A–17B, Sociology 1, or appropriate equivalents. Recommended: courses chosen in consultation with an American Studies adviser as preparation for (a) the upper division cross-cultural study, as well as (c) courses in the natural sciences, social sciences, and humanities which meet College distribution requirements and at the same time contribute clearly to the study of American culture (e.g., Biological Sciences 10, English 30A–30B–30C, Psychology 10). A listing of appropriate courses is available upon request in the American Studies office.

Upper-Division Major.—Required: 1. American Studies 110, 140A–140B–140C, 190A–190B–190C; 2. *One* from the following three emphases (student's plan to be approved in advance by an adviser): (a) 20 units of upper-division course work in a single department, concentrating on American culture (e.g., 20 units of courses in anthropology or literature or history or sociology); or (b) 20 units of course work focusing on a single cultural problem or theme (e.g., bureaucratization, urban studies, the arts, science and culture, religion and culture); or (c) 8 units of course work in a culture or subculture selected as the subject of cross-cultural study (see below) plus 12 units of further study in the data of American culture (see below). 3. *Two* from the following three options: (a) 12 units of cross-cultural study beyond American Studies 110 chosen in consultation with an American Studies adviser; (b) 12 units of supplementary theory and methods courses chosen from an annually revised list available in the American Studies office; (c) 16 units of courses in the data of American culture chosen from an annually revised list available in the American Studies office. Recommended: courses in the unused option from (3) above.

*Teaching Major.*—The major in American Studies provides a basis for obtaining teaching credentials in elementary and secondary schools; the student's program must be arranged for the purpose in consultation with the Chairman of the American Studies Program.

#### Lower Division Courses

##### 1A. American Culture and Technology. (4) III.

Lecture—2 hours; discussion—2 hours. Critical examination of industrial and agricultural technology's role in American culture by exploring its ramifications in past and contemporary America, using written and other materials drawn from many fields and synthesizing the disparate cultural elements of the problem.

Mr. Mechling

##### 1B. Religion in American Culture. (4) I.

Lecture—2 hours; discussion—2 hours. Critical examination of religion's role in American culture by exploring its ramifications in past and contemporary America, using written and other materials drawn from many fields and synthesizing the disparate cultural elements of the problem.

Mr. Wilson

##### \*1C. Race and Nationality in American Culture. (4) III.

Lecture—2 hours; discussion—2 hours. Critical examination of the role of race and nationality in American culture by exploring their ramifications in past and contemporary America, using written and other materials drawn from many fields and synthesizing the disparate cultural elements of the problem.

Mr. Wilson

##### 1D. Tradition and Revolution in American Culture.

###### (4) II.

Lecture—3 hours; discussion—1 hour. Critical examination of characteristic patterns of tradition and revolution in American culture, past and present; emphasis on continuities and relationships in the arts, communities, ideologies, literature, politics, radical movements, religion, etc.

Mr. Merideth

##### 45. Introduction to American Studies. (4) I, III.

Lecture—2 hours; discussion—2 hours; evaluation of written reports and conferences with individual students. Prerequisite: Anthropology 2, Sociology 1 or 12. The elements of American Studies, including the background and general nature of American Studies, and the methods and philosophies of the academic disciplines which deal with the United States.

Mr. Merideth, Mr. Mechling

##### 98. Directed Group Study. (1–5) I, II, III.

The Staff (Chairman in charge)

##### 99. Individual Study for Undergraduates. (1–5)

###### I, II, III.

The Staff (Chairman in charge)

#### Upper Division Courses

##### 110. Introduction to Cross-Cultural Studies. (4) II.

Lecture—3 hours; short papers, tutorial conferences, archival exercises. Prerequisite: course 45. Similarities and differences between (1)

\* Not to be given, 1972–73.

American culture and foreign cultures, and (2) comparable elements in American culture (sub-cultures, value systems, etc.); theories, research methods and problems, representative models and importance of cross-cultural comparison and contrast; historical and nonhistorical approaches.

Mr. Weber

**140A. Events and Institutions in American Culture.**

(4) II.

Lecture—3 hours; reports and tutorial conferences. Prerequisite: course 45. Study of a selected, limited period in the history of American culture, focusing on events and institutions, multidisciplinary but integrated for the purpose of comprehending the period's character and meaning. Emphasis on quantitative theory and methods.

Mr. Mechling

**140B. Value and Meaning in American Culture. (4) I.**

Lecture—3 hours; reports and tutorial conferences. Prerequisite: course 45. Study of a selected, limited period in the history of American culture, approached thematically, multidisciplinary but integrated for the purpose of comprehending the period's character and meaning. Emphasis on qualitative theory and methods.

Mr. Wilson

**140C. Problems in American Culture. (4) III.**

Lecture—3 hours; reports and tutorial conferences. Prerequisite: courses 45, 140A, 140B. Multi- and inter-disciplinary analysis in depth of a selected problem in American culture. Emphasis on the selection and application of appropriate concepts, methods, and techniques.

Mr. Merideth

**190A. Senior Proseminar. (4) I.**

Seminar—3 hours; individual conferences and written report evaluations. Prerequisite: consent

of Chairman of American Studies Program. Individual research on American Studies topics. (Deferred grading only, pending completion of sequence.) The Staff (Mr. Merideth in charge)

**190B. Senior Proseminar. (4) II.**

Seminar—3 hours; individual conferences and written report evaluations. Prerequisite: course 190A. Individual research on American Studies topics. (Deferred grading only, pending completion of sequence.)

The Staff (Mr. Merideth in charge)

**190C. Senior Proseminar. (4) III.**

Seminar—3 hours; individual conferences and written report evaluations. Prerequisite: course 190A-190B. Individual research on American Studies topics. (Deferred grading only, pending completion of sequence.)

The Staff (Mr. Merideth in charge)

**197T. Tutoring in American Studies. (1-5) I, II, III.**

Tutorial—1-5 hours. Prerequisite: consent of Chairman 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. (Passed/Not Passed grading only.)

**198. Directed Group Study. (1-4) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Merideth in charge)

**199. Special Study for Advanced Undergraduates.**

(1-4) I, II, III.

Prerequisite: consent of instructor and Chairman of American Studies Program.

The Staff (Mr. Merideth in charge)

## ANATOMY

\_\_\_\_\_, *Chairman of the Department*

Department Office, 1091 Haring Hall

**Professors:**

Logan M. Julian, D.V.M., Ph.D.

Walter S. Tyler, D.V.M., Ph.D.

**Associate Professors:**

Leslie J. Faulkin, Jr., Ph.D.

<sup>1</sup>Benjamin L. Hart, D.V.M., Ph.D.

**Assistant Professor:**

Raymond D. Barnes, Ph.D.

◇ ◇ ◇

**Professor:**

Ralph L. Kitchell, D.V.M., Ph.D. (*Visiting*)

<sup>1</sup> Absent on leave, 1972-73.

**Lecturer:**

Dale L. Brooks, D.V.M.

**Upper Division Courses**

**100. Systematic Anatomy. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Zoology 2. Lectures and dissections emphasizing the typical structure of the anatomical systems of the dog, rat and monkey. Offered in odd-numbered years. Mr. Barnes

**140. Neurology of Domestic Animals. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: freshman standing in School of Veterinary Medicine or consent of instructor. An integrated approach to neuroanatomy-neurophysiology of domestic animals. Mr. Kitchell in charge

**150. Functional Comparative Anatomy of the Locomotor System of Domestic Animals. (2) I.**

Lecture—2 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or Zoology 100 and consent of instructor. Gross, subgross, light microscopic and electron microscopic anatomy of the locomotor systems of domesticated mammals. Chairman in charge

**151. Functional Comparative Anatomy of the Locomotor System of Domestic Animals. (4) I.**

Laboratory—12 hours. Prerequisite: course 150 (should be taken concurrently). Dissection of the locomotor system. Microscopic anatomy of the basic tissue types as represented in the locomotor system. Chairman in charge

**155. Functional Comparative Anatomy of Internal Organ Systems: Lecture. (2) II.**

Lecture—2 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or embryology and consent of instructors. Functional comparative gross, subgross, light microscopic, and electron microscopic anatomy of the organs in the abdomen and thorax. Chairman in charge

**156. Functional Comparative Anatomy of Internal Organ Systems: Gross Laboratory. (2) II.**

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Dissection and demonstration of organ systems in abdomen and thorax. Chairman in charge

**157. Functional Comparative Anatomy of Internal Organ Systems: Microscopic Laboratory. (2) II.**

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Laboratory study and demonstration of microscopic and submicroscopic structure of organs of abdomen and thorax. Chairman in charge

**160. Functional Comparative Anatomy of Poultry and Experimental Animals. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: freshman standing in School of Veterinary Medicine or consent of instructor. Gross and microscopic anatomy of poultry and conventional laboratory mammals. Chairman in charge

**170. Principles of Normal and Abnormal Animal Behavior. (3) III.**

Lecture—3 hours. Prerequisite: course 150 and Physiological Sciences 140B or consent of instructor. An examination of normal behavioral patterns of domestic animals with emphasis on the historical, environmental, and organismic determinants of behavior. An analysis of factors contributing to abnormal behavior in domestic animals.

**180. Surgical Anatomy. (4) III.**

Laboratory—12 hours. Prerequisite: second-

year standing in the School of Veterinary Medicine. Topographical, radiological, and regional anatomy as applied to the clinical sciences.

**198. Directed Group Study. (2-5) I, II, III.**

Laboratory—6-15 hours. Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Laboratory—3-15 hours. Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**Graduate Courses**

**\*200. Comparative Neuroanatomy. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140 or equivalent in human or veterinary neuroanatomy. A comparative-quantitative study of the central nervous systems of vertebrates, particularly mammals, with emphasis on function.

**201. Regional Anatomy. (4) II.**

Laboratory—12 hours. Prerequisite: course 100 or equivalent. Detailed dissections comparing the regional anatomy of the sheep, cat, rabbit, chicken and man. Offered in even-numbered years.

**202. Organology. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157, and consent of instructor. The comparative development, growth patterns, and composition of selected animal organs: liver, kidney, lung, brain, a viscus and a skeletal muscle. Offered in odd-numbered years.

Mr. Julian in charge

**204. Functional Comparative Anatomy of the Reproductive Systems. (3) I.**

Lecture—3 hours. Gross, microscopic, and ultramicroscopic structure of the male and female reproductive systems in birds and mammals. Offered in odd-numbered years.

Mr. Barnes in charge

**205. Ultramicroscopic Anatomy. (3) I.**

Lecture—3 hours. Prerequisite: Zoology 107 or equivalent. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in even-numbered years.

Mr. Tyler, Mr. Faulkin

**206. Morphology of Body Surfaces. (2) III.**

Lecture—1 hour; discussion—1 hour. Information concerning the three-dimensional morphology of internal and external body surfaces, both normal and abnormal, as revealed by scanning electron microscopy of cells, tissues, organs, and replicas will be compared and correlated

\* Not to be given, 1972-73.

with that derived from other techniques. Offered in even-numbered years. Mr. Tyler

**207. Perspectives in Morphological Research. (3) III.**

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. Mr. Tyler

**210. Principles of Histochemistry. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Zoology 107, Biochemistry 101A. Principles of enzyme histochemistry of animal tissues applicable to light and electron microscopy. Offered in odd-numbered years. Mr. Tyler

**ANESTHESIOLOGY—See Medicine**

**ANIMAL BIOCHEMISTRY—See Biochemistry**

**ANIMAL GENETICS—See Genetics**

**ANIMAL NUTRITION—See Nutrition**

**ANIMAL SCIENCE**

*Major Advisers.*—See *Class Schedule* listing.

*Major Program and Graduate Study.*—See pages 70 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**1. Domestic Animals and Man. (3) I.**

Lecture—2 hours; laboratory—2 hours. Domestication of animals and factors affecting their characteristics and distribution. Animal use by man for food, work, fiber, drugs, research and recreation; projected effects of population expansion and urbanization. Demonstrations of beef and dairy cattle, poultry, sheep, swine and horses. The Staff (Mr. Ronning in charge)

**2. Introductory Animal Science. (3) III.**

Lecture—2 hours; laboratory—2 hours. Recommended: course 1; Biological Sciences 1. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals; the application of sciences to animal production. The Staff (Mr. Bradford in charge)

**21. Livestock and Dairy Cattle Judging. (2) III.**

Laboratory—6 hours. Prerequisite: courses 1 and 2. Conformation, finish and quality in relation to ideal type. Relationship of form to func-

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.) Mr. Faulkin in charge

**297. Advanced Group Study in Surgical Anatomy. (2-4) I, II, III.**

Laboratory—6-12 hours. Prerequisite: course 180. Selected topics in topographical, radiological, or regional anatomy as they apply to the clinical sciences.

**298. Group Study. (2-5) I, II, III.**

Laboratory—6-15 hours. Prerequisite: consent of instructor. The Staff (Chairman in charge)

**299. Research. (2-12) I, II, III.**

Laboratory—6-36 hours. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.) The Staff (Chairman in charge)

tion. Change in body proportions with growth and maturity. Correlation between types in live meat animals and carcass quality. Mr. Mendel

**31. Current Topics in Animal Science. (1) II.**

Lecture-discussion—1 hour. A presentation and discussion of topics of current concern to the animal industry. Topics such as animal waste disposal, land utilization, livestock improvement programs, disease control programs, and importation problems will be considered. (Passed/Not Passed grading only.) Mr. Ronning

**49A-49B-49C. Animal Management Practices.**

(2-2-2) I-II-III.

Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology; the art and science of management of beef and dairy cattle, horses, sheep, swine and laboratory animals. (Passed/Not Passed grading only.) The Staff (Mr. Heitman in charge)

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. Selected topics relating to the animal sciences. The Staff (Mr. Ronning in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor. Problems in animal biology; nutrition, breeding, and physiology of livestock. The Staff (Mr. Ronning in charge)



Upper Division Courses

**111. Type Evaluation in Livestock and Dairy Cattle. (2) I.**

Laboratory—6 hours. Prerequisite: course 21. Studies of recognized type evaluation in livestock and dairy cattle. Critical evaluation of the bases for the criteria used in establishing these standards. Mr. Carroll

**114. Advanced Dairy Cattle Production. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 107; Nutrition 110 and course 124, or their equivalent recommended. Scientific principles from genetics, nutrition, physiology and related fields applied to conversion of animal feed to human food through dairy animals. Genetic, environmental, and managerial sources of variation in milk composition and yield; economic and energetic efficiency of milk production. Mr. Laben

**115. Horse Production. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B; Nutrition 103 or 110; Physiology 110B. Feeding, breeding, and management of horses; application of the principles of basic animal sciences to problems of production of all classes of horses. Mr. Evans

**116. Meat Animal Production. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 107; Nutrition 103 or 110; Physiology 110B. Application of the sciences of nutrition, physiology and genetics to the development of efficient management programs for beef, sheep and swine production. Similarities and differences among these species affecting management practices. Methods of improving carcass and meat quality. Mr. Bradford, Mr. Garrett

**\*117. Physiological Aspects of Animal Production from Tropical and Arid Areas. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Nutrition 110; Physiology 110B. Comparative aspects of animal production from domesticated and wild species in tropical and arid environments, with emphasis upon the effects of the climatic and nutritional environment on basic physiological mechanisms as they relate to the efficiency of animal production. Mr. Morris

**118A. Range Livestock Production. (3) II.**

Lecture—3 hours. Prerequisite: Nutrition 103 or 110; courses 1 and 2. Genetics 100B recommended. Not open for credit to Animal Science majors. The application of scientific knowledge to the improvement and production of beef cattle and sheep. Reproduction including artificial insemination; breeding plans; management; supplementary feeding; marketing. Mr. Carroll

**118B. Intensive Livestock Production. (3) III**

Lecture—3 hours. Prerequisite: Nutrition 103 or 110. Recommended: courses 1, 2 and 118A; Genetics 100B. Not open for credit to Animal Science majors. Principles and practices involved in feedlot, dairy and swine operations. Growth and fattening; lactation; feeding practices; methods of evaluating body composition of meat animals; housing and equipment; waste disposal. Messrs. Carroll, Heitman, Laben

**123. Animal Growth. (4) II.**

Lecture—2 hours; special reports and discussions—2 hours. Prerequisite: upper division course in physiology and Nutrition 110, or equivalent background knowledge. Basic and practical aspects of prenatal, postnatal and adult growth of animals focusing on nutritional, physiological and genetic effects and interrelationships. An unconventional approach will integrate knowledge from the several disciplines on the major factors regulating and influencing growth. Messrs. Garrett, Ashmore, Bradford

**124. Lactation. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physiology 110B and Nutrition 110, or equivalent background knowledge. Consideration of the biochemical, genetic, physiological, nutritional and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance. Mr. Baldwin, Mr. Laben

**190. Proseminar in Animal Science. (1) I.**

Seminar—1 hour. Prerequisite: senior standing in Animal Science or consent of instructor. Reports and discussions of recent advances in animal science. Mr. Heitman

**197T. Tutoring in Animal Science. (1-2) I, II, III.**

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. (Passed/Not Passed grading only.) Mr. Ronning

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. Selected topics relating to the animal sciences. The Staff (Mr. Ronning in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor. Problems in animal biology related to nutrition, breeding, and physiology of large domestic livestock. The Staff (Mr. Ronning in charge)

Graduate Courses

**\*219. Muscle Growth and Development. (3) I.**

Lecture—2 hours; seminar—1 hour. Prere-

\* Not to be given, 1972-73.



uisite: Biochemistry 101B, Zoology 100, 121A; or consent of instructor. Integration of growth and development of skeletal muscle: morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Offered in odd-numbered years. Mr. Ashmore

**\*240. Statistical Inference in Animal Experimentation. (4) III.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: Mathematics 13; a knowledge of Fortran recommended. A development of hypothesis-testing techniques for specific application to problems involving large animal research and related areas. Particular emphasis on principles of inference and prediction. Laboratory

exercises in statistical analysis utilizing computer techniques. Mr. Gall

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Ronning in charge)

**298. Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in the animal sciences. The Staff (Mr. Ronning in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Ronning in charge)

**Related Courses:** see Food Science and Technology 120.

## ANTHROPOLOGY

Delbert L. True, Ph.D., *Chairman of the Department*  
Department Office, 328 Young Hall

**Professors:**

Martin A. Baumhoff, Ph.D.  
Daniel J. Crowley, Ph.D. (*Anthropology and Art*)  
Jack D. Forbes, Ph.D. (*Anthropology and Applied Behavioral Sciences*)  
David L. Olmsted, Ph.D.

**Associate Professor:**

Delbert L. True, Ph.D.

**Assistant Professors:**

Kenne H-K Chang, Ph.D.  
Richard T. Curley, Ph.D.  
William G. Davis, Ph.D.  
Donald G. Lindburg, Ph.D.  
Melvin K. Neville, Ph.D.



**Assistant Professors:**

Henry McHenry, M.A. (*Acting*)  
Jerry A. Moles, M.A. (*Acting*)  
Henry J. Rutz, M.A. (*Acting*)

**Lecturers:**

Kenneth R. Martin, B.A.  
Carol F. Wall, M.A.

**Departmental Major Advisers for Bachelor of Arts Degree.**—Mr. Curley, Miss Wall.

**Departmental Major Adviser for Bachelor of Science Degree.**—Mr. Lindburg.

**Bachelor of Arts Major Program**

**Lower Division Courses.**—Required: Anthropology 1, 2, 3, and Mathematic 13. Geography 1 or Environmental Studies 10.

\* Not to be given, 1972-73.

**Upper Division Courses.**—Required: Anthropology 102, 103A, 109, 110; 111 or 112 or 120; 128; 4 units of physical anthropology; 4 units of ethnography; one additional archaeology course; and 8 additional units of courses selected from the following: any upper division anthropology course, Art 150, 151, Genetics 100A, 100B, 115.

**Language Requirement.**—18 units or the equivalent in one language.

**Bachelor of Science Major Program**

**Lower Division Courses.**—Required: Anthropology 1, 2, 3; Biology 1; Chemistry 1A-1B; Mathematics 13; Zoology 2; and either Chemistry 8A-8B or Mathematics 16A-16B. Recommended: Physics 2A-2B-2C; Psychology 1A-1B; Geology 1, 1L, 3, 3L.

**Upper Division Courses.**—A minimum of 44 units including three courses in physical anthropology and three additional courses in anthropology chosen in consultation with the adviser. Of these units, 20 shall be chosen in consultation with the adviser from a list provided by the department and shall include Genetics 103, and either 115 or 100A-100B, and not less than one laboratory course in human or vertebrate anatomy.

**Language Requirement.**—18 units or the equivalent in one language.

**Bachelor of Science List of Courses**

**Physical Anthropology.**—Courses 150, 151, 152, 153, 154A, 154B, 155, 156.

**Upper Division Courses outside the Department.**—Anatomy 100; Biochemistry 101A, 101B; Epidemiology 103A, 103B, 103C; Genetics 100A, 100B, 103, 105, 115; Geology 106, 107, 140; Human Anatomy 102; Physiology

110A, 110B, 111A, 111B; Psychology 108, 112, 150, 180; Zoology 100, 106, 107, 125, 136, 147, 148, 155, 156.

**Graduate Study.**—The department offers a program of study leading to the M.A. and Ph.D. degrees in anthropology. Further information regarding graduate study may be obtained at the department office and at the Graduate Division.

**Teaching Major.**—Requirements for the teaching major are the same as for the departmental major.

**Teaching Minor.**—Required: 30 quarter units of anthropology.

**Subject Representative:** Mr. Curley.

**Lower Division Courses**

**1. Physical Anthropology. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Human biology and physical anthropology; the relation of man and the animals; the origin and antiquity of man; fossil man; anthropometry, the criteria of race and racial classification; current racial theories; race problems.

Messrs. Neville, Lindburg, McHenry

**2. Cultural Anthropology. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion; culture change.

Messrs. Davis, Crowley, Curley

**3. Introduction to Archaeology. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology; prehistory and growth of culture, the origins and early development of civilization in the Old and New World.

Mr. True

**\*4. Introduction to Linguistic Anthropology. (4) III.**

Lecture—3 hours; discussion—1 hour. Language in its interrelationships with man's biology, his culture, and his society.

Miss Wall

**5. The Relevance of Human Biology. (4) II.**

Lecture-seminar—4 hours. Prerequisite: consent of instructor. The interrelation between biological and cultural adaptations to man's environment. (Passed/Not Passed grading only.)

**13. Quantitative Method in Anthropology. (4) II.**

Lecture—3 hours; discussion—1 hour.

Mr. Baumhoff

**20. The Native American Experience. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Native American Studies 1 or consent of instructor. An introduction to American Indian historical and socio-cultural develop-

ment with emphasis upon the United States area and upon those processes, such as relations with non-Indians, which have contributed to the current condition of Indian people. (Same course as Native American Studies 20.)

Mr. Martin

**Upper Division Courses**

**102. Ethnology. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introduction to varieties of explanation in anthropology; discussion of controversy surrounding relations between the designation of problem areas, choice of concepts, and selection of facts in the construction of anthropological theory.

Mr. Rutz

**103A. Archaeological Theory and Method. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 3, and 13. Theory and method of prehistoric archaeology.

Mr. True

**103B. Old World Archaeology. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Comparative prehistory and archaeology of the Eastern Hemisphere.

Mr. Baumhoff

**103C. New World Archaeology. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Comparative prehistory and archaeology of the Western Hemisphere.

Mr. Baumhoff

**\*104. Race and Sex: Race Mixture and Mixed Populations. (4) I.**

Lecture—3 hours; discussion—1 hour. A study of the phenomena of race mixture (miscegenation), interracial marriage, and mixed (hybrid) human populations. Emphasis will be placed upon the social and cultural effects of race mixture and of the interaction of racism and sexual behavior.

Mr. Forbes

**105A. Indians of North America. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians of North America: origins, languages, civilizations, and history.

Mr. Forbes

**\*105B. Indians of South America. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians of South America: origins, languages, civilizations, and history.

Mr. Moles

**106. Native Peoples of California and the Great Basin. (4) I.**

Lecture—3 hours; discussion—1 hour. An introduction to the traditional and recent cul-

\* Not to be given, 1972-73.

tures of the American Indian peoples of the California-Great Basin area. Considerable emphasis will be placed upon the changes in those cultures taking place during the past 400 years.

Mr. Forbes

**108. Native Americans in Contemporary Society.**

(4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An introduction to the socio-cultural 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.

Mr. Martin

**109. Phonetics. (4) I, II.**

Lecture—3 hours; discussion—1 hour. Thorough grounding in articulatory phonetics with some attention to the fundamentals of acoustic phonetics.

Miss Wall

**110. Elementary Linguistic Analysis. (4) II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Phonemic theory and exercises on phonemic analysis.

Mr. Olmsted, Miss Wall

**111. Intermediate Linguistic Analysis. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 (may be taken concurrently). Morphophonemics, morphemics and tactics.

Mr. Olmsted

**112. Comparative Linguistics. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Linguistic prehistory, historical linguistics and reconstruction; dialect geography.

Mr. Olmsted

**118. Ethnosemantics. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or equivalent. An examination of the uses of linguistic, cognitive psychological, and mathematical analyses in the study of meaning of folk classification systems. Emphasis will be placed upon the development of skills in the collection and analysis of field data.

Mr. Moles

**\*119A. Culture and Personality. (4) II.**

Lecture 3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Methods and theories in the study of the relationships among culture, society, and personality. The development of culture and personality as a subdiscipline in anthropology.

**\*119B. Culture and Personality. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 119A. An examination of empirical investigations of preliterate and contemporary societies in relation to the techniques of culture and personality studies.

\* Not to be given, 1972-73.

**120. Language and Culture. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 and 110. Language and thought; classification of languages; linguistic aspects of culture; language, nation, and state.

Mr. Moles

**\*121. Folklore. (4) III.**

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.

Mr. Crowley

**122. Economic Anthropology. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in nonindustrial societies; its social and cultural setting, and its modern changes.

Mr. Davis

**123. Political Anthropology. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. A survey of functional, structural, organizational, and decision-making approaches to primitive, tribal, and peasant political organization. Some attention will be given to political modernization within the setting of the colonial situation.

Mr. Rutz

**124. Comparative Religion. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An anthropological analysis of the origins, elements, forms, and symbolism of religion; functional interpretation with stress on ethnographic materials.

Mr. Curley

**128. Kinship and Social Organization. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical: discussion of theories of social organization with primary emphasis on typology and classification of family and kinship systems.

Mr. Davis

**139A. Peoples of Africa. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of Eastern, Central, and Southern Africa with analyses of representative societies which illustrate problems of general theoretical concern. A major consideration will be the continuities and discontinuities between periods prior to European contact and the present.

Mr. Curley

**139B. Peoples of Africa. (4) III.**

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. A major consideration will be the continuities and discontinuities between periods prior to European contact and the present.

Mr. Curley

**140. Peoples of Afroamerica. (4) I.**

Lecture—3 hours; discussion—1 hour. A study of the cultural implications of slavery and the contribution of Africans to the national cultures of the Americas. Mr. Crowley

**\*143. Peoples of India. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Development of Indian cultural traditions; social organization and social trends.

**147A. Peoples of the Pacific. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Aboriginal cultures of Micronesia, Melanesia, and Polynesia in prehistoric and modern times. Primary emphasis will be given to comparative social organization. Mr. Rutz

**147B. Peoples of the Pacific. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. The effects of European colonization of the Pacific upon the cultures of Micronesia, Melanesia, and Polynesia. Mr. Rutz

**148. Ecological Anthropology. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories, methods, and applications of the ecological perspective to cultural and physical attributes of human populations. Mr. Chang

**150. Primate Evolution Laboratory. (3) III.**

Lecture—1 hour; laboratory—5 hours. Prerequisite: course 155 or 151 (may be taken concurrently). Osteological, dental, and neuro-anatomical studies of living and fossil primates. Limited enrollment. Mr. Lindburg

**151. Primate Evolution. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; Zoology 2 recommended. The origin and relationships of the prosimians, monkeys, and apes. Mr. Lindburg

**152. Human Evolution and Fossil Man. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Nature and results of the evolutionary processes involved in the formation and differentiation of mankind. Mr. McHenry

**\*153. Human Variation. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. The origin and meaning of differences among human populations. Racial differences, such as those in blood groups, physiology, morphology, dermatoglyphics, will be considered relative to the evolutionary factors involved.

**154A. Primate Behavior and Ecology. (4) I, II.**

Lecture—3 hours; discussion—1 hour. Pre-

requisite: course 1. The social behavior and ecology of the prosimians, monkeys, and apes, and their relevance to the evolution of human behavior and social groupings. Mr. Lindburg

**154B. Primate Behavior and Ecology. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 154A, Mathematics 13 or equivalent knowledge of statistics, and consent of instructor. The intensive study of theoretical problems arising in connection with primate behavior and ecology. Certain primate species will be discussed in depth, and laboratory work will involve individual projects on primate groups or special problems. Mr. Neville

**155. Comparative Primate Anatomy. (4) II.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: Zoology 2. The functional anatomy of the locomotor, digestive, reproductive, and nervous systems of monkeys and apes. Emphasis on the anatomical evidence for their interrelationships. Mr. McHenry

**156. Human Osteology. (4) I.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, microscopy, dentition, and variations in race, sex, and age. Mr. McHenry

**162. Peasant Society and Culture. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban rural relations; problems of economic development and culture change. Mr. Chang

**165. Culture Change. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introduction to the analysis of socio-cultural stability and change; theories of innovation, diffusion, acculturation, and cultural evolution; problems of social planning. Mr. Chang

**190. Cultures of China and Korea. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnological and comparative treatments of two cultures with emphasis on the village level. Mr. Chang

**\*191. Culture of Japan. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Development of Japanese cultural traditions; social structure and social trends. Mr. Chang

**192. Peoples and Cultures of Southeast Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. Pre-

\* Not to be given, 1972-73.

requisite: course 2 or equivalent or consent of instructor. The development of major cultural traditions, the patterns of ecological relationships, and comparative social organization of ethnic and regional groups in Southeast Asia.

Mr. Davis

**194H. Special Study for Honors Students. (1-5) I, II, III.**

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. (Passed/Not Passed grading only.)

The Staff (Mr. True in charge)

**195. Field Course in Archaeological Method. (3) III.**

Laboratory—8 hours. Prerequisite: course 3. Lectures, museum preparation, and weekend excavations. May be repeated for credit with consent of instructor. Limited enrollment.

Mr. True

**\*196. Archaeological Method. (3) II.**

Laboratory—6 hours. Prerequisite: course 195 and 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.

Mr. Baumhoff

**197T. Tutoring in Anthropology. (1-5) I, II, III.**

Tutorial—1-5 hours. Prerequisite: upper division standing with major in anthropology and consent of Department Chairman. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit.

The Staff (Mr. True in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Discussion—3 hours. Prerequisite: consent of instructor. Directed reading and group discussion of selected anthropological problems.

The Staff (Mr. True in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Mr. True in charge)

**Graduate Courses**

**201. History of Anthropological Theory. (4) I.**

Lecture—2 hours; discussion—1 hour. The historical development of the various fields of anthropology with emphasis upon their interrelationships.

Mr. Baumhoff

**202. History and Theory of Physical Anthropology. (4) II.**

Seminar—3 hours. The history of thought in physical anthropology and an analysis of the major theoretical problems in the field. Sug-

gested for all first-year graduate students lacking intensive preparation in biological anthropology.

Mr. Neville

**209. Objectives and Methods for College Teaching of Anthropology. (2) I.**

Discussion—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the student's experience in the classroom situation.

Mr. Olmsted

**\*210. Aspects of Culture Structure. (4) I, II, III.**

Seminar—3 hours. Analysis of various phases of culture, such as religion, economics, law, and folklore.

The Staff

**\*216. Problems in Archaeological Method. (4) III.**

Seminar—3 hours. Techniques for analyzing archaeological data; application to various prehistoric cultures.

Mr. Baumhoff

**217. Andean Prehistory—Theory and Method. (4) II.**

Seminar—3 hours. Prerequisite: consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Preceramic and early farming peoples. Discussion will be directed toward the use of the resources of this region to test archaeological theory and to propose problem oriented studies that will work in this direction.

Mr. True

**\*219. Culture and Personality. (4) II.**

Seminar—3 hours.

**220. Field Course in Linguistics. (4) III.**

Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110, 111. Techniques of eliciting, recording, and analyzing; work with a native speaker.

Mr. Olmsted

**221. Rural Transformation in Post-Colonial Societies. (4) I.**

Seminar—3 hours. Prerequisite: courses 223, 265, or consent of instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in post-colonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

Mr. Rutz

**222. Ethnemics. (4) I.**

Seminar—3 hours. Prerequisite: course 120 or consent of instructor. Application of linguistic, cognitive psychological, and related analytical models to folk taxa.

Mr. Moles

**223. Economic Anthropology. (4) III.**

Seminar—3 hours. Prerequisite: course 122,

\* Not to be given, 1972-73.

or consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.

Mr. Davis

**224. Problems in Comparative Religion. (4) II.**

Seminar—3 hours. Advanced study of current problems in the anthropological study of religion.

Mr. Curley

**\*225. Kinship and Social Structure. (4) II.**

Seminar—3 hours. Componential analysis of kinship systems and discussion of descent group and alliance theories.

Mr. Curley

**\*226. Evolution of Social Organization. (4) II.**

Seminar—3 hours. Diachronic and synchronic analyses of social organization.

**\*239. Problems in African Society and Culture. (4) I.**

Seminar—3 hours. Diachronic analyses of traditional institutions in sub-Saharan Africa.

Mr. Curley

**\*242. Problems in African Prehistory. (4) I.**

Seminar—3 hours.

Mr. Baumhoff

**245. Ethnology of Northern and Central Asia. (4) II.**

Seminar—3 hours. 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.

Mr. Olmsted

**\*247. Peoples and Cultures of Oceania. (4) III.**

Seminar—3 hours.

**248. Concepts and Problems in Ecological Anthropology. (4) I.**

Seminar—3 hours. Prerequisite: course 148 or equivalent or consent of instructor. Advanced

study of theories, methods, and applications of the ecological perspective to cultural and physical attributes of human population.

**250. Theory and Method of Anthropology. (4) II, III.**

Seminar—3 hours.

**253. Concepts and Problems in Physical Anthropology. (4) II.**

Seminar—3 hours.

Mr. McHenry

**254. Primate Social Behavior. (4) III.**

Seminar—3 hours. Prerequisite: course 154B or equivalent. Analysis of primate social behavior, with particular emphasis on field studies.

Mr. Neville

**\*265. Concepts and Problems in Applied Anthropology. (4) I.**

Seminar—3 hours. Prerequisite: course 165 or equivalent or consent of instructor. Advanced study in culture change; case studies of directed culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

Mr. Chang

**280. Ethnohistorical Theory and Method. (4) III.**

Seminar—3 hours. A 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 ethnohistory in the solution of contemporary social problems.

Mr. Forbes

**292. Seminar in Anthropological Linguistics. (4) III.**

Seminar—3 hours.

Miss Wall

**299. Research. (3-8) I, II, III.**

The Staff (Chairman in charge)

**APPLIED BEHAVIORAL SCIENCES**

*Major Advisers.*—See *Class Schedule listing*.

*Major Program.*—See page 71.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**17. Population Problems. (2) II, III.**

Lecture—2 hours. An assessment of relevant aspects of overpopulation to determine man's chance of survival.

Mr. Howard

**18. Scientific Bias and Social Myth. (3) II, III.**

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 be-

tween University education and issues of society.

II. Mr. Fujimoto, III. Miss Regan

**47. Orientation to Community Resources. (2) I, II, III.**

Field trip—3 days; Seminar—three 2-hour sessions. (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 reservation required. (Passed/Not Passed grading only.)

Mr. Hawkes

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Thompson in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

The Staff (Mr. Thompson in charge)

\* Not to be given, 1972-73.

## Upper Division Courses

**140. Research Methods in Applied Behavioral Sciences. (4) I.**

Lecture—4 hours. Prerequisite: Psychology 1A. Application of social sciences research methodology to multidisciplinary problems.

Miss Regan, Mr. Thompson

**141. Research Design and Analysis. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13; course 140 or consent of instructor. Survey of major types of research design in the Behavioral Sciences. Tests of statistical significance, analysis of variance, and related topics. Use of computer in data processing.

Miss Regan

**150. Housing. (4) III.**

Lecture—4 hours. Exploration of the shelter aspects of the family environment. Study of technological, social, economic and aesthetic factors affecting the nature and organization of family and community housing.

**151A. Community Research and Analysis. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Theories on the emergence and structure of contemporary communities. Ethnographic, power structure and comparative approaches to community studies. Ways to incorporate research into programs for community change and development. Lecture and field work.

Mr. Fujimoto

**151B. Community Development. (4) II.**

Discussion—1 hour; seminar—3 hours. Prerequisite: course 151A or consent of instructor. Principles and strategies of building institutions so community people can effect change. Examination of styles of citizen participation and control and the various roles of change agents in working with communities for their own self-development. Seminar and field work.

Mr. Forbes

**151C. Field Experience in Community Development. (12) III.**

Field experience. Prerequisite: course 151A and 151B or consent of instructor. Field assignment-internship with community and grass roots groups, analysis of resources and alternatives for resolution of community development needs as defined by citizen groups.

Mr. Fujimoto, Mr. Forbes

**160. The Disadvantaged: Issues and Innovations.**

(3) I, II.

Seminar—3 hours. Prerequisite: 10 units of psychology, sociology, and/or anthropology. Identification and characteristics of the "invisible" segments of society with emphasis on the

socially and culturally disadvantaged. Barriers encountered by these individuals and avenues for change are explored.

I. Mr. Forbes, II. \_\_\_\_\_

**161. The Continuing Learner. (3) II.**

Lecture—3 hours. Prerequisite: Education 110 (may be taken concurrently). Principles of adult education emphasizing barriers to learning, the role of non-verbal communication, the importance of self-concept in teaching adults, and the educator's role in working with non-school populations.

Mr. White

**162. Man, Work and Technology. (3) III.**

Lecture—3 hours. Critical issues created for man by technology. Employment-unemployment and its effect upon man. Social responsibility of persons and institutions which implement changes in the labor market. Significance of quality in employer-employee relationships.

**190. Proseminar in Applied Behavioral Sciences.**

(1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. Discussion of selected critical issues in the applied behavioral sciences. Required of seniors in the Applied Behavioral Sciences major. May be repeated for credit. (Passed/Not Passed grading only.)

The Staff (Mr. Thompson in charge)

**196. Senior Project in Applied Behavioral Sciences.**

(1-5) I, II, III.

Prerequisite: major in Applied Behavioral Sciences and consent of instructor. Guided research leading to completion of senior thesis. May be repeated for credit.

The Staff (Mr. Thompson in charge)

**197T. Tutoring in Applied Behavioral Sciences.**

(1-5) I, II, III.

Prerequisite: consent of instructor. Leading of small voluntary discussion groups.

The Staff (Mr. Thompson in charge)

**197TC. Community Tutoring in Applied Behavioral Sciences. (1-5) I, II, III.**

Prerequisite: consent of instructor. Supervised tutoring in the community.

The Staff (Mr. Thompson in charge)

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Thompson in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

Related Courses: see Environmental Planning and Management 1; Environmental Studies 10, 101, 111.

\* Not to be given, 1972-73.



## ART

Richard D. Cramer, M.F.A., *Chairman of the Department*  
Department Office, 101 Art

*Professors:*

Richard D. Cramer, M.F.A. (*Acting Director, Laboratory for Research in the Fine Arts and Museology*)

Daniel J. Crowley, Ph.D., (*Art and Anthropology*)

Seymour Howard, Ph.D.

Ralph M. Johnson, M.A.

Richard L. Nelson, M.A. (*Emeritus*)

<sup>1</sup>Daniel Shapiro

<sup>4</sup>Wayne Thiebaud, M.A.

*Associate Professors:*

Robert C. Arneson, M.F.A.

<sup>2</sup>Roy R. DeForest, M.A.

Roland C. Petersen, M.A.

William T. Wiley, M.F.A.

*Assistant Professors:*

Sherwood A. Fehm, Jr., Ph.D.

Craig Harbison, Ph.D.

Harvey Himelfarb, M.A.

Manuel J. Neri

◇ ◇ ◇

*Assistant Professor:*

Lynn Matteson (*Acting*), M.A.

*Lecturers:*

L. Price Amerson, M.A.

Joseph A. Baird, Ph.D.

William Henderson, M.F.A.

Gerald Hoepfner, B.F.A.

*Departmental Major Advisers.*—See the *Class Schedule*.

*Preparation for the Major:*

Practice of Art: <sup>3</sup> 3 courses from the following list: Art 2, 3, 4, 14, 16 (see prerequisites for upper division courses); 8 units chosen from courses 1A, 1B, 1C, 1D. Entering freshmen who have studied art in high school should apply for advanced standing by submitting examples of their work for faculty review.

History of Art: courses 1A, 1B, 1C, 1D; one course in drawing, graphics, or painting; and one course in sculpture or ceramics.

*The Major Program:*

Practice of Art: <sup>4</sup> 4 courses from Group A

<sup>1</sup> Absent on leave, 1972-73.

<sup>2</sup> Absent on leave, winter quarter 1973.

<sup>3</sup> Absent on leave, spring quarter 1973.

<sup>4</sup> Students interested in drawing and painting should take courses 2, 3, 4; course 14 is recommended.

Students interested in sculpture, should take courses 2, 3, 14; course 4 is recommended.

Students preparing for graduate work in any of the environmental design professions should take

courses 2, 14, 16, 121A, 121B, 121C, 149, 168, 184. courses under three different artists; 1 course from Group B; 2 courses from Group C; and 2 courses chosen from Group A, B, or C. The Department reserves the right to retain student work, at its discretion.

History of Art: 2 Group C courses within each of two periods (e.g., 154A, 154B, and 178B, 178C); 5 courses chosen from Group C. Students planning to do graduate work in the History of Art should develop their knowledge of foreign languages (especially German) as early as possible.

*Transfer Students.*—Before enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.

*Graduate Study.*—The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art and the M.A. degree in the history of art. Detailed information regarding graduate study may be obtained from the *Announcement of the Graduate Division*.

*Teaching Major.*—The A.B. degree with a major in the practice of art or in the history of art. Depending on the credential, certain other courses are required. For information see the subject representative.

*Teaching Minor.*—30 units in Art. These must be selected in consultation with the subject representative.

*Subject Representative:* Department Chairman.

*Lower Division Courses***1A. Ancient Art. (4) I.**

Lecture—4 hours. Art of the pagan Mediterranean world from the prehistoric caves to the fall of the Roman Empire. Mr. Howard

**1B. Medieval and Renaissance Art. (4) II.**

Lecture—4 hours. Christian, Barbarian, Moslem and Classical traditions in European Art from the fourth through the sixteenth centuries.

**1C. Baroque and Modern Art. (4) III.**

Lecture—4 hours. Major styles and masters of the Western world after the Counterreformation. Mr. Matteson

**1D. Oriental Art. (4) III.**

Lecture—4 hours. The art of India, South East Asia, China, and Japan. Mr. Crowley

**2. Elementary Form and Color. (4) I, II, III.**

Laboratory—12 hours. Form in composition using black and white media. Introduction to color in composition. The Staff



**3. Intermediate Form and Color. (4) I, II, III.**

Laboratory—12 hours. Prerequisite: course 2. Color and form in composition. The Staff

**4. Introductory Figure Painting. (4) I, II, III.**

Laboratory—12 hours. Prerequisite: course 2. Form in composition, with the human figure as subject. The Staff

**10. Introduction to Art: History and Appreciation.****(3) I.**

Lecture—3 hours. The understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. \_\_\_\_\_

**11. Introduction to Art: Practice. (3) I, II, III.**

Lecture—1 hour; laboratory—4 hours; 2 hours to be arranged. Individual explorations in various media. Intended for students not specializing in Art. Not open for credit to students who have had Art 2, 14, or 16. The Staff

**14. Elementary Sculpture. (4) I, II, III.**

Laboratory—12 hours. Form in space using clay and plaster. The Staff

**16. Descriptive Drawing and Rendering. (4) I, II, III.**

Lecture—1 hour; laboratory—6 hours. Methods of objective drawing and of space description; rendering in various media. \_\_\_\_\_

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. The Staff (Mr. Cramer in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor. The Staff (Mr. Cramer in charge)

**Upper Division Courses****Group A: Practice of Art****101. Painting: Materials and Carriers. (4) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 3. Experimentation in media and their supports. Mr. Hoepfner

**102. Advanced Drawing and Painting. (4) I, II, III.**

Laboratory—8 hours, 1 hour to be arranged. Prerequisite: courses 3, 4. Drawing and painting in various media including oil and polymers. May be repeated for credit. The Staff

**104. Advanced Form and Figure Composition.****(4) I, II, III.**

Laboratory—8 hours, 1 hour to be arranged. Prerequisite: course 4. Problems of light, color and space that involve the human figure and its environment. May be repeated for credit. The Staff

**110. Photography. (4) I, II, III.**

Laboratory—9 hours. Prerequisite: course 3 or 128A. Photography as a creative medium using the view camera and the miniature camera. Mr. Himelfarb

**112A. Ceramics. (4) I, II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2 or 14. Ceramics; introduction to ceramic forms and processes. Mr. Arneson

**112B. Ceramics. (4) I, II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 112A. Ceramics; introduction to ceramic color and glaze. Mr. Arneson

**115. Film-making. (4) I, II, III.**

Lecture—1 hour; laboratory—6 hours; film-making projects. Prerequisite: at least a junior standing. Film-making as a creative medium using 8 and 16 mm. cameras and sound track. Mr. Henderson

**121A. Architectural Design. (4) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: two quarters in art practice or design; or consent of instructor. Studio projects in architectural design. Mr. Cramer

**121B. Architectural Design. (4) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121A. Studio projects in architectural design. Mr. Cramer

**\*121C. Architectural Design. (4) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121B. Studio projects in architectural design. Mr. Cramer

**128A. Graphic Arts. (4) I, II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: 2 courses in art practice. Beginning practice and theory of printmaking; practice in traditional and experimental methods in relief and silk-screen printmaking, related to discussion of aesthetics of graphic form. \_\_\_\_\_

**128B. Graphic Arts. (4) I, II, III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128A. Practice and theory of traditional and experimental methods of intaglio printmaking: etching, engraving, aquatint, and innovative techniques and materials. \_\_\_\_\_

**128C. Graphic Arts. (4) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128A. Practice and theory of lithographic printmaking. \_\_\_\_\_

**141. Sculpture: Materials and Methods. (4) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 14. Influences of material and technique on sculptural forms: clay, wood, metal, plastics. \_\_\_\_\_

\* Not to be given, 1972-73.

**142. Figure Sculpture. (4) I.**

Lecture—1 hour; laboratory—6 hours; 1 hour to be arranged. Prerequisite: course 141; course 4 recommended. The human figure in sculpture. May be repeated for credit. Mr. Neri

**143. Casting Techniques and Theories of Cast Sculpture. (4) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 14. Sculpture in various casting techniques and media. May be repeated for credit.

**\*144. Advanced Sculpture. (4) III.**

Laboratory—8 hours; 1 hour to be arranged. Prerequisite: course 141. Advanced sculptural projects in various media. The Staff

**146. Ceramic Sculpture. (4) III.**

Laboratory—8 hours; 1 hour to be arranged. Prerequisite: course 112B. Clay as material for sculpture in round and relief. May be repeated for credit. Mr. Arneson

*Group B: Theory and Criticism*

**148. Theory and Criticism: Painting and Sculpture. (4) II.**

Lecture—3 hours; term paper required. Prerequisite: course 2 or 14, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces. Mr. Thiebaut

**149. Theory and Criticism: Architecture. (4) III.**

Lecture—3 hours; seminar paper. Prerequisite: course 2 or 14; one art lecture course. Aesthetic theories of design styles, historic and contemporary. Mr. Cramer

*Group C: History of Art*

**150. Arts of Sub-Saharan Africa. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of sub-Saharan Africa; particular attention to the relationships between sculpture and culture in West and Central Africa. Mr. Crowley

**\*151. Arts of the Indians of the Americas. (4) II.**

Lecture—3 hours; term paper or gallery studies and review. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile. Mr. Crowley

**\*152. Arts of Oceania and Prehistoric Europe. (4) III.**

Lecture—3 hours; term paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East. Mr. Crowley

**\*154A. Archaic Greek Art. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. The art of Greece from the Protogeometric through Archaic periods. Mr. Howard

**154B. Classical Greek Art. (4) II.**

Lecture—3 hours; term paper or gallery studies and review. Greek art of the Gold and Silver Ages. Mr. Howard

**154C. Hellenistic Art. (4) III.**

Lecture—3 hours; term paper or gallery studies and review. Greek Art from Alexander to Julius Caesar. Mr. Howard

**155. Roman Art. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. The art of republican and Imperial Rome. Mr. Howard

**162. History of Printmaking. (4) II.**

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. Mr. Amerson

**168. History of Urban Form. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. The evolution of cities. Physical forms of town planning in the past as a guide to modern developments. Emphasis on major civic centers; Rome, Paris, London, New York, etc. Relation of European and American town planning. Mr. Baird

**\*176A. Art of the Middle Ages: Early Christian through Romanesque. (4) II.**

Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in Christian Europe from the founding of Constantinople through the twelfth century. Mr. Fehm

**176B. Art of the Middle Ages: Gothic. (4) II.**

Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in Christian Europe from the twelfth through the fifteenth centuries. Mr. Fehm

**177A. Northern European Art. (4) II.**

Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the fifteenth century in Austria, Germany, France and the Lowlands, including such artists as Jan van Eyck and Hieronymus Bosch. Mr. Harbison

**177B. Northern European Art. (4) III.**

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. Mr. Harbison

\* Not to be given, 1972-73.

**178A. Italian Art 1200-1400. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. Late medieval painting and sculpture. Origins of the Renaissance. Mr. Fehm

**178B. Italian Art 1400-1500. (4) II.**

Lecture—3 hours; term paper or gallery studies and review. Early Renaissance painting and sculpture. Mr. Amerson

**178C. Italian Art 1500-1550. (4) III.**

Lecture—3 hours; term paper or gallery studies and review. High Renaissance manneristic painting and sculpture. Mr. Amerson

**\*178D. Italian Architecture: 1250-1550. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. Architecture in Italy: late medieval through manneristic. Mr. Fehm

**\*179A. Baroque Art. (4) I.**

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. Mr. Baird

**179B. Baroque Art. (4) II.**

Lecture—3 hours. Painting in Western Europe in the seventeenth century; especially the Dutch, Flemish, French and Italian painters. Mr. Amerson

**183A. Painting from Goya to Manet. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. Developments of the late eighteenth and first half of the nineteenth century, with emphasis on France and England. (Neo-Classicism, Romanticism, Realism, etc.) Mr. Matteson

**183B. Painting from Manet to 1900. (4) II.**

Lecture—3 hours; term paper or gallery studies and review. Later nineteenth century developments. Emphasis on France (Impressionism, Post-Impressionism, etc.). Mr. Matteson

**183C. Painting in the Twentieth Century. (4) III.**

Lecture—3 hours; term paper or gallery studies and review. Modern and contemporary developments. Emphasis on Europe and America (Cubism, Surrealism, etc.). Mr. Matteson

**\*183D. Modern Sculpture. (4) III.**

Lecture—3 hours; term paper or gallery studies and review. Sculpture from Neo-Classicism to the present. Mr. Howard

**184. Architecture in the Twentieth Century. (4) II.**

Lecture—3 hours. The forms and substyles of modern architecture, with emphasis on the development of organicism in the works of Frank Lloyd Wright and of the international style in the work of Le Corbusier and Mies van der Rohe. Mr. Cramer

**188A. Art of Latin America. (4) I.**

Lecture—3 hours; term paper or gallery studies and review. Architecture, sculpture and painting in Mexico from 1530 to the present. The American Southwest, the colonial art of Peru, and eighteenth century to modern architecture in Brazil. European backgrounds and creative originality in the New World. Mr. Baird

**\*188B. Architecture of the United States. (4) III.**

Lecture—3 hours; term paper or gallery studies and review. American building, with emphasis on early colonial, Georgian, nineteenth and twentieth century developments. Particular attention to Northern California in the latter part of the course. Mr. Baird

**188C. Painting of the United States. (4) III.**

Lecture—3 hours; term paper or gallery studies and review. American pictorial development from 1650 to the present, with emphasis on twentieth-century developments. Mr. Fehm

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Cramer in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Cramer in charge)

**Graduate Courses****201. Experiments in Art and Visual Communication. (4) II.**

Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit. The Staff

**\*202. Sculpture in Selected Media. (4) I, II, III.**

Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit. The Staff

**\*250. Principles of Art Historical Research. (4) I.**

Seminar—3 hours. Major historic bibliographical sources and reference materials. Use of national and international facilities for research, including intercampus potential of U.C. and other libraries of California. Techniques of research in specialized fields. Methods of illustration for published papers and books; forms of printing. Required of M.A. candidates in History of Art. The Staff

**\*251. Seminar in Primitive Art. (4) I.**

Seminar—3 hours. Selected areas of special study in the arts of Africa, Oceania, and Pre-historic Europe; in certain years, study of the Indians of the Americas, pre-Conquest to contemporary. Mr. Crowley

**\*254. Seminar in Ancient Art: Greece. (4) I.**

Seminar—3 hours. Selected areas of special study in Greek art from Helladic to later Hellenistic. Mr. Howard

\* Not to be given, 1972-73.

**255. Seminar in Ancient Art: Rome. (4) II.**

Seminar—3 hours. Selected areas of special study in Roman art from Republican to late Imperial. Mr. Howard

**276. Seminar in Medieval Art. (4) I.**

Seminar—3 hours. Selected areas of special study in medieval art from Early Christian to late Gothic. Mr. Fehm

**277. Seminar in Northern Renaissance Art. (4) I.**

Seminar—3 hours. Selected areas of special study in Netherlandish and German art of the fifteenth and sixteenth centuries. Mr. Harbison

**\*278. Seminar in Italian Renaissance Art. (4) II.**

Seminar—3 hours. Selected areas of special study in Italian art from trecento to cinquecento.

**\*279. Seminar in Baroque Art. (4) III.**

Seminar—3 hours. Selected areas of special study in Baroque art from late sixteenth to late eighteenth centuries. Mr. Baird

**283. Seminar in Modern European Art. (4) II.**

Seminar—3 hours. Selected areas of special study in art since 1800 in Europe. Mr. Matteson

**288. Seminar in American Art. (4) III.**

Seminar—3 hours. Selected areas of special study in art in the United States from colonial times to the present. Mr. Baird

**290. Seminar. (4) I, II, III.**

Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit. The Staff (Graduate Adviser in charge)

**291. Seminar: Critical Evaluation. (1) I, II, III.**

Seminar—1 hour. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Graduate Adviser in charge)

**292. Seminar: Comprehensive Qualifying.**

(1) I, II, III.

Seminar—1 hour. A further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Graduate Adviser in charge)

**299. Individual Study. (1-6) I, II, III.**

The Staff (Graduate Adviser in charge)

**299D. Comprehensive Project. (9) I, II, III.**

An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)

The Staff (Graduate Adviser in charge)

**Professional Courses**

**\*300. Practice and Principles of Art Education.**

(3) I, II, III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: senior or graduate standing; or consent of instructor. Art education and practice of techniques used in elementary and secondary schools.

**\*401. Museum Training: Curatorial Principles. (4) I.**

Seminar—3 hours. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Seminar with assigned papers. Mr. Baird

**402. Museum Training: Exhibition Methods. (4) III.**

Seminar—3 hours. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Seminar and exhibition. Mr. Baird

**403. Museum Training: Historic Materials and Techniques. (4) II.**

Seminar—3 hours. Examination of works of art with emphasis on materials and methods of construction: wall paintings, panel paintings, paintings on cloth, drawings, ceramics, metals, etc. Experimentation in constructing works of art from historical writings. Collateral reading. Visits to museums. Mr. Hoepfner

**404. Museum Training: Problems of Conservation.**

(4) III.

Seminar—3 hours. Examination of works of art with emphasis on physical condition. Typical problems in preservation and restoration. Ethics and aesthetics of museum conservation. Demonstrations of scientific methods. Collateral reading. Visits to museums. Seminar and assigned papers. Mr. Hoepfner

**ASIAN AMERICAN STUDIES**

Questions pertaining to the following courses should be directed to the instructor or the Dean's

Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

\* Not to be given, 1972-73.

**Lower Division Courses**

**1C-2C-3C. Elementary Standard Cantonese.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. (Same course as Oriental Languages 1C-2C-3C.) Mr. Leung

**4C-5C-6C. Intermediate Standard Cantonese.**

(3-3-3) I-II-III.

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 3C or Oriental Languages 3C. A continuation of course 1C-2C-3C. Mr. Leung

**33. The Asian Experience in America. (3) III.**

Lecture—2 hours; discussion—1 hour. A general consideration of Asians in America, past and present. The Staff (Mr. Yoshioka in charge)

**Upper Division Courses**

**100. Ecology of Asian American Communities. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 33 or consent of instructor. Political and social status, occupation, income, education, health, housing, and civic culture of various Asian American communities in the United States; segregation in interrelations between geographical groups, relations between

rich and poor, patronism, exploitation; mobility within each ethnic group. Mr. Kagiwada

**110. Asian Americans: A Case Study in Inter-Ethnic Relations. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 33 or consent of instructor. A study of prejudices, intermarriages, economical and political interaction between Asian American ethnic groups, of Asian Americans with other non-Asian ethnic groups, and with the larger society. Mr. Kagiwada

**111. Alienation and the Asian American. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 33 or consent of instructor. An examination of self-awareness, alienation, and life perspective of Asians in America. Emphasis will be placed on the problems of identity formation of Asian Americans. Mr. Yoshioka

**\*140. Speech Patterns of Asian Americans. (4) II.**

Lecture—4 hours. A general introduction to bilingualism as a social issue; survey of bilingual communities, problems of bilingual speakers, linguistic effects of bilingualism, particularly the effects of Asian languages in the speech patterns of Asian Americans. Offered in even-numbered years.

**ASTRONOMY—See Physics**

**ATMOSPHERIC SCIENCE**

*Major Advisers.—See Class Schedule listing. Major Program.—See page 72.*

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**20. Introduction to Meteorology. (3) I.**

Lecture—3 hours. Prerequisite: Mathematics 21A (may be taken concurrently) or equivalent. Basic concepts of modern meteorology: weather and weather elements, atmospheric circulations, clouds, precipitation, radiation, instruments and observations, meteorological satellites.

The Staff (Mr. Carroll in charge)

**20L. Introduction to Meteorology Laboratory. (1) I.**

Laboratory—3 hours. Prerequisite: course 20 (preferably taken concurrently). Introduction to meteorological instruments and observations; weather station visits; weather maps and charts; special films on weather modification, air pollution, and atmospheric circulation; physical experiments illustrating atmospheric phenomena.

The Staff (Mr. Carroll in charge)

**Upper Division Courses**

**110A. Weather Analysis and Forecasting. (3) II.**

Lecture—1 hour; laboratory—6 hours. Pre-

requisite: course 20 or equivalent; course 121A (may be taken concurrently). Theory and practice of three-dimensional scalar and vector analysis as applied to atmospheric circulations. Physics, structure, and evolution of large-scale weather systems. Techniques of drawing weather maps. Mr. Carroll

**110B. Weather Analysis and Forecasting. (3) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 110A. Application of dynamic theory to atmospheric weather systems. Graphical integration techniques applied to weather maps. Beginning of numerical forecasting techniques. Mr. Myrup, Mr. Carroll

**110C. Weather Analysis and Forecasting. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 110B. Numerical forecasting techniques applied to the general circulation of the atmosphere. The World Weather Watch and its requirements. Use and limitations of satellite data. Long-range forecasting.

Mr. Coulson, Mr. Carroll

**120. Atmospheric Thermodynamics and Statics. (3) I.**

Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 4B. The atmosphere at rest: atmospheric composition and structure, thermo-

\* Not to be given, 1972-73.

dynamics of atmospheric gases, thermal properties of dry and moist air, hydrostatic equilibrium and stability criteria, and thermodynamic diagrams in meteorology. Mr. Myrup

**121A. Atmospheric Dynamics. (3) II.**

Lecture—3 hours. Prerequisite: course 120. The atmosphere in motion: the equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulations; wave motion in the atmosphere; vorticity. The physical basis of modern numerical methods in meteorology. Mr. Myrup

**121B. Atmospheric Dynamics. (3) III.**

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. Mr. Myrup

**122. Atmospheric Radiation. (3) II.**

Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 4C. Basic laws of radiation; properties of solar radiation; absorption, reflection and scattering in the atmosphere; planetary albedo; absorption and emission by atmospheric gases and aerosols; atmospheric energy budget. Offered in odd-numbered years. Mr. Coulson

**123. Micrometeorology. (3) III.**

Lecture—3 hours. Prerequisite: Mathematics 16B or equivalent. Properties of the atmosphere near the earth's surface: frictional effects, mass and energy transfers across the surface-atmosphere interface, and the effect of these in modifying the localized environment. Mr. Coulson

**124. Meteorological Instruments and Observations. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 20 or equivalent. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. Mr. Carroll, Mr. Goddard

**131. Airborne Particulates. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 13; course 20 or Agricultural Engineering 107 recommended. Atmospheric sampling techniques and instrumentation, statistical evaluation of data. Sources of particulates—natural, agricultural, municipal, industrial. Interaction of particles with their atmospheric environment and their importance to health, agriculture, etc. Control of particulates: technology, economics, legislation. Mr. Akesson

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: three upper division units in Atmospheric Science.

The Staff (Mr. Coulson in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. The Staff (Mr. Coulson in charge)

**Graduate Courses**

**215. Atmospheric Processes. (3) I.**

Lecture—3 hours. Prerequisite: graduate standing in atmospheric science or consent of instructor. Dynamics of the general circulation of the atmosphere, structure of weather systems, atmospheric energy budgets, mass momentum and radiative transfers, observational network and methods of measurement. Mr. Coulson

**221. Advanced Atmospheric Dynamics. (3) III.**

Lecture—3 hours. Prerequisite: course 110C, Mathematics 22B. Dynamics of sub-synoptic scale atmospheric flows with emphasis on: the effect of vertical density gradients on shear flow stability, wake generation and gravity waves; circulations in response to local horizontal density gradients; cumulus cloud dynamics and local severe weather. Mr. Carroll

**222. Radiation in Planetary Atmospheres. (3) III.**

Lecture—3 hours. Prerequisite: course 122 or equivalent. Theory and observations of radiation in planetary atmospheres. Absorption, transmission, scattering by atmospheric gases, aerosols, and clouds; gaseous emission; effects of surface reflection; radiative energy budget of the atmosphere and of the planet as a whole; methods of measurement. Mr. Coulson

**223. Advanced Micrometeorology. (3) I.**

Lecture—3 hours. Prerequisite: course 123 and 121B or equivalent. Turbulent transfer of momentum, heat and moisture in the atmospheric boundary layer. Stability parameters. Air/sea interaction. Numerical boundary layer models. Micrometeorology of plant canopies and cities. Microclimate modification. Turbulent diffusion in the atmospheric boundary layer. Mr. Myrup

**\*230. Atmospheric Turbulence. (3) II.**

Lecture—3 hours. Prerequisite: course 223 or equivalent. Dynamics and energetics of turbulent motion: transition to turbulence, energy dissipation, kinetic energy and thermal variance equations, convective and mechanical turbulence, integral methods. Statistical methods: probability density function, moments, spectral analysis. The Kolmogoroff theory: spectrum, structure function and diffusion predictions. Mr. Myrup

**240. Physical Climatology. (3) I.**

Lecture—3 hours. Prerequisite: course 123 or equivalent. Causes of climatic phenomena including the heat and water balance of the earth-atmosphere system and application of the physi-

\* Not to be given, 1972-73.

cal principles involved to general climatology, agrometeorology and hydrology. Offered in odd-numbered years. Mr. Morgan

**Related Courses:** See Agricultural Engineering 107; Water Science 202; Geography 3.

## AVIAN MEDICINE—See Epidemiology and Preventive Medicine

### AVIAN SCIENCES

*Related Undergraduate Major and Graduate Study.*—See pages 70 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

#### Lower Division Courses

#### 10. Poultry Production. (4) II.

Lecture—4 hours. A survey of principles and practices involved in poultry production. Designed for students not specializing in avian sciences. Mr. Ogasawara

#### 11. Laboratory in Poultry Production. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 10 (may be taken concurrently) or consent of instructor. Laboratory studies in poultry biology; techniques and economics of poultry production. Mr. Ogasawara

#### 12. Survey of Poultry and Allied Industries. (3) III.

Lecture—2 hours; conference—1 hour. A survey of industries concerned with poultry products in the U.S.A. and various regions of the world: hatchery industry, feed industry, egg and meat production, poultry products, specialized enterprises. Offered in odd-numbered years. Mr. Peterson

#### 13. Birds, Man, and the Environment. (2) III.

Lecture—2 hours. Birds in the world of man: folklore, art, literature, uniqueness, domestication, recreation, game birds, zoos, falconry, endangered species, public health, in research, as food sources. The Staff (Mr. Grau in charge)

#### 13L. Birds, Man, and the Environment: Laboratory. (1) III.

Laboratory—3 hours. Demonstrations and field trips for students enrolled concurrently in course 13. The Staff (Mr. Grau in charge)

#### 98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Grau in charge)

#### 99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor. Problems in avian biology; nutrition, breeding, and physiology of poultry and their products.

The Staff (Mr. Grau in charge)

#### Upper Division Courses

#### 102. Fertility and Hatchability in Birds. (3) III.

Lecture—2 hours; two field trips. Prerequisite:

Biological Sciences 1 and Chemistry 8A. Reproduction in domestic and wild bird species. The influences on genetic, environmental and behavioral factors on embryonic development; special emphasis on the effects of diet, drugs, and pesticides. Mrs. Abbott

#### 149. Environmental Management of Poultry. (1) III.

Lecture—1 hour. Prerequisite: Physiology 149 (may be taken concurrently). Application of physiological principles to environmental management of poultry. Mr. W. O. Wilson

#### 150. Comparative Nutrition of Avian Species. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1 and Chemistry 8A or consent of instructor. 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. Mr. Vohra

#### 190. Proseminar in Avian Science. (1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in avian sciences or consent of instructor.

Mr. Grau

#### 198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Grau in charge)

#### 199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor. Problems in avian biology related to nutrition, breeding, and physiology of poultry and their products.

The Staff (Mr. Grau in charge)

#### Graduate Courses

#### 202L. Laboratory in Avian Experimental Embryology and Teratology. (3) II.

Laboratory—9 hours. Prerequisite: consent of instructor. The causes of abnormal morphogenesis in avian embryos including genetic, chemical, and physical-environmental factors; the application of transplantation, organ culture, and other experimental techniques. Offered in odd-numbered years. Mrs. Abbott

#### 290. Seminar. (1) I, II, III.

Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.

The Staff (Mr. Grau in charge)



**298. Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Grau in charge)

**299. Research. (1-12) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Grau in charge)

Related Course: see Food Science and Technology 121.

**BACTERIOLOGY**

Herman J. Phaff, Ph.D., *Chairman of the Department*

Department Office, 156 Hutchison Hall

*Professors:*

- Robert E. Hungate, Ph.D.
- John L. Ingraham, Ph.D.
- Allen G. Marr, Ph.D.
- Herman J. Phaff, Ph.D. (*Bacteriology and Food Science and Technology*)
- \*Mortimer P. Starr, Ph.D.

*Associate Professors:*

- David Pratt, Ph.D.
- Donald M. Reynolds, Ph.D.

*Assistant Professors:*

- Donald P. Kessler, Ph.D.
- Mark L. Wheelis, Ph.D.



*Professor:*

Martin W. Miller, Ph.D. (*Food Science and Technology*)

*Lecturer:*

Wiltraud P. Segel, Ph.D.

*Major Advisers.*—Mr. Kessler, Mrs. Segel.

*The Major Programs*

The undergraduate major programs provide a balance of studies in the biology of bacteria and other microorganisms together with appropriate courses in mathematics and physical science, and may be elected by students registered in either the College of Letters and Science or College of Agricultural and Environmental Sciences. Both the Bachelor of Arts program and the Bachelor of Science program are suitable for students who plan to do graduate work in a biological science or who wish a professional career in bacteriology.

Either major is appropriate for students contemplating a career in Medical Technology. Such students are advised to take Veterinary Microbiology 127 and 128 and a year laboratory course in physics in addition to the courses required for a major in bacteriology.

*Bachelor of Arts Major Program*

Lower Division Courses.—Bacteriology 3; Biological Sciences 1; Botany 2 or Zoology 2; Chemistry 1A-1B-1C, 5, 8A-8B; Mathematics 16A-16B and either 13, 16C, or 36A-36B; Physics 2A-2B-2C.

\* Absent on leave, fall quarter 1972.

\* Absent on leave, winter quarter 1973.

Upper Division Courses.—Bacteriology 105A, 105B, 105AL, 130A-130B, and either 105BL or 130L; Biochemistry 101A-101B-101L; Genetics 100A-100B; and one course from the following: Bacteriology 150, Biological Sciences 162, Botany 114, 118, 119, or Zoology 110; and two additional units in bacteriology which may include Veterinary Microbiology 127.

*Bachelor of Science Major Program*

Lower Division Courses.—Bacteriology 3; Biological Sciences 1; Chemistry 1A-1B-1C, 5; Mathematics 13, 21A-21B-21C; Physics 2A-2B-2C and 3A-3B-3C. Recommended: elementary course in French or German.

Upper Division Courses.—Bacteriology 105A, 105B, 105AL, 130A-130B, and either 105BL or 130L; Biochemistry 101A-101B-101L; three quarters of physical chemistry; Chemistry 128A, 128B, 128C, 129A; Genetics 100A-100B; Genetics 102 or Biological Sciences 162.

*Honors and Honors Program* (see page 148).

*Graduate Study* (see page 172).—The Graduate Group in Microbiology offers programs of study and research leading to the M.A. and Ph.D. degrees in general microbiology, including bacteriology. The offerings of the Department of Bacteriology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics, Botany, Food Science and Technology, Genetics, Viticulture and Enology, and the Schools of Veterinary Medicine and of Medicine. For detailed information regarding graduate study in microbiology, address the Chairman, Graduate Group in Microbiology, Department of Bacteriology.

*Teaching Major.*—Requirements for the principal teaching major are the same as those for the departmental major.

*Teaching Minor.*—30 units selected from the A.B. or B.S. Bacteriology major programs, as approved by the Department Subject Representative.

*Subject Representative:* Mr. Phaff

**Lower Division Courses**

**2. General Bacteriology. (4) I, II, III.**

Lecture-demonstration—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1. The biology of bacteria with some of its applications.

- I. Mrs. Segel; II. Mr. Ingraham;
- III. Mr. Wheelis



**3. Bacteriological Laboratory Techniques.**

(1) I, II, III.

Laboratory—3 hours. Prerequisite: Biological Sciences 1. Designed to acquaint the student with the basic techniques of bacteriology, with the major responsibility for organizing and accomplishing the work resting with the student. (Passed/Not Passed grading only.) Mrs. Segel

**98. Directed Group Study. (1-5) I, II, III.**

Lecture—1-5 hours. Prerequisite: consent of instructor. The Staff (Mr. Phaff in charge)

**Upper Division Courses****101. Microbiology and Society. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; introductory courses in biology and chemistry recommended. Microbes and microbiology, with particular attention to human welfare and experience. Nature and classification of microbes. Ways in which microbes aid, harm, and otherwise affect man, including environmental, literary, historical, intellectual, aesthetic, ethical, legal, economic, and political aspects. Mr. Starr

**105A. Bacterial Diversity. (3) I.**

Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1, Chemistry 8B or 128A and 129A. An integrated consideration of aerobic bacteria as organisms; their morphology, systematics, ecology, metabolism, and economic importance. Mr. Wheelis

**105AL. Bacterial Diversity Laboratory. (2) I.**

Laboratory—6 hours. Prerequisite: course 3; concurrent enrollment in course 105A. Designed to give the student laboratory experience with selected organisms considered in course 105A. Mr. Wheelis

**105B. Bacterial Diversity. (3) II.**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 105A. A continuation of course 105A but dealing with the anaerobic bacteria, including comparisons of fermentation patterns and their significance to the organism. Mr. Hungate

**105BL. Bacterial Diversity Laboratory. (2) II.**

Laboratory—6 hours. Prerequisite: course 105AL; concurrent enrollment in course 105B. Designed to give the student laboratory experience with selected organisms considered in course 105B. Mr. Hungate

**130A-130B. Physiology and Genetics of Bacteria.**

(3-3) II-III.

Lecture—3 hours. Prerequisite: Biochemistry 101B (may be taken concurrently), Genetics 100A, Mathematics 16A or 21A. An integrated

consideration of the physiology, genetics, and molecular biology of bacteria. Topics will include bacterial growth, mutant selection, genetic analysis, regulation of enzyme function and macromolecular synthesis, and episomes.

Messrs. Ingraham, Kessler, Wheelis

**130L. Bacterial Physiology Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: courses 3 and 130A. Physiology and genetics of bacteria and bacterial viruses. Messrs. Kessler,

Ingraham, Marr, Pratt, Wheelis

**150. Protistology. (3) III.**

Lecture—3 hours. Prerequisite: Biological Sciences 1. A survey of protozoa and yeasts, including selected physiological topics.

Mr. Hungate, Mr. Phaff

**150L. Protistology Laboratory. (1) III.**

Laboratory—3 hours. Prerequisite: courses 3 and 150 (may be taken concurrently). Experiments on the taxonomy, physiology, and ecology of selected yeasts and protozoa.

Mr. Hungate, Mr. Phaff

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Phaff in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Phaff in charge)

**Graduate Courses****205. Bacterial Diversity and Ecology. (3) I.**

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 105B, 105BL. Intensive study of selected microorganisms and habitats in relation to diversification factors. Mr. Wheelis

**\*206. Bacterial Taxonomy. (2) I.**

Lecture-discussion—2 hours. Prerequisite: course on the bacteria; courses 105A and 105B (or courses in plant and/or animal diversity) recommended. Principles and procedures of bacterial taxonomy. Mr. Starr

**207. Microbial Ecology. (2) I.**

Lecture and discussion—2 hours. Prerequisite: consent of instructor. Analysis of microbial participation in various ecosystems with a view toward formulation of quantitatively descriptive models. Mr. Hungate

**230. Bacterial Physiology. (2) III.**

Lecture—2 hours. Prerequisite: course 130B, Biochemistry 101B. Selected topics in bacterial physiology. Mr. Ingraham, Mr. Marr

**250. Yeasts and Related Organisms. (5) I.**

Lecture—3 hours; laboratory—6 hours. Pre-

\* Not to be given, 1972-73.

requisite: consent of instructor. Morphology, development, classification and distribution of yeasts; relation to other fungi; growth requirements; physiological activities.

Mr. Phaff, Mr. Miller

**260. Bacterial Viruses. (2) III.**

Lecture—2 hours. Prerequisite: consent of instructor. Selected topics on the structure, replication, and genetics of bacterial viruses.

Mr. Pratt

**280. Comparative Genetics of Prokaryotes. (2) II.**

Lecture—2 hours. Recommended: knowledge of genetics of enteric bacteria. Systems of genetic exchange and genetic mapping techniques in various groups of prokaryotes, with special emphasis upon the actinomycetes and pseudomonads. Offered in odd-numbered years.

Mr. Wheelis

**291. Seminar in General Microbiology. (1) III.**

Seminar—1 hour. A review and discussion of the current literature and developments in the field of microbiology with presentations by individual students. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Phaff in charge)

**292. Seminar in Bacterial Physiology. (1) I, II, III.**

Seminar—1 hour. A review and discussion of the current literature and developments in bacterial physiology with presentations by individual students. (Satisfactory/Unsatisfactory grading only.)

Mr. Marr, Mr. Ingraham

**293. Seminar in Bacterial Genetics. (1) I, II, III.**

Seminar—1 hour. A review and discussion of the current literature and developments in bacterial genetics with presentations by individual

students. (Satisfactory/Unsatisfactory grading only.)

Mr. Kessler

**294. Seminar in Bacterial Virology. (1) I, II, III.**

Seminar—1 hour. Prerequisite: consent of instructor. An examination of current topics in the structure, replication, and genetics of bacterial viruses. (Satisfactory/Unsatisfactory grading only.)

Mr. Pratt

**295. Seminar in Microbial Ecology. (1) I, III.**

Seminar—1 hour. Prerequisite: consent of instructor. A review and discussion of the current literature in the ecology of protists and bacteria with presentations by individual students. (Satisfactory/Unsatisfactory grading only.)

Mr. Hungate

**298. Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Phaff in charge)

**299. Research. (1-12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Phaff in charge)

**Related Courses:** Botany 114, 118, 119; Epidemiology and Preventive Medicine 150; Food Science and Technology 104, 104L, 105, 106, 106L; Genetics 102; Veterinary Microbiology 126, 127, 128, 270; Viticulture and Enology 217; Zoology 110.

For other courses related to Bacteriology see the course offerings in the Departments of Food Science and Technology, Veterinary Microbiology, Medical Microbiology, Epidemiology and Preventive Medicine, Botany, Plant Pathology, and Biological Sciences.

**BEHAVIORAL BIOLOGY—See Medicine**

**BIOCHEMISTRY (A Graduate Group)**

Eric E. Conn, Ph.D., *Chairman of the Group*

Group Office, 104A Briggs Hall

*Graduate Study.*—The Graduate Group in Biochemistry offers programs of study and research leading to the M.A. and Ph.D. degrees. For detailed information regarding graduate study in biochemistry address the chairman of the group.

**Graduate Courses**

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Conn in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Conn in charge)

**BIOCHEMISTRY AND BIOPHYSICS**

*Major Advisers.*—See *Class Schedule* listing.

*Major Program and Graduate Study.*—See pages 72 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Division of Biological Sciences, 150 Mrak Hall.

**Upper Division Courses****101A. General Biochemistry. (3) I, II.**

Lecture—3 hours. Prerequisite: Chemistry 8B or 128B–129B. Recommended: introductory course in bacteriology, botany, or zoology. Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with examples from animals, plants, and microorganisms.

Mr. Conn, Ms. Etzler, Mr. Segel

**101B. General Biochemistry. (3) II, III.**

Lecture—3 hours. Prerequisite: course 101A. A continuation of 101A.

Mr. Conn, Ms. Etzler, Mr. Segel

**101L. General Biochemistry Laboratory. (5) I, III.**

Lecture—2 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 require experience in the use of biochemical techniques as laboratory tools.

Mr. Criddle, Mr. Toliver

**102. Animal Biochemistry Laboratory. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B (may be taken concurrently). Laboratory procedures employed in the study of physiological and biochemical processes.

Mr. Baldwin

**108. Biochemical Control Mechanisms. (3) III.**

Lecture—3 hours. Prerequisite: Biochemistry 101B. The mechanisms by which metabolism is regulated in living cells. The role of variations in the intracellular levels of intermediates, activators, and inhibitors; enzyme induction and repression; and multiple forms of enzymes.

Messrs. Dahmus, Segel, Doi

**122. Plant Biochemistry. (3) II.**

Lecture—3 hours. Prerequisite: Biochemistry 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

Mr. Conn, Mr. Stumpf

**123. An Introduction to Enzymology. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 101B. Principles of the 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 mechanism of action illustrated by consideration of selected enzymes. Mr. Mazelis

**190. Undergraduate Seminar in Biochemistry. (1)**

I, II, III.

Seminar—1 hour. Prerequisite: courses 101A, 101B (may be taken concurrently). Discussion of the historical developments of modern biochemistry.

Messrs. Segel, Toliver, Stumpf

**199. Special Study for Advanced Undergraduates.**

(1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Preiss in charge)

**Graduate Courses****201A–201B–201C. Advanced General Biochemistry.**

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 101B; Chemistry 110C or 107B, 108; Chemistry 128C, 129C; or consent of instructor. Physical and chemical properties of amino acids, proteins, lipids, carbohydrates and nucleic acids; methods of isolating proteins; enzymes, including kinetics, cofactors, and type reactions; and the study of organized cell structures. The Staff

**202A–202B. Advanced Biochemistry Laboratory.**

(6–6) I–II.

Lecture—1 hour; laboratory—15 hours. Prerequisite: course 201A (may be taken concurrently); Chemistry 5. Laboratory methods and procedures used in biochemical research. Critical evaluation of experimental design and data is stressed. The Staff

**203. Carbohydrates. (3) III.**

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biosynthesis of simple and complex sugars and polysaccharides. Offered in odd-numbered years.

Mr. Preiss

**\*204. Nucleic Acids. (3) I.**

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The physical and biological properties of nucleic acids; biosynthetic pathways; metabolism and structure of bases, nucleotides and their occurrence and distribution. The relation of structure and function of RNA and DNA to heredity, coding, and protein synthesis. Offered in odd-numbered years.

Messrs. Bruening, Dahmus, Doi

**205. Biochemical Mechanisms. (3) II.**

Lecture—3 hours. Prerequisite: course 101B; Chemistry 110C, 131; or consent of instructor. Bond structures of biochemical interest. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

Mr. Ingraham

**206. Physical Biochemistry of Macromolecules.**

(3) I.

Lecture—3 hours. Prerequisite: course 201C; Chemistry 110C; or consent of instructor. Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest. Offered in even-numbered years.

Mr. Criddle

\* Not to be given, 1972–73.

**\*207. Lipids. (3) III.**

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. A discussion of the chemistry, metabolism and experimental methodology unique to fatty acids, triglycerides, phospholipids, plasmalogens, sphingolipids, carotenoids and steroids. Offered in even-numbered years. Mr. Stumpf

**210. Protein Biochemistry. (3) II.**

Lecture—3 hours. Prerequisite: course 201C. Chemical, physical, and biological properties of amino acids, peptides, and proteins. The biological aspects include protein function, biosynthetic and biodegradative pathways, and nutritional requirements for amino acids. Mr. Geschwind

**212. Chemical Modifications of Proteins. (2) III.**

Lecture—2 hours. Prerequisite: course 101B; Chemistry 128A–128B–128C and 129A–129B–129C or 128A–128B–128C–129A. 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 of the structure of proteins to their functions. Mr. Feeney

**\*213. Principles of Comparative Biochemistry. (3) I.**

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. An advanced treatment of comparative biochemistry. Comparisons of living systems, their structures and functions on a molecular basis, biochemical unity and diversity; protein structures and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism, and excretion. Offered in odd-numbered years. (Same course as Biological Chemistry 213.) Mr. Benisek, Mr. Feeney

**215. Kinetics of Biological Systems. (2) III.**

Lecture—2 hours. Prerequisite: course 201B; Fortran IV (may be taken concurrently). The kinetic behavior of multivariable biological systems; mathematical methods and analysis of typical data with accent on computer use; in particular, the kinetics of multivariant catalysts, pre-steady state systems, perturbed systems, and reactions in a metabolic sequence. Mr. Ingraham

**225. Science, the Scientist, and Society. (2) II.**

Discussion—2 hours. Prerequisite: two years of graduate work and consent of instructor.

Readings and discussions on the attitudes and values of scientists toward themselves, science, and society. Scientists and ethics, responsibilities, prejudices; the organization, teaching, and publication of science; basic versus applied research; science and art creativity, societal control of science; antiscience. Mr. Hedrick

**230. Biochemical Aspects of Endocrinology. (3) III.**

Lecture—3 hours. Prerequisite: course 101B; Physiology 110B. The chemistry and function of animal hormones, with special reference to the isolation and structure of those of vertebrate origin. Assay, mechanism of action, biosynthesis, and metabolism of hormones. Biochemical lesions in congenital and other endocrinopathies. Offered in odd-numbered years. Mr. Geschwind

**240. Selected Topics in Biochemistry. (2) I.**

Lecture—2 hours. Prerequisite: course 201C or consent of instructor. (Satisfactory/Unsatisfactory grading only.) The Staff

**250. Biochemical Literature. (1) I, II, III.**

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Critical reading and evaluation of the current biochemical literature. Selected papers will be presented and discussed in detail. (Satisfactory/Unsatisfactory grading only.) The Staff

**270. Advanced Research Conference. (1) I, II, III.**

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Presentation and critical discussions of the research activities of various members of the local biochemical community; primarily designed for graduate students. (Satisfactory/Unsatisfactory grading only.) Mr. Stumpf

**291. Current Progress in Biochemistry. (1) I, II, III.**

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Seminars presented by guest lecturers on the subject of their own research activities. (Satisfactory/Unsatisfactory grading only.) The Staff

**299. Research. (1–12) I, II, III.**

The Staff (Mr. Preiss in charge)

**Related Courses:** see Food Science and Technology 250A–250B, 250C, 251A–251B; Biological Chemistry (Medicine) 215.

**BIOLOGICAL CHEMISTRY—See Medicine**

**BIOLOGICAL SCIENCES**

S. R. Snow, Ph.D., *Associate Dean of Biological Sciences*

Division Office, 150 Mrak Hall

**Major Advisers.**—Assignments made in Division Office.

*The Major Programs*

The major programs in Biological Sciences provide an opportunity for broader study of

\* Not to be given, 1972–73.

biology than is possible with most departmental majors. The programs are suitable preparation for a wide variety of careers in professional areas such as medicine, nursing, dentistry, veterinary medicine, medical technology, and many other allied health sciences fields, for teaching, for work with various governmental agencies and private companies, and as preparation for advanced degrees and careers in research. Students interested in careers in one of the health science areas involving considerable personal interactions will be best served by the Bachelor of Arts plan; for those contemplating careers in areas where the emphasis is more laboratory-oriented, the Bachelor of Science plan will be more suitable. The B.S. degree can be attained by students registered either in the College of Letters and Science or in the College of Agricultural and Environmental Sciences; study leading to the A.B. degree is offered only in Letters and Science.

#### *Bachelor of Arts Major Program*

**Lower Division Courses.**—Required: Bacteriology 2 and 3; Biological Sciences 1; Botany 2; Chemistry 1A-1B, 8A-8B; Zoology 2; 6 units of mathematics. Recommended: Chemistry 1C; Physics 2A-2B-2C.

**Upper Division Courses.**—Required: A total of 36 upper division units in biological sciences including Genetics 100A-100B, and at least one course or course sequence from each of the following groups, including one course each in plant biology and animal biology:

a) Organismal Biology.—Bacteriology 105A, 150; Biological Sciences 162; Botany 105, 108, 114, 118, 119; Entomology 101, 103; Zoology 100, 105, 106, 110, 112, 133A, 133B, 135, 136, 137.

b) Population Biology and Ecology.—Botany 117, 141; Entomology 104; Genetics 105; Water Science 120, 122; Wildlife and Fisheries Biology 151; Zoology 116, 125.

c) Evolutionary Biology.—Botany 116, 140; Genetics 103; Geology 107, 140; Zoology 148.

d) Physiology.—Physiology 101, 110A-110B; Bacteriology 130A-130B; Botany 111A-111B; Entomology 102; Zoology 142.

e) Cell Biology.—Physiology 100A-100B, 103; Botany 130; Zoology 120, 121A-121B.

#### *Bachelor of Science Major Program*

**Lower Division Courses.**—Required: Bacteriology 2 and 3; Biological Sciences 1; Botany 2; Chemistry 1A-1B-1C or 4A-4B-4C, and 8A-8B or 128A-128B-128C-129A or 128A-128B-128C and 129A-129B-129C; Mathematics 13 or 131A and 16A-16B-16C; Physics 2A-2B-2C; Zoology 2. Recommended: Chemistry 5; Physics 3A-3B-3C.

**Upper Division Courses.**—Required: A total of 45 upper division units in biological sciences including Biochemistry 101A-101B or Physiological Sciences 101A-101B, and Genetics 100A-100B; and one course or course sequence

from each of the following groups including one course each in animal biology, microbiology, and plant biology:

(Same as *a* through *e* under Bachelor of Arts major program above.)

**The Honors Program.**—Students on the honor list may enroll in an Honors Program of courses leading to honors with the bachelor's degree (see page 148).

A special study course (194H) involving either independent research or reading on an appropriate topic, followed by preparation of an honors thesis (course 195H) based primarily on the work done in the prerequisite course, must be completed.

**Teaching Major.**—A degree in Biological Sciences satisfies the requirement for a teaching major in the life sciences for both elementary and secondary teaching credentials, except that for the elementary credential Entomology 1 or 10 must be included.

**Teaching Minor.**—A minimum of 30 units of biology, including the undergraduate core: Biological Sciences 1, Botany 2, Zoology 2, and Bacteriology 2.

**Subject Representative:** Mr. Murphy (Botany)

#### **Lower Division Courses**

### **1. Principles of Biology. (5) I, II, III.**

Lecture-discussion—4 hours; Laboratory—3 hours. Prerequisite: Chemistry 1B, or a passing score on a qualifying examination in Chemistry. An interdisciplinary course designed for majors in the biological sciences. The emphasis is on the unity of basic biological principles as related to cell structure and function, reproduction, genetics, evolution, and ecology.

I. Mr. Murphy, Mr. Thornton (Botany)

II. Mr. Pratt (Bacteriology)

III. ——— (Zoology)

### **10. General Biology. (4) II, III.**

Lecture—3 hours; discussion—1 hour. Not open for credit to those who have had course 1. Consideration of the main features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. Designed for students not specializing in biology.

II. Mr. Ketellapper (Botany)

III. Mr. Spieth (Zoology)

#### **Upper Division Courses**

### **162. General Virology. (3) II.**

Lecture—3 hours. Prerequisite: course 1; Genetics 100A and Biochemistry 101B recommended. An integrated presentation of the nature of animal, bacterial and plant viruses, including their structure, replication, and genetics.

Messrs. Bruening, Pratt, Shalla

### **189. Integration of Biological Concepts. (3) III.**

Lecture—2 hours; discussion—1 hour. Pre-

requisite: twenty upper division units in biology. A detailed examination in depth of the coherence of biology through a study of several unifying themes, for example, evolution. Mr. Stebbins

#### 195H. Honors Thesis. (2) I, II, III.

Prerequisite: course 194H. Preparation of comprehensive thesis incorporating studies undertaken in course 194H.

The Staff (Mr. Snow in charge)

## BOTANY

C. Ralph Stocking, Ph.D., *Chairman of the Department*

Department Office, 143 Robbins Hall

### Professors:

Floyd M. Ashton, Ph.D.  
Daniel I. Axelrod, Ph.D.  
Paul A. Castelfranco, Ph.D.  
Alden S. Crafts, Ph.D., LL.D. (*Emeritus*)  
Herbert B. Currier, Ph.D.  
Ernest M. Gifford, Jr., Ph.D.  
Hendrik J. Ketellapper, Ph.D.  
<sup>1</sup>Jack Major, Ph.D.  
C. Ralph Stocking, Ph.D.  
John M. Tucker, Ph.D.  
<sup>4</sup>Grady L. Webster, Ph.D.  
T. Elliot Weier, Ph.D. (*Emeritus*)

### Associate Professors:

Michael G. Barbour, Ph.D.  
Bruce A. Bonner, Ph.D.  
<sup>2</sup>Donald W. Kyhos, Ph.D.  
Norma J. Lang, Ph.D.  
Kenneth Wells, Ph.D.

### Assistant Professors:

Richard H. Falk, Ph.D.  
Terence M. Murphy, Ph.D.  
Robert F. Norris, Ph.D.  
Thomas E. Ragland, Ph.D.  
Robert M. Thornton, Ph.D.



### Lecturers:

David E. Bayer, Ph.D.  
<sup>3,4</sup>Oliver A. Leonard, Ph.D.

*Departmental Major Adviser.*—Mr. Wells

### The Major Programs

The Bachelor of Science major program should be elected by those students who plan advanced study in botany, who wish to obtain general secondary teaching credentials, or who wish training for a position requiring a detailed knowledge of plants. Students who wish a less intensive program in botany, but one that acquaints the students with plant life and its im-

### Graduate Course

#### 210. Effective Teaching of College Biology. (3) III.

Lecture—1 hour; discussion—1 hour; assignments and reports. The teaching function of an academic career; objectives, nature, and evaluation of effective teaching; preparation of curricula, courses, lectures, discussions, and examinations; innovative programs. Undergraduate enrollment limited. (Satisfactory/Unsatisfactory grading only.) Mr. Hildebrand

portance, should elect the Bachelor of Arts major program.

The Bachelor of Science program may be elected by students registered either in the College of Letters and Science or in the College of Agricultural and Environmental Sciences.

#### *Bachelor of Science Major Program*

Lower Division Courses.—Required: Bacteriology 2; Biological Sciences 1; Botany 2; Zoology 2; Chemistry 1A, 1B, 1C, 8A, 8B; Physics 2A, 2B, 2C; Mathematics 13. German, French or Russian is the recommended language. Recommended: Chemistry 5; Mathematics 16A, 16B, 16C, especially for those students whose major interests are ecological, biochemical or physiological.

Upper Division Courses.—Required: Biochemistry 1Q1A, 1Q1B; Botany 105, 108, 111A, 111B, 116; Genetics 100A, 100B; in addition, students whose interests are morphological or taxonomic are required to take Botany 118 and 119, students whose interests are ecological are required to take Botany 114 and 117, students whose interests are biochemical or physiological are required to take Botany 114 and 5 additional upper division units in botany or related natural science courses.

#### *Bachelor of Arts Major Program*

Lower Division Courses.—Required: Biological Sciences 1; Botany 2; Chemistry 1A, 1B, 8A, 8B; Zoology 2. Recommended: Bacteriology 2; Chemistry 1C; Mathematics 13.

Upper Division Courses.—Required: Botany 105, 108, 111A, 111B, 116; Genetics 100A, 100B; 10 additional units in botany or related natural science courses. Recommended: Botany 114 or 118, 119.

*Honors and Honors Program* (see page 148).—Students on the honors list may elect to substitute a maximum 5 units of 194H for 5 upper division units of the regular major; however,

<sup>1</sup> Absent on leave, 1972–73.

<sup>2</sup> Absent on leave, fall quarter 1972.

<sup>3</sup> Absent on leave, winter quarter 1973.

<sup>4</sup> Absent on leave, spring quarter 1973.

recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H.

**Teaching Major.**—The requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

**Teaching Minor.**—Botany 2; and a minimum of 23 units in botany or closely related subjects. Students must consult with subject representative.

**Subject Representative:** Mr. Wells

**Graduate Study.**—Graduate programs leading to M.S. and Ph.D. degrees are offered in cytology, plant physiology, anatomy, morphology, taxonomy, ecology, mycology, phycology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

#### Lower Division Courses

### 2. General Botany. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1. Structure, physiology, and taxonomy of plants, with special emphasis on seed plants.

I. Mr. Bonner; II. Mr. Tucker; III. Mr. Kyhos

### 98. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Stocking in charge)

### 99. Special Study for Undergraduates. (1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Stocking in charge)

#### Upper Division Courses

### 101. Survey of Biotic Communities of California.

(3) III.

Lecture—2 hours; weekend field trips—8 to 10 days. Prerequisite: upper division standing, consent of instructor; course 2 recommended. The structure of selected plant communities and the relationship of their component species to the environment.

The Staff (Mr. Barbour in charge)

### 105. Plant Anatomy. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Structure and growth of meristems; development and structure of cells, tissues and tissue systems; comparative anatomy of stem, root, and leaf.

### 107. Weed Control. (4) III.

Lecture—2 hours; laboratory—6 hours; 2 field trips. Prerequisite: course 2; Chemistry 8B. Introduction to the physiological and chemical principles underlying control of weeds; principles of preventive, cultural, and biological weed control; identification of common weeds.

Mr. Norris

### 108. Systematic Botany of Flowering Plants. (5) III.

Lecture—3 hours; laboratory—6 hours. Pre-

requisite: course 2. Laboratory and field studies of the characters and relationships of the principal families and orders of flowering plants. Principles of taxonomy. Practice in identification of species by means of keys.

Mr. Tucker

### 111A. Introduction to Plant Physiology. (3) I, II.

Lecture—3 hours. Prerequisite: course 2; Chemistry 8B (may be taken concurrently). The fundamental activities of plants, the plant cell as a functioning unit. The processes of absorption, movement and utilization of water and minerals. Water loss, translocation, photosynthesis.

I. Mr. Ragland; II. Mr. Stocking

### 111B. Introduction to Plant Physiology. (3) II, III.

Lecture—3 hours. Prerequisite: course 111A; Biochemistry 101A recommended. Continuation of course 111A. Respiration, metabolism. The dynamics and control of growth and development.

II. Mr. Murphy; III. Mr. Thornton

### 111L. Introductory Plant Physiology Laboratory.

(2) III.

Laboratory—6 hours. Prerequisite: course 111. Experiments designed to illustrate basic principles considered in course 111.

Messrs. Stocking, Murphy, Thornton

### 114. Biology of Fungi and Algae. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Not open for credit to students having received credit for courses 118 or 119. An introduction to the morphology, taxonomy, evolution, and physiology of the fungi and the algae.

Miss Lang, Mr. Wells

### \*115. Mosses and Liverworts. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2. Morphology, taxonomy, and ecology of mosses and liverworts. Field trips.

### 116. Vascular Plants: Structure and Evolution. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2; course 105 recommended. Structure, reproduction and evolution of the major groups of living and extinct vascular plants; special emphasis given to seed plants.

Mr. Gifford

### 117. Plant Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111. Study of individual plants, species, and vegetation in relation to environment and of modification of the environment by vegetation.

Mr. Barbour

### 118. Phycology. (5) II.

Lecture—3 hours; laboratory—6 hours; field trip. Prerequisite: course 2. Morphology, physiology, genetics, evolution, distribution, cultivation, and economic importance of algae.

Miss Lang

\* Not to be given, 1972–73.



**119. Introductory Mycology. (5) I.**

Lecture—3 hours; laboratory—6 hours; field trip. Prerequisite: course 2 or Bacteriology 2. Introduction to structure, ontogeny, and taxonomy of selected species of the major taxa of *Myxomycota* and *Eumycota*. Mr. Wells

**130. General Cytology. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Zoology 2; Genetics 100B or Biochemistry 101A. An analysis of the structure and ultrastructure of cells; the relationship between structure and function at cellular and subcellular levels. Consideration of cell particulates, membranes, endoplasmic reticulum, mitochondria, plastids, the Golgi region and their relation to both the metabolic nucleus and the dividing nucleus. Should not be taken by Biological Sciences majors to satisfy the Biological Sciences requirement in Plant Biology. Mr. Falk

**130L. General Cytology Laboratory. (2) I.**

Laboratory—6 hours. Prerequisite: course 130 (may be taken concurrently). Introduction to the laboratory methods of cytology; introduction to the interpretation of electron micrographs. Mr. Falk

**140. Paleobotany. (5) III.**

Lecture—2 hours; laboratory—6 hours; two all-day field trips, one 3-day field trip. Prerequisite: senior standing. Guiding principles underlying an analysis of successive floral assemblages in Cenozoic and Cretaceous rocks. Development of modern vegetation with emphasis on centers of origin and radiation, rates of evolution, and community evolution. (Same course as Geology 140.) Mr. Axelrod

**141. Plant Geography. (3) II.**

Lecture—3 hours. Prerequisite: course 108 or 116, course 117 recommended; or consent of instructor. Analysis of the distribution patterns of the vascular plant groups, and consideration of the factors which account for the present diversity of flora and vegetation. Mr. Webster

**142. Evolution of Plant Ecosystems. (4) I.**

Lecture—2 hours; discussion—1 hour; field trips. Prerequisite: course 140 or 141. Development of mixed mesophytic forest, conifer-hardwood forest, taiga, rain forest, desert, and "mediterranean" ecosystems. (Same course as Geology 142.) Mr. Axelrod

**155. Plant Microtechnique. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 105 or 116. Introduction to practical laboratory methods in preparing plant materials for microscopic examination; special emphasis on paraffin and chromosome smear techniques; introduction to techniques of tissue culture and photomicrography. Mr. Gifford

**180. Biological Evaluation of Herbicides. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 107 and 111A–111B (may be taken concurrently). Principles dealing with the physical, chemical, and physiological aspects of herbicides. Laboratory, greenhouse and field studies illustrating these principles in herbicide evaluation; emphasis upon biological assays and upon the interpretation of biological data. Mr. Bayer

**194H. Special Study for Honors Students. (1–5) I, II, III.**

Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis.

The Staff (Mr. Stocking in charge)

**198. Directed Group Study. (1–5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Stocking in charge)

**199. Special Study for Advanced Undergraduates. (1–5) I, II, III.**

The Staff (Mr. Stocking in charge)

**Graduate Courses****201A. Ecological Theory. (3) I.**

Lecture—2 hours; discussion—1 hour. Prerequisite: a course in ecology. The course will focus on the ecologic community as a unit. The major generalizations concerning the structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic environment and its fluctuations. (Same course as Ecology, Geology, and Zoology 201A.)

The Staff (Mr. Salt in charge)

**201B. Analysis of a Selected Ecosystem. (3) II.**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists from several fields. May be repeated for credit. (Same course as Ecology, Geology, and Zoology 201B)

The Staff (Chairman in charge)

**201C. The Changing Biosphere. (3) III.**

Lecture—2 hours; 1 assigned problem. Prerequisite: courses 201A, 201B; or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes of living systems, changes in species diversity, effects on human population increase, and related topics. (Same



course as Ecology, Geology, and Zoology 201C).  
The Staff (Chairman in charge)

#### 205A. Advanced Plant Physiology. (3) I.

Lecture—3 hours. Prerequisite: course 111B, Biochemistry 101A (may be taken concurrently). Cellular physiology, plant water relations, and translocation. Mr. Currier

#### 205B. Advanced Plant Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 111B, Biochemistry 101B (may be taken concurrently). Mineral nutrition, photosynthesis, respiration, and general plant metabolism. Mr. Ragland

#### 205C. Advanced Plant Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 111B, Biochemistry 101A; courses 205A and 205B, Biochemistry 101B recommended. Internal and environmental regulation of plant growth and development. Mr. Bonner

#### 206A. Advanced Plant Physiology Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in advanced plant physiology. Experiments designed to follow subject-matter sequence of course 205A. Mr. Currier

#### 206B. Advanced Plant Physiology Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 205B (may be taken concurrently), Chemistry 5. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B. Mr. Ragland

#### 206C. Advanced Plant Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C. Mr. Bonner

#### 210. Cell Physiology-Protoplasmatics. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected plant physiological topics treated on the cellular level: water relations, plasmolytic phenomena, cytoplasmic movements, transport mechanisms, vital staining, responses of cells to high and low temperatures, wound reactions, effects of poisons. Microscopic techniques are stressed. Mr. Currier

#### 211. Plant Cell Metabolism. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Plant cell physiology, dealing particularly with the roles of plastids, mitochondria, microsomes, and nuclei in cellular metabolism. Isolation and study of these particulates, using centrifugation, gasometric, chromatographic, and spectroscopic methods. Detailed consideration of photosynthesis and respiration. Mr. Castelfranco

#### \*212. Physiology of Herbicidal Action. (3) I.

Lecture—3 hours. Prerequisite: courses 107, 205A, 205B, 205C. A study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants and soils. Mr. Ashton

#### \*215. Light and Plant Growth. (3) II.

Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C; Physics 2B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis. Mr. Bonner

#### \*216. Advanced Morphology of Vascular Plants.

##### (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116. Evolution of form, structure, and reproduction of fossil and extant types through Cycadophytes. Mr. Gifford

#### \*217. Concept and Measurement of the Plant Community. (3) I.

Seminar-discussion—3 hours; term paper involving the application of some sampling and analytical methods. Prerequisite: course 117 and a course in statistics. Major subject areas are: 1) historical concepts of the plant community and of hierarchical groupings of communities, and 2) a review of sampling and analytical methods employed in the description or measurement of plant communities. Mr. Barbour

#### 218. Experimental Phycology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 118. Special problems in development, physiology, and genetics using algae as experimental organisms. Topics to be investigated will be selected according to the interests of individual students. Miss Lang

#### \*220. Plant Morphogenesis. (3) III.

Lecture—3 hours. Prerequisite: course 105 or 116; course 155 recommended. A survey of recent advances in the study of growth and the development of form, with special reference to higher plants, and some emphasis on experimental approaches.

#### \*220L. Plant Morphogenesis Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Procedures, principally experimental, used to study the development of plant form.

#### 221. Selected Topics in Plant Physiology. (2) I, II, III.

Lecture—2 hours. Evaluation of the most recent research in plant physiology. Lectures

\* Not to be given, 1972-73.

and discussions by specialists in the areas of their research interests. May be repeated for credit. (Satisfactory / Unsatisfactory grading only.)

I. Mr. Castelfranco;  
II. Mr. Bonner; III. Mr. Murphy

**231. Biological Electron Microscopy. (3) II.**

Lecture—1 hour; laboratory—8 hours. Prerequisite: consent of instructor. An introduction to biological electron microscopy. Areas to be covered are: electron optics, electron-specimen interactions, vacuum systems, specimen preparation, and microscope operation. Mr. Falk

**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—atomy, embryology, biochemistry, etc.—elucidate problems of taxonomic relationship, mainly of genera and higher categories. Mr. Tucker

**256A. Experimental Plant Taxonomy. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 108. Recommended: course 117; Genetics 103. The application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Mr. Kyhos

**256B. Experimental Plant Taxonomy. (2) III.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. A continuation of course 256A. The study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cytogenetics, transplant studies, etc., to the solution of taxonomic problems and the clarification of relationships. Mr. Kyhos

**257. Plant Autecology. (3) I.**

Lecture—3 hours. Prerequisite: course 117, Mathematics 13. Evaluation of biotic and abiotic environmental factors in the distribution of plant species. Mr. Barbour

**\*258. Plant Synecology. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 108, 117; Soil Science 120A recommended. Theories and techniques involved in the study of structure, composition, boundaries, ecology, and classification of vegetation, with particular emphasis on California plant communities. Mr. Major

**\*290. Seminar. (1) I, II, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**291. Seminar in Plant Morphology. (1) I, II.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

I. Mr. Webster; II. Mr. Tucker

**292. Seminar in Plant Physiology. (1) I, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

I. Mr. Norris; III. Mr. Ashton

**293. Seminar in Weed Science. (1) II.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.) Mr. Norris

**294. Seminar in Cytology and Cytobiochemistry. (1) III.**

Seminar—1 hour. Survey of current research developments in the fields of cytology and biochemistry with special reference to plants. Discussion of the fine structure of cells in relation to biochemical function. (Satisfactory/Unsatisfactory grading only.) Mr. Falk

**295. Seminar in Mycology. (1) I, II, III.**

Seminar—1 hour. Review and evaluation of current literature and research in mycology. (Same course as Plant Pathology 295; Satisfactory/Unsatisfactory grading only.)

Mr. Butler, Mr. Wells

**298. Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1-9) I, II, III.**

The Staff (Chairman in charge)

**CANTONESE—See Oriental Languages**

**CHEMISTRY**

Raymond M. Keefer, Ph.D., *Chairman of the Department*

Department Office, 108 Chemistry Building

*Professors:*

- Thomas L. Allen, Ph.D.
- Lawrence J. Andrews, Ph.D.
- Albert T. Bottini, Ph.D.
- Robert K. Brinton, Ph.D.
- \*Raymond M. Keefer, Ph.D.

- Richard E. Kepner, Ph.D.
- Charles P. Nash, Ph.D.
- Edgar P. Painter, Ph.D.
- Harold G. Reiber, Ph.D. (*Emeritus*)

\* Not to be given, 1972-73.  
 † Absent on leave, winter quarter 1973.  
 ‡ Absent on leave, spring quarter 1973.

Leo H. Sommer, Ph.D.

<sup>2</sup>David H. Volman, Ph.D.

George S. Zweifel, Sc.D.

**Associate Professors:**

Edwin C. Friedrich, Ph.D.

Hakon Hope, Cand. real

W. Kenneth Musker, Ph.D.

<sup>2</sup>Peter A. Rock, Ph.D.

<sup>1</sup>John W. Root, Ph.D.

<sup>2</sup>James H. Swinehart, Ph.D.

**Assistant Professors:**

Alan L. Balch, Ph.D.

William H. Fink, Ph.D.

Kenneth G. Hancock, Ph.D.

Joel E. Keizer, Ph.D.

Gerd N. LaMar, Ph.D.

R. Bryan Miller, Ph.D.

Dino S. Tinti, Ph.D.

**Major Subject Advisers.**—Mr. Fink, Mr. Hancock, Mr. Keizer, Mr. Kepner, Mr. Painter, Mr. Tinti.

**The Major Programs**

Students who are interested in chemistry as a profession should elect the program leading to the Bachelor of Science degree. Certification of the degree by the American Chemical Society requires that in addition the student acquire a reading knowledge of German or Russian. Students desiring a less intensive program in chemistry should elect the program leading to the Bachelor of Arts degree. Students who plan to pursue graduate work in Chemistry or related fields are strongly advised to obtain a reading knowledge of German or Russian. High school students should note that the preparation for either degree is simplified if their high school programs include chemistry and four years of mathematics.

Candidates for the bachelors' degree in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.

**Bachelor of Science Major Program**

**Lower Division Courses.**—Required: Chemistry 1A, 1B, 1C, 5 or 4A, 4B, 4C; Physics 4A, 4B, 4C, 4D, 4E; Mathematics 11, 21A, 21B, 21C, 22B, and either 22A or 22C.

**Upper Division Courses.**—Required: Chemistry 110A, 110B, 110C, 111A, 111B, 124, 128A, 128B, 128C, 129A, 129B, 129C, and 8 units of any additional courses in chemistry (one of which must include laboratory work) except Chemistry 107A or 107B.

<sup>1</sup> Absent on leave, 1972–1973.

<sup>2</sup> Absent on leave, fall quarter 1972.

<sup>3</sup> Absent on leave, winter quarter 1973.

<sup>4</sup> Absent on leave, spring quarter 1973.

**Bachelor of Arts Major Program**

**Lower Division Courses.**—Required: Chemistry 1A, 1B, 1C, 5 or 4A, 4B, 4C; Physics 2A, 2B, 2C, 3A, 3B, 3C; Mathematics 11, 21A, 21B, 21C, or 16A, 16B, 16C.

**Upper Division Courses.**—Required: 36 units in chemistry, biochemistry, or physics, including Chemistry 110A, 110B, 110C, 128A, 128B, 128C, 129A, and 129B.

**Honors and Honors Program** (see page 148).—The honors program comprises 6 units of course 194H.

**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.

**Teaching Major.**—The teaching major is satisfied by either the A.B. or B.S. major in chemistry.

**Teaching Minor.**—Chemistry 1A, 1B, 1C, 5, 8A, 8B, 107A, 107B. With the approval of the subject representative some substitution may be permitted.

**Subject Representative:** Mr. Nash

**Lower Division Courses**

**1A. General Chemistry. (5) I, II.**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: high school chemistry; or high school physics and three years of high school mathematics (with an average grade of B or higher); or second-quarter standing. Fundamental principles of chemistry. Stoichiometry, properties and theory of gases, first law of thermodynamics, atomic and molecular structure, colligative properties of solutions.

The Staff

(I. Mr. Keefer and Mr. Allen in charge;

II. Mr. LaMar in charge)

**1B. General Chemistry. (5) II, III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1A. Continuation of course 1A. Chemical equilibria, oxidation-reduction processes, electrochemistry, introduction to qualitative analysis.

The Staff (II. Mr. Swinehart in charge;

III. Mr. Allen in charge)

**1C. General Chemistry. (5) I, III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1B. Continuation of course 1B. Chemical kinetics, structures and reactions of complex ions and molecules, application of principles of chemistry to problems of qualitative analysis. The Staff (I. Mr. Musker in charge;

III. Mr. Fink in charge)

**4A. General Chemistry. (5) I.**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Mathematics

21A or 16A (may be taken concurrently); high school chemistry or consent of instructor. An introduction to atomic and molecular structure and binding, states of matter, thermochemistry and chemical equilibria. Courses 4A-4B-4C are equivalent to course sequence 1A-1B-1C-5. The sequence 4A-4B-4C is accelerated for students majoring in the physical sciences or in engineering. Mr. Tinti

#### 4B. General Chemistry. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4A. Continuation of course 4A. A quantitative treatment of chemical equilibria with applications to precipitation reactions, acid-base reactions, complexation reactions, and oxidation-reduction reactions. Elementary electrochemistry and chemical kinetics. The laboratory will emphasize quantitative techniques. Mr. Rock

#### 4C. General Chemistry. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4B. Continuation of course 4B. Topics in systematic inorganic chemistry, nuclear chemistry, introduction to organic chemistry and the functional group concept, biological applications. The laboratory will emphasize qualitative analysis and preparative techniques. Mr. Balch

#### 5. Quantitative Analysis. (4) I, III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1C with grade of C or higher. Not open to students who have credit for Chemistry 4B. An introduction to the principles and methods of quantitative chemical analysis, with emphasis on the application of equilibrium theory to analytical problems. I. Mr. Hope; III. ———

#### 8A. Organic Chemistry, Brief Course. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1B with a grade of C or higher. With course 8B an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than chemistry. I. Mr. Sommer; II. ———; III. ———

#### 8B. Organic Chemistry, Brief Course. (3) I, II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 8A. Continuation of course 8A. The laboratory is concerned primarily with the study of the properties and chemistry of the common classes of organic compounds. I. ———; II. Mr. Sommer; III. Mr. Hancock

#### 10. Concepts of Chemistry. (4) I.

Lecture—3 hours; discussion—1 hour. Designed for the nonscience major. A survey of the important basic concepts and modern applications of chemistry. Not open to students who have credit for course 1A; students with credit for course 10 may take course 1A for full credit. Mr. Friedrich

#### Upper Division Courses

#### 107A. Physical Chemistry for the Life Sciences.

##### (3) I.

Lecture—3 hours. Prerequisite: course 4C or 5 or consent of instructor; Mathematics 16C or 21C; one year college level physics. A basic course in physical chemistry intended for majors in 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.

Lecture—3 hours. Prerequisite: course 107A or 110A. Continuation of course 107A. Electrochemistry and the thermodynamics of simple electrolyte solutions. Chemical rate processes. Introduction to spectroscopy, atomic and molecular structure, x-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and colloidal systems. Considerations on bioirreversible processes.

#### 108. Physical Chemistry of Macromolecules. (3) III.

Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon those of biological interest. Structural, thermodynamic, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.

#### 110A. Physical Chemistry. (3) I, III.

Lecture—3 hours. Prerequisite: course 5; Mathematics 11 and 21C or equivalent, or 16C; one year of college physics. A development of the principles of classical thermodynamics; emphasis on criteria for the existence and maintenance of equilibrium. I. Mr. Brinton; III. ———

#### 110B. Physical Chemistry. (3) I, II.

Lecture—3 hours. Prerequisite: course 110A. Continuation of course 110A. Atomic and molecular structure and spectra; the relation between molecular and thermodynamic properties. I. Mr. LaMar; II. Mr. Allen, Mr. Tinti

#### 110C. Physical Chemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 110B. Continuation of course 110B with emphasis on solution thermodynamics, kinetic theory, and chemical kinetics. II. Mr. Keizer; III. Mr. Nash

#### 111A. Physical Chemistry: Methods and Applications. (4) I, II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107B or 110C (may be taken concurrently). Lecture topics include statistical

analysis and data processing, basic electronics, diffraction methods, and optical systems. Laboratory exercises will involve computer practice, thermodynamic measurements on nonelectrolyte systems, and structural properties of molecules.

I. Mr. Fink; II. Mr. Nash

**111B. Physical Chemistry: Methods and Applications. (4) II, III.**

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 111A or consent of instructor. Lecture topics will include distribution equilibria and electroanalytical methods. Laboratory exercises will involve kinetics and mechanism, electrochemistry, distribution equilibria, chromatography, and elective projects.

II. Mr. Hope; III. Mr. Rock

**121. Introduction to Molecular Structure and Spectra. (4) III.**

Lecture—4 hours. Prerequisite: course 110C. Modern theoretical and experimental methods used to study problems of molecular structure and binding; emphasis on spectroscopic techniques.

Mr. LaMar

**124. Inorganic Chemistry. (4) II.**

Lecture—4 hours. Prerequisite: courses 107B or 110C, 128B (both may be taken concurrently). Modern interpretations of bonding, structure, and reactivity of inorganic compounds; emphasis on the chemistry of the first- and second-row elements and transition metals.

Mr. Musker

**\*124L. Advanced Inorganic Chemistry Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: course 124. Synthesis and characterization of inorganic compounds.

**126. Nuclear Chemistry. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110B (may be taken concurrently with consent of instructor). Introduction to experimental and theoretical nuclear chemistry including nuclear properties, nuclear spectroscopy, radiation effects, radioactive decay, and nuclear reactions. Both the lectures and the laboratory stress applications of nuclear phenomena in chemistry.

**128A. Organic Chemistry. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher; chemistry majors should enroll in course 129A concurrently. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry. Only two units credit allowed students having had course 8B.

I. Mr. Bottini; II. Mr. Painter;  
III. Mr. Zweifel

**128B. Organic Chemistry. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 128A or consent of instructor; course 129A strongly recommended; chemistry majors should enroll in course 129B concurrently. Continuation of course 128A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.

I. Mr. Kepner; II. Mr. Miller; III. Mr. Bottini

**128C. Organic Chemistry. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 128B; chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds.

I. Mr. Zweifel; II. Mr. Bottini; III. Mr. Sommer

**129A. Organic Chemistry Laboratory. (2) I, II, III.**

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. Only one unit credit allowed students having had course 8B.

I. Mr. Miller; II. Mr. Kepner; III. ———

**129B. Organic Chemistry Laboratory. (2) I, II, III.**

Laboratory—6 hours. Prerequisite: courses 128B (may be taken concurrently), 129A. Continuation of course 129A. Emphasis is on methods used for synthesis and isolation of organic compounds.

I. Mr. Kepner; II. ———; III. Mr. Bottini

**129C. Organic Chemistry Laboratory. (2) I, II, III.**

Laboratory—6 hours. Prerequisite: courses 128C (may be taken concurrently), 129B. Continuation of course 129B.

I. Mr. Zweifel; II. Mr. Bottini; III. Mr. Sommer

**130. Qualitative Organic Analysis. (4) III.**

Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 5, 128C, 129C. The application of physical and chemical techniques to the qualitative identification of organic compounds.

Mr. Friedrich

**131. Advanced Organic Chemistry. (4) II.**

Lecture—4 hours. Prerequisite: courses 107B or 110B, 128C. Application of current knowledge of reaction mechanisms and molecular structure to problems of organic synthesis.

Mr. Zweifel

**150. Chemistry of Natural Products. (3) I.**

Lecture—3 hours. Prerequisite: courses 107B or 110B, and 128C. Chemistry of carbohydrates and lipids: structure proof, stereochemistry, conformation, substitutions, and rearrangements of model systems.

Mr. Painter

**194H. Undergraduate Research. (2-5) I, II, III.**

Prerequisite: course 110C (may be taken concurrently) and honors status. Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research.

The Staff (Mr. Keefer in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics.

The Staff (Mr. Keefer in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. The Staff (Mr. Keefer in charge)

**Graduate Courses****204. Chemical Kinetics. (3) III.**

Lecture—3 hours. Basic theories describing rate processes, with special emphasis on the interpretation of activation parameters. An intensive study of the relationship between rate law and mechanism.

Mr. Swinehart

**205. Quantum Chemistry I. (3) II.**

Lecture—3 hours. Introduction to quantum chemistry, with emphasis on molecular electronic structure.

Mr. Fink

**206. Quantum Chemistry II. (3) III.**

Lecture—3 hours. Prerequisite: course 205. A quantum mechanical description of the fundamental nature of the interaction between electromagnetic radiation and matter, emphasizing molecular spectroscopy; consideration of vibrational, rotational, electronic, and magnetic aspects. Offered in even-numbered years.

Mr. Tinti

**207. Quantum Chemistry III. (3) III.**

Lecture—3 hours. Prerequisite: course 205. An advanced course in the quantum theory of molecular electronic structure. Offered in odd-numbered years.

Mr. Tinti

**214. Chemical Thermodynamics. (4) I.**

Lecture—3 hours. Applications of thermodynamics to special topics of interest to chemists and biologists such as surfaces and adsorption, osmotic pressure and Donnan membrane equilibrium, and electric and magnetic fields; introduction to irreversible thermodynamics.

Mr. Volman

**215. Advanced Physical Chemistry—Statistical Methods. (3) III.**

Lecture—3 hours. Prerequisite: course 214. Probability and statistical methods; introduction to partition functions and statistical thermodynamics; heat capacities; chemical equilibrium;

statistical theory of reaction rates; liquids and solutions; matter in fields.

Mr. Keizer

**216. Statistical Thermodynamics. (3) I.**

Lecture—3 hours. Prerequisite: course 215. Development of the laws of molecular assemblies; ensemble theory; fluctuations; imperfect gases; quantum effects; cooperative phenomena. Offered in even-numbered years.

Mr. Keizer

**219. Spectroscopy of Organic Compounds. (3) I.**

Lecture—3 hours. Use of spectroscopy in organic chemistry for the identification of compounds and the investigation of stereochemical and reaction mechanism phenomena.

**220. Organic Chemistry. (3) III.**

Lecture—3 hours. Selected topics of current interest concerning the structures and syntheses of naturally occurring organic compounds, including both carbocyclic and heterocyclic systems. Offered in odd-numbered years.

Mr. Miller

**221A-H. Organic Chemistry. (3) II.**

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.

The Staff

**223. Organometallic Compounds. (3) III.**

Lecture—3 hours. Selected topics of current interest concerning the preparation of organometallic compounds and their utilization in organic synthesis. Offered in even-numbered years.

Mr. Zweifel

**224. Inorganic Chemistry. (3) I.**

Lecture—3 hours. Prerequisite: course 124. A development of the modern theories related to the structural, optical, and magnetic properties of inorganic compounds and complexes. Offered in odd-numbered years.

Mr. Swinehart

**225. Inorganic Chemistry. (3) I.**

Lecture—3 hours. Prerequisite: course 124. Application of kinetic and thermodynamic principles to the interpretation of inorganic systems. Offered in even-numbered years.

Mr. Musker

**\*226. Advanced Nuclear Chemistry. (3) III.**

Lecture—3 hours. Prerequisite: courses 126 and 205 or consent of instructor. Detailed discussion of nuclear models, decay processes, nuclear reactions, and interaction of radiations with matter with emphasis on chemical applications. Offered in odd-numbered years.

Mr. Root

**223. Physical Organic Chemistry. (3) I.**

Lecture—3 hours. Modern concepts of substitution, elimination, and addition reactions, rearrangements, and stereochemistry.

Mr. Andrews

\* Not to be given, 1972-73.

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.) Messrs. Balch, Hancock, Volman

**298. Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1-12) I, II, III.**

The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. The Staff (Chairman in charge)

**CHINESE—See Oriental Languages****CLASSICS**

Department Office, 615 Sproul Hall

**Professor:**

Wesley E. Thompson, Ph.D.

**Associate Professor:**

Richard E. Grimm, Ph.D.

**Assistant Professors:**

Frederick H. van Doorninck, Jr., Ph.D.

David H. Traill, Ph.D.

**The Major Program—Greek**

Lower Division Courses.—Required: Greek 1, 2, and 3 or their equivalents. Recommended: Latin 1, 2, and 3.

Upper Division Courses.—Required: 36 units of upper division courses of which two may be chosen from department-approved courses in other fields. Students majoring in Greek must maintain at least a C average in upper division courses.

**The Major Program—Latin**

Lower Division Courses.—Required: Latin 1, 2, 3, or their equivalents.

Upper Division Courses.—Required: at least 36 units of upper division courses, including 121A-121B.

*Graduate Study.*—M.A. degree.

*Teaching Major.*—Requirements for the teaching major are the same as for the departmental major.

*Teaching Minor.*—Requirements for the teaching minor in Latin: Latin 1, 2, 3, or their equivalents; at least 18 units of upper division work, including Latin 121A-121B. Recommended: History 111C.

*Subject Representative:* Mr. Grimm

**Classics****Lower Division Courses****4A. Classical Civilization. (3) III.**

Lecture—3 hours. An introduction to the literature, art, and institutions of classical Greece. Mr. Thompson

**10. Greek and Roman Mythology. (3) I.**

Lecture—3 hours. Origin and development

of myths and legends, their place in the religion, literature, and art of Greece and Rome. Mr. Thompson

**17A. Greek Archaeology. (3) I.**

Lecture—3 hours. Greece, Crete, and the Aegean world during the Bronze Age with emphasis on the Minoan and Mycenaean civilizations. Consideration of certain aspects of Homeric civilization in light of the archaeological remains. Mr. van Doorninck

**17B. Greek Archaeology. (3) II.**

Lecture—3 hours. The archaeological monuments of Archaic and Classical Greece. Selections from Greek literature are related to the archaeological remains. Mr. van Doorninck

**\*17C. Roman Archaeology. (3) III.**

Lecture—3 hours. The development of Rome and its Empire as illustrated by the monuments. Mr. van Doorninck

**40. Homer and the Tradition of Ancient Epic. (3) II.**

Lecture—3 hours. Reading in translation of the *Iliad* and *Odyssey*. Homer's influence on Vergil. Lectures on the development of ancient epic. Offered in odd-numbered years. Mr. Traill

**41. Greek Tragedy. (3) III.**

Lecture—3 hours. Reading in translation of selected plays of Aeschylus, Sophocles, and Euripides. Lectures on the development and influence of Athenian tragedy. Mr. Grimm

**Upper Division Courses****\*139B. Greek Literature in Translation. (3) II.**

Lecture—3 hours. The development of historical writing in Greece: Herodotus, Thucydides, and selections from the minor historians. Offered in even-numbered years. Mr. Thompson

**\*141. Greek and Roman Comedy. (4) II.**

Lecture—3 hours. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in odd-numbered years. Mr. Grimm

\* Not to be given, 1972-73.



**\*150. Athenian Political and Social Institutions. (3) II.**

Lecture—2 hours; discussion—1 hour. Politics and government, marriage and kinship, religious societies, and the demographic and economic basis of Athenian democracy. Offered in odd-numbered years. Mr. Thompson

**\*174. Ancient Greek Sanctuaries. (4) III.**

Lecture-discussion—4 hours. Prerequisite: course 17B or consent of instructor. The history, cults, and monuments of Olympia, Delphi, and other sanctuaries. Student reports on major monuments. Offered in even-numbered years. Mr. van Doorninck

**\*175. Topography and Monuments of Ancient Athens. (4) III.**

Lecture-discussion—4 hours. Prerequisite: course 17A-17B or consent of instructor. The history of Athens as an urban center from the Bronze Age through the late Roman period. Student reports on major monuments with emphasis placed on restoration, chronology, and on the relating of documentary to excavational evidence. Offered in odd-numbered years. Mr. van Doorninck

**Graduate Courses**

**201. Introduction to Classical Philology. (4) I.**

Seminar—3 hours. A survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism. Mr. Thompson

**202. Homer. (4) III.**

Seminar—3 hours. Readings in the *Iliad* and *Odyssey*; the origins and transmission of the poems. Mr. van Doorninck

**203. Vergil. (4) II.**

Seminar—3 hours. Reading of selected books of the *Bucolics*, *Georgics*, and *Aeneid*. Emphasis will be placed on the study of Vergilian poetic language. Mr. Grimm

**\*204. Greek and Roman Comedy. (4) I.**

Seminar—3 hours. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit. Mr. Thompson

**\*205. Latin Lyric and Elegy. (4) II.**

Seminar—3 hours. A critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit. Mr. Traill

**\*206. Greek Historiography. (4) III.**

Seminar—3 hours. The development of historical writing in Greece. May be repeated for credit. Mr. Thompson

**\*207. Greek Drama. (4) II.**

Seminar—3 hours. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit. Mr. Grimm

## Greek

*Departmental Major Adviser.*—Mr. Thompson.

**Lower Division Courses**

**1. Elementary Greek. (5) I.**

Lecture—4 hours.

The Staff

**2. Elementary Greek. (5) II.**

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1. The Staff

**3. Elementary Greek. (5) III.**

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2. The Staff

**Upper Division Courses**

**\*100. Attic Orators. (4) I.**

Lecture—3 hours. Prerequisite: course 3.

Mr. Thompson

**\*101. Plato. (4) I.**

Lecture—3 hours. Prerequisite: course 3.

Mr. Grimm

**\*102. Euripides. (4) I.**

Lecture—3 hours. Prerequisite: course 101.

**\*103A. Homer: *Iliad*. (4) I.**

Recitation—3 hours; term paper. Prerequisite: course 3. Mr. van Doorninck

**\*103B. Homer: *Odyssey*. (4) II.**

Recitation—3 hours; term paper. Prerequisite: course 3. Mr. van Doorninck

**\*104. Menander. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 3. Mr. Thompson

**\*105. Demosthenes. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 3. Mr. Thompson

**\*111. Sophocles. (4) III.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years. Mr. Grimm

**\*112. Aristophanes. (4) III.**

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Grimm

**\*113. Thucydides. (4) I.**

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Thompson

**114. Lyric Poetry. (4) III.**

Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years. Mr. Thompson

**\*115. Aeschylus. (4) II.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years. Mr. Grimm

\* Not to be given, 1972-73.



**116. Herodotus. (4) II.**

Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years.

Mr. van Doorninck

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

**Latin**

*Departmental Major Adviser.*—Mr. Grimm.

**Lower Division Courses**

**1. Elementary Latin (4) I.**

Lecture—4 hours.

The Staff

**2. Elementary Latin. (4) II.**

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1.

The Staff

**3. Elementary Latin. (4) III.**

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2.

The Staff

**\*10. The Structure of Latin. (4) III.**

Lecture—4 hours. Prerequisite: not open to students who have received credit for any other course in Latin. A survey of the Latin language, with special emphasis on the morphology and syntactical relationships of classical Latin.

Mr. Thompson

**Upper Division Courses**

**\*101. Livy. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years.

Mr. Thompson

**102. Roman Comedy. (5) I.**

Lecture—4 hours; term paper. Offered in even-numbered years.

Mr. Thompson

**\*103. Vergil: Aeneid. (4) III.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years.

**\*104. Sallust. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years.

Mr. Thompson

**\*105. Catullus. (4) II.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years.

Mr. Grimm

**\*106. Horace: Odes and Epodes. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years.

Mr. Grimm

**\*108. Horace: Satires and Epistles. (4) II.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years.

Mr. Grimm

**\*109. Roman Elegy. (4) III.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years.

Mr. Grimm

**\*111A-111B-111C. Silver Age Latin. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 3. Selections from Tacitus, Pliny, Petronius, Juvenal, Martial, and other writers of the Silver Age. Offered in odd-numbered years.

Mr. Traill

**\*112. Cicero: Political Writings. (4) I.**

Recitation—3 hours; term paper. Prerequisite: course 3.

Mr. Thompson

**\*114. Cicero: Philosophical Works. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Offered in odd-numbered years.

**\*115. Lucretius. (4) II.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years.

**\*116. Vergil: Eclogues and Georgics. (4) III.**

Lecture—3 hours. Prerequisite: course 3. Offered in even-numbered years.

**121A-121B. Latin Composition. (3-3) II, III.**

Lecture—3 hours. Prerequisite: junior standing. Offered in odd-numbered years.

Mr. Grimm

**199. Special Study for Advanced Undergraduates.**

(2-5) I, II, III.

The Staff (Mr. Grimm in charge)

**Graduate Course**

**299. Research. (2-5) I, II, III.**

The Staff (Chairman in charge)

**CLINICAL PATHOLOGY**

Jiro J. Kaneko, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 1165 Haring Hall

*Professors:*

Donald E. Jasper, D.V.M., Ph.D.

Jiro J. Kaneko, D.V.M., Ph.D.

Oscar W. Schalm, D.V.M., Ph.D.

*Associate Professor:*

Nemi C. Jain, M.V.Sc., Ph.D.

*Assistant Professor:*

Kerry S. Keeton, D.V.M., Ph.D.



*Lecturers:*

Edward J. Carroll, Ph.D.

Jerry P. Lewis, M.D. (*Clinical Pathology and Professor of Internal Medicine*)

\* Not to be given, 1972-73.

Upper Division Courses

101. Comparative Hematology. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Physiology 110B, Chemistry 5, introductory biochemistry or consent of instructors. Principles, methods and procedures of clinical hematology; comparative blood cellular morphology and function. Offered in even-numbered years.

Messrs. Schalm, Jain, Kaneko

199. Special Study for Undergraduates. (1-4)

I, II, III.

The Staff (Mr. Kaneko in charge)

Graduate Courses

201. Clinical Hematology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Hematological techniques and interpretation as applied to the study of disease in animals.

Mr. Schalm, Mr. Jain

202. Clinical Biochemistry. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Biochemical methods in the diagnosis of disease. Special emphasis on electrolyte balance, liver function, kidney function, urinalysis, osteological diseases, thyroid function, and disorders of carbohydrate, protein, and lipid metabolism.

Mr. Kaneko, Mr. Keeton

203. Biochemistry of Metabolic Diseases. (3) II.

Lecture—3 hours. Prerequisite: biochemistry and physiology or consent of instructor. The biochemistry of inborn and acquired errors of metabolism in animals and man. Offered in even-numbered years.

Mr. Kaneko, Mr. Freedland

204. Morphological Hematology. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Morphological and interpretive clinical hematology for graduate students. Offered in odd-numbered years.

Mr. Schalm

205. Physiology and Pathology of Leukocytes. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 201 or 204, Biochemistry

101B or Physiological Sciences 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 inflammatory and immunologic processes; cytochemical reactions, spectrophotometry, fluorescence microscopy, column chromatography, and electron microscopy. Offered in even-numbered years.

Mr. Jain

206. Immunohematology. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 201, Veterinary Microbiology 111 or 121, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hematologic diseases; reactions to blood transfusion; transplantation mechanisms. Offered in odd-numbered years. Messrs. Jain, Carroll, Lewis, MacKenzie

261. The Bovine Mammary Glands in Health and Disease. (2) II.

Lecture—2 hours; two 2-hour laboratory sessions. Prerequisite: consent of instructor. Ontogeny, embryology, anatomy and physiology of the mammary glands; relationship of mastitis and milk quality; infectious causes and the influence of environment, milking machines and management on mastitis; pathogenesis of mastitis; cellular and humoral defense mechanisms; mastitis diagnosis and control.

Mr. Jasper, Mr. Carroll

290. Seminar in Clinical Pathology. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Kaneko in charge)

295A-295B-295C. Clinical Pathology Laboratory.

(1-1-1) I-II-III.

Discussion—7 hours total; laboratory—16 hours total. Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of laboratory methods to the diagnosis of animal disease. (Satisfactory/Unsatisfactory grading only.)

The Staff

298. Directed Group Study. (1-3) I, II, III. The Staff

299. Research in Clinical Pathology. (1-12) I, II, III.

The Staff

CLINICAL SCIENCES

Edward A. Rhode, Jr., D.V.M., *Chairman of the Department*

Department Office, 1321A Haring Hall

Professors:

Robert M. Cello, D.V.M.

John F. Christensen, D.V.M., Ph.D.

(Emeritus)

Jack A. Howarth, D.V.M., Ph.D.

John P. Hughes, D.V.M.

John W. Kendrick, D.V.M., Ph.D.

Robert L. Leighton, V.M.D.

Blaine McGowan, Jr., D.V.M.

Joe P. Morgan, D.V.M., Vet. med. dr.

William R. Pritchard, D.V.M., Ph.D., J.D.  
 Edward A. Rhode, Jr., D.V.M.  
 Gordon H. Theilen, D.V.M.  
 John D. Wheat, D.V.M.

**Associate Professors:**

Murray E. Fowler, D.V.M.  
 I. Gary Courley, D.V.M., Ph.D.  
 Charles A. Hjerpe, D.V.M.  
 Terrell A. Holliday, D.V.M., Ph.D.  
 George H. Stabenfeldt, D.V.M., Ph.D.  
 Peter F. Suter, Dr. med. vet.

**Assistant Professors:**

Alexander A. Ardans, D.V.M.  
 Maarten Drost, D.V.M.  
 Gary O. Ewing, D.V.M.  
 Robert Hart, D.V.A.  
 Humphrey D. Knight, D.V.M.  
 Gerald V. Ling, D.V.M.  
 Dennis M. Meagher, D.V.M., Ph.D.  
 Timothy R. O'Brien, D.V.M., Ph.D.  
 Ronald D. Schechter, V.M.D.  
 Anthony A. Stannard, D.V.M., Ph.D.



**Professor:**

Donald R. Lamond, D.V.Sc. (Visiting)

**Associate Professor:**

Andrew G. Hendrickx, Ph.D.  
 (In Residence)

**Assistant Professor:**

Andrew J. Gabor, M.D., Ph.D.

**Lecturers:**

Donald L. Bath, Ph.D.  
 Charles S. Crane, D.V.M.  
 Wyland S. Cripe, D.V.M.  
 Robert E. Dickerson, D.V.M.  
 Robert S. Dickson, D.V.M.  
 Laurence R. Enos, Pharm.D.  
 Robert J. Harris, D.V.M.  
 James R. Howard, D.V.M., Ph.D.  
 Thomas G. Kawakami, Ph.D.  
 Ronald L. Laub, D.V.M.  
 Gerald R. Mitchell, D.V.M.  
 Jack W. Morse, D.V.M.  
 Vicki Nelson, D.V.M.  
 Sigmund T. Rich, D.V.M.  
 James D. Versteeg, D.V.M.  
 Alida P. Wind, M.V.D.

**Upper Division Courses**

**\*102. Recognition and Identification of Poisonous Plants. (1) III.**

Lecture-discussion — 1 hour. Prerequisite: sophomore standing in School of Veterinary

<sup>1</sup>Absent on leave, 1972-73.

Medicine or consent of instructor. General introduction to plant nomenclature and principles of taxonomy. Poisonous plant species will be discussed systematically according to families. The use of keys and other devices will be used to teach recognition of these species. Mr. Fowler

**103. Introductory Medicine. (4) III.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: sophomore standing in School of Veterinary Medicine. Principles of clinical diagnosis of animal diseases, with special emphasis on history taking and identification and interpretation of symptoms. Laboratory practice in physical examination of normal and abnormal animals. Mr. Ling

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Fowler in charge)

**Graduate Courses**

**202. Laboratory Animal Preventive Medicine. (2) III.**

Lecture—2 hours; discussion—optional. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Lectures and discussion of the principles of animal facility design, husbandry, and legal aspects of laboratory animal care.

Messrs. Edward, Rich, Bustad

**204A. Medicine (3) I.**

Lecture—3 hours. Prerequisite: course 103. A study of the medical diseases of domestic animals. The Staff (Mr. Ewing in charge)

**204B. Medicine. (4) II.**

Lecture—4 hours. Prerequisite: course 204A. A study of the medical diseases of domestic animals. The Staff (Mr. Howarth in charge)

**204C. Medicine. (3) III.**

Lecture—3 hours. Prerequisite: course 204B. A study of the medical diseases of domestic animals. The Staff

**204D. Medicine. (5) I.**

Lecture—5 hours. Prerequisite: course 204C. A study of the medical diseases of domestic animals. The Staff (Mr. Stannard in charge)

**204E. Medicine. (3) II.**

Lecture—3 hours. Prerequisite: course 204D. A study of the medical diseases of domestic animals. The Staff (Mr. Holliday in charge)

**204F. Medicine. (3) III.**

Lecture—3 hours. Prerequisite: course 204E. A study of the medical diseases of domestic animals. The Staff (Mr. Schechter in charge)

**205. Advanced Veterinary Clinical Neurology. (1) III.**

Laboratory—2 hours. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. Extension of neu-

rology portions of courses 204 and 250. Some special techniques of neurological examination, electroencephalography, electromyography, and neuroradiography. Discussions emphasizing the anatomical, physiological, and pathological basis of the techniques and interpretation of the results. Mr. Holliday

**206. Clinical Oncology. (3) II.**

Lecture—2 hours; laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. A study of neoplastic diseases of animals.

Mr. Theilen, Mr. Ling

**208. Advanced Small Animal Surgery. (2) III.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. A comprehensive review of the surgical diseases encountered with particular attention to those of the cat. Illustrated by slides, demonstrations, and current cases from the Veterinary Medical Teaching Hospital. Limited enrollment. Mr. Leighton

**209. Reproduction in the Equine. (1) II.**

Lecture—1 hour. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. A discussion of special problems of equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings. Mr. Hughes

**210A. Medical Rounds. (1) I.**

Laboratory—2 hours. Prerequisite: course 103. Discussion of selected cases from the clinic. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Holliday in charge)

**210B. Medical Rounds. (1) II.**

Laboratory—2 hours. Prerequisite: course 204A. Discussion of selected cases from the clinic. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Holliday in charge)

**210C. Medical Rounds. (1) III.**

Laboratory—2 hours. Prerequisite: course 204B. Discussion of selected cases from the clinic. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Holliday in charge)

**211A. Medical Rounds in Laboratory Animal Medicine. (1) I.**

Laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition.

The Staff

**211B. Medical Rounds in Laboratory Animal Medicine. (1) II.**

Laboratory—2 hours. Prerequisite: senior

standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition.

The Staff

**211C. Medical Rounds in Laboratory Animal Medicine. (1) III.**

Laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition.

The Staff

**213. Veterinary Ophthalmology. (2) III.**

Lecture—2 hours. Prerequisite: course 204E or consent of instructor. Selected topics relating to the eye and its diseases.

Mr. Cello

**214. Ophthalmic Surgery. (1) III.**

Laboratory—2 hours. Prerequisite: consent of instructor. Technics of eye surgery in domestic animals. Limited enrollment.

Mr. Cello

**\*215. Selected Topics in Zoo Medicine. (2) III.**

Lecture—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Lectures or selected topics related to the health of zoo animals. These will include nutritional requirements, housing, sanitation, restraint, anesthesia, surgery, and specific disease problems.

Mr. Fowler

**216. Primate Medicine. (2) II.**

Lecture—1 hour; discussion—1 hour. Prerequisite: senior standing in School of Veterinary Medicine, or consent of instructor. An introduction to primate medicine and primatology with emphasis on practical aspects of handling, husbandry, nutrition, reproduction, diseases, and anesthesia in nonhuman primates. Appropriate demonstrations at the National Center for Primate Biology will be included.

The Staff (Mrs. Nelson in charge)

**\*217. Caged Bird Medicine and Surgery. (1) I.**

Lecture—1 hour. Prerequisite: senior standing in School of Veterinary Medicine 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.

Mr. Fowler

**\*218. Diseases of Free-Living Wild Animals. (2) II.**

Lecture—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. The diseases of free-living wild animals. Effects of these diseases on the wild

population itself, domestic animals and man. Infectious, nutritional, toxic (pollution) and parasitic diseases will be considered.

Mr. Fowler

**220. Introductory Surgery. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. Principles of surgery and surgical technique.

Surgery Staff

**221. Large Animal Surgery. (5) II.**

Lecture—5 hours. Prerequisite: course 220. Surgical diseases of large animals.

Surgery Staff

**222. Techniques of Small Animal Surgery. (5) III.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or consent of instructor.

Surgery Staff

**223. Experimental Surgery. (3) II.**

Lecture—1 hour; laboratory—2 hours and two 3-hour laboratories. Prerequisite: graduate standing or consent of instructor. A basic course in experimental surgery with emphasis on the principles of surgical technique, experimental animal care, and anesthesia.

Mr. Gourley

**230. Reproduction, Genital Diseases and Obstetrics. (6) I.**

Lecture—5 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. A course in the diagnosis, treatment, and control of diseases affecting the reproductive organs; the normal and disturbed physiology of reproduction; and obstetrics.

Messrs. Drost, Hughes, Kendrick, Stabenfeldt

**231. Pathophysiology of Mammalian Reproductive Processes. (3) III.**

Lecture—3 hours. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior.

Mr. Stabenfeldt

**232. Teratologic Aspects of Development. (3) II.**

Lecture—3 hours. Prerequisite: Anatomy 100, and Zoology 100 or equivalent, or consent of instructor. Embryological and pharmacological principles of teratogenesis; design and interpretation of teratogenic tests; consideration of congenital malformations and abnormalities induced by environmental and genetic factors. Offered in odd-numbered years.

Mr. Hendrickx

**233. Large Animal Obstetrics. (1) III.**

Laboratory—3 hours. Prerequisite: course 230 or consent of instructor. Diagnostic and

manipulative techniques used for examination of pregnant and parturient animals.

Mr. Drost, Mr. Kendrick

**240. Herd Health Management. (2) II.**

Lecture—2 hours. Prerequisite: senior standing in School Veterinary Medicine or consent of instructor. Principles of animal health management are explored at the herd level. Specific discussions are limited to cattle feeding and dairy enterprises.

Mr. Hjerpe

**241. Ecological Factors of Animal Disease. (2) III.**

Lecture—1 hour; discussion—1 hour. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Relationship of animal environment to control and prevention of disease. Application of nutrition, genetics, husbandry, and management to disease control. Emphasis will be on sheep and beef cattle operations.

Mr. McGowan

**249. Clinics. (2-8) (Summer).**

Diagnosis and treatment of animal diseases. Students are responsible for case records, care of patients, physical examinations, and participation in surgery. Laboratory exercises in restraint, diagnostic and therapeutic procedures and surgical techniques.

The Staff (Mr. Fowler in charge)

**250A. Clinics. (8) I.**

Laboratory—24 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff

**250B. Clinics. (8) II.**

Laboratory—24 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff

**250C. Clinics. (7) III.**

Laboratory—21 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff

**260. Radiology. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 103, 220. The physics and practical operation of x-ray and fluoroscopic equipment; the development and interpretation of radiographs, radiation therapy, and radiobiology.

Mr. Morgan

**261. Special Radiographic Procedures. (3) I, II, III.**

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 260 or consent of instructor. The theory of selected radiographic technics, contrast media, and special radiographic equipment.

Messrs. Morgan, O'Brien, Suter

**262A. Advanced Radiographic Interpretation. (1-3) I.**

Discussion—1-3 hours. Prerequisite: course 260 or consent of instructor. Principles of radiographic interpretation in the diagnosis of disease of small and large animals. Current clinic cases will be utilized when possible.

Mr. Morgan and Staff

**262B. Advanced Radiographic Interpretation.**

(1-3) II.

Discussion—1-3 hours. Prerequisite: course 260 or consent of instructor. Principles of radiographic interpretation in the diagnosis of disease of small and large animals. Current clinic cases will be utilized when possible.

Mr. Morgan and Staff

**262C. Advanced Radiographic Interpretation.**

(1-3) III.

Discussion—1-3 hours. Prerequisite: course 260 or consent of instructor. Principles of radiographic interpretation in the diagnosis of disease of small and large animals. Current clinic cases will be utilized when possible.

Messrs. Morgan, O'Brien, Suter

**263. Advanced Radiation Therapy. (3) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 260 or consent of instructor. Principles of radiation therapy. The application of X-, beta-, and gamma-radiation on selected clinic cases.

Mr. O'Brien

**270. Jurisprudence and Law for the Veterinarian.**

(1) II.

Lecture—1 hour. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. The student is introduced to the principles of veterinary medical jurisprudence and the legal concepts pertinent to professional activities.

Mr. Pritchard

**280. Advanced Pulmonary Physiology. (3) II.**

Lecture—3 hours. Prerequisite: Physiology 120B, Physiology 210B or Physiological Sciences 141B. Advanced study of physiology of mammalian respiration with emphasis on mechanisms of ventilation, gas distribution, diffusion and blood perfusion.

Mr. Gillespie, Mr. Cross

**280L. Advanced Pulmonary Physiology. (1) II.**

Laboratory—4 hours. Prerequisite: Physiology 120B, Physiology 210B or Physiological Sciences 141B. Advanced study of physiology of mammalian respiration with emphasis on mechanisms of ventilation, gas distribution, diffusion and blood perfusion. Laboratory exercises illustrate modern functional concepts and procedures.

Mr. Gillespie, Mr. Cross

**285. Clinical Applications of Body Acid-Base Physiology. (2) III.**

Lecture—2 hours. Prerequisite: Physiological

Sciences 101B, 102B; or consent of instructor. An examination of the buffer systems in the mammalian body. Effects on the buffer systems and organ functions of adding endogenous or exogenous acid or basic products to the body fluids. Control mechanisms and body fluid relationships to the buffer systems.

Mr. Gillespie, Mr. Cross

**290. Seminar in Veterinary Medicine. (1) I, II, III.**

The Staff (Mr. Rhode in charge)

**291. Radiology Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisite: course 260. Presentation by faculty, radiology graduate students, and visiting faculty of current research undertaken in clinical radiology both at this and other institutions.

Mr. Morgan

**292. Current Topics in Reproduction. (1) I, II, III.**

Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty.

The Staff (Mr. Stabenfeldt in charge)

**298. Group Study. (1-2) I, II, III.**

The Staff (Mr. Rhode in charge)

**299. Research. (1-9) I, II, III.**

The Staff

**Professional Courses**

**401. Small Animal Clinics. (1½ per week) I, II, III.**

Laboratory—50 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for diagnoses, medical and surgical treatment of animals in the wards and outpatient clinic, including history taking, physical examinations, laboratory tests, special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Ling in charge)

**402. Large Animal Medicine. (1½ per week) I, II, III.**

Laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for the medical care of patients in the VMTH and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Hughes in charge)

**403. Small Animal Medicine. (1½ per week) I, II, III.**

Laboratory—50 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of animals in the wards and outpatient clinic in-

cluding physical examinations, history taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Ling in charge)

#### 404. Herd Health Management. (1½ per week) I, II, III.

Laboratory—50 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns apply their knowledge of veterinary medicine, animal nutrition, genetics, husbandry, management and economics on a herd basis toward the improvement of food animal production efficiency through control and prevention of disease. (Satisfactory/Unsatisfactory grading only.)  
(Mr. Hjerpe and Mr. McGowan in charge)

#### 410. Small Animal Surgery. (1½ per week) I, II, III.

Laboratory—50 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for preoperative preparation of hospital patients, assistance at operating and postoperative care under the supervision of the senior surgical staff. Provides experience in orthopedic and general surgery in small animals. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Leighton in charge)

#### 411. Small Animal Surgery. (1½ per week) I, II, III.

Laboratory—50 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for care of pet animal patients in the hospital including physical examinations, presurgical work-ups, surgery, postoperative care and followup under the supervision of the senior surgical staff. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Leighton in charge)

#### 412. Large Animal Surgery. (1½ per week) I, II, III.

Laboratory—50 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns 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. (Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Wheat in charge)

#### 414. Veterinary Anesthesiology. (1½ per week) I, II, III.

Laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of in-

structor. Interns responsible for anesthetic care of patients in the operating rooms under the supervision of the senior staff. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Hart in charge)

#### 420. Veterinary Neurology. (1½ per week) I, II, III.

Laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for care of hospital and outpatients including history taking, neurologic examinations and special diagnostic and therapeutic procedures under the direction of the staff neurologist. (Satisfactory/Unsatisfactory grading only.)  
Mr. Holliday

#### 421. Veterinary Dermatology. (¾ per week) I, II, III.

Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the staff dermatologist. (Satisfactory/Unsatisfactory grading only.)  
Mr. Stannard

#### 422. Veterinary Ophthalmology. (¾ to 1½ per week) I, II, III.

Laboratory—25–50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for the care of animals in the hospital and outpatient clinic including history taking, ophthalmologic examinations, special diagnostic techniques, assistance at ophthalmologic surgery and medical and post surgical care under the direction of the staff ophthalmologist. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)  
Mr. Cello

#### 423. Pulmonary Diseases. (¾ per week) I, II, III.

Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. New and advanced techniques for the detection and characterization of respiratory and cardiac diseases in animals demonstrated and discussed. Interns assist in assessment of respiratory dysfunction of patients and correlation of the dysfunction and the clinical signs. (Satisfactory/Unsatisfactory grading only.)  
Mr. Gillespie

#### 424. Genital Diseases and Obstetrics of Farm Animals. (1½ per week) I, II, III.

Laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Emphasis placed on preventive medicine aspects of reproduction in the horse and cow. Opportunity given for in-depth study of individual animal disease problems. Seminar



participation is required. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Kendrick and Mr. Hughes in charge)

**425. Zoo and Wildlife Medicine. (¾ per week)  
I, II, III.**

Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for assisting in handling and treatment of clinic cases and for learning the techniques of manual and chemical restraint of a wide variety of mammals, birds, reptiles, and fish. Medication problems, anesthetic techniques and surgical procedures will be discussed and practiced. (Satisfactory/Unsatisfactory grading only.) Mr. Fowler

**440. Veterinary Radiology. (¾ to 1½ per week)  
I, II, III.**

Laboratory—25–50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents carry out radiographic examinations and interpretations of cases referred from the hospitals and outpatient clinics and assist in diagnostic techniques under the direction of the senior radiology staff. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Morgan in charge)

**490. Radiology Rounds. (1) I, II, III.**

Discussion—2 hours. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Films of interesting cases from the daily case load are presented and discussed. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Morgan in charge)

**491. Small Animal Grand Rounds. (½) I, II, III.**

Discussion—1 hour. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Interns and residents take an active part in the presentation and discussion of selected cases from the small animal clinic. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Ling in charge)

**492. Large Animal Grand Rounds. (½) I, II, III.**

Discussion—1 hour. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Interns and residents take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Wheat in charge)

**493. Seminar in Veterinary Medicine. (1) I, II, III.**

Seminar—2 hours. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Interns and residents will assist in the presentation of seminar material. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Ling in charge)

**494. Radiology Conference. (1) I, II, III.**

Discussion—2 hours. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Radiographs presented of cases proven by pathologic examination of tissue obtained from biopsy or necropsy procedures. May be repeated for credit. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Morgan in charge)

**COMPARATIVE LITERATURE**

Roland W. Hoermann, Ph.D., *Chairman of the Program*  
Marshall Lindsay, Ph.D., *Acting Chairman of the Program*  
Program Office, 150 Mrak Hall

**Committee in Charge:**

Richard E. Grimm, Ph.D. (*Classics*)  
Peter L. Hays, Ph.D. (*English*)  
Roland W. Hoermann, Ph.D. (*German*)  
Didier T. Jaén, Ph.D. (*Spanish*)  
Marsdall Lindsay, Ph.D. (*French*)  
Enrico Marelli, Dottore in Lettere  
(*Italian*)  
Valerie A. Tumins, Ph.D. (*Russian*)

Marian B. Ury, Ph.D. (*Oriental Languages*)

*Major Advisers.*—Mr. Grimm, *Classics*; Mr. Hays, Mr. Isaacs, *English*; Mr. Kusch, *French*; Mr. Menges, *German*; Mr. Marelli, *Italian*; Mrs. Ury, *Oriental Languages*; Mr. Patterson, *Russian*; Mr. Jaén, *Spanish*.

Comparative Literature is the intercultural study of the literary arts in such a manner as to transcend national or linguistic boundaries. Its purpose is to examine—comparatively and contrastively—the humanistic components involved



in such interrelated phenomena as literary styles, taste, and influences; the history, theory, and practice of literary criticism; the analogues and transformations in literary devices, themes, imagery, and genres; the historical flow of literary archetypes; and the role of folklore and myth in literature.

The specific goals of the undergraduate curriculum are: a) to develop the student's ability to read literature critically; b) to encourage scrutiny of literary masterpieces as manifestations of craftsmanship and human imagination that are not isolated by time, place, or language; c) to aid the student in gaining a more integrated sense of general literary history than is offered by the study of a single literature; and d) to prepare the student in the original languages for methodological investigation of problems involving more than one literature.

The interdepartmental major in Comparative Literature consists of a minimum of 69 units of course work in literature departments, including a distribution between a first and second literature of concentration.

#### *The Major Program*

**Lower Division Courses.**—Required: a) Sufficient preparation in elementary and intermediate language courses to insure satisfactory performance in first and second literatures of concentration on the upper division level; b) one segment from Comparative Literature 40; c) Classics 10, 40, 41. Recommended: Art 10, Dramatic Art 15, 20; History 4A-4B-4C; Philosophy 6, 20A, 20B.

**Upper Division Courses.**—Required: a) First Literature of Concentration—six courses in the original language, including appropriate historical distribution; b) Second Literature of Concentration—three courses in the original language; c) Comparative Literature 140 (one segment), 141; and d) three literature courses exclusive of first and second literatures of concentration (may include foreign literature in translation or additional Comparative Literature courses).

**Teaching Major.**—In addition to the normal requirements for the major, the teaching major presupposes completion of three courses in advanced (upper division) grammar, conversation, and composition in the foreign language corresponding to the student's foreign literature choice for his first or second literature of concentration.

**Teaching Minor.**—Minimum requirements include: a) 12 units in Comparative Literature courses; b) 12 units of upper division work in a single foreign literature in the original language, and three courses in advanced (upper division) grammar, conversation, and composition in the same foreign language; c) 12 units of upper division literary breadth outside the literature of "b."

\* Not to be given, 1972-73.

#### **Lower Division Courses**

#### **40A-H. Introduction to Comparative Literature. (4) I.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: consent of instructor. Introduction to the comparative study of literature: archetypes, analogues, and transformations in major epochs and works. Content will alternate among the following segments: 40A. Folklore, Legend and Myth; 40B. Lyric Verse; 40C. Epic Poetry; 40D. Tragedy; 40E. Comedy; 40F. The Novel; 40G. Tales and Short Stories; 40H. Satire and Didactic Forms. May be repeated for credit in different subject area. Mr. Grimm

#### **49. Freshman Seminar. (2) I.**

Seminar—2 hours. Prerequisite: consent of instructor. Literary representations of the creative process and the artist problem; introduction to modes of literary judgment and criticism; the range and validity of the comparative study of literature. Mr. Hoermann

#### **98. Directed Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

#### **99. Special Study for Undergraduates. (1-5) I, II, III.**

The Staff (Chairman in charge)

#### **Upper Division Courses**

#### **140A-F. Themes and Structures in Literature. (4) II.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Interpretation of selected works according to recurring thematic, formal, and structural elements. Special emphasis on problems of meaning, consciousness, perception, and convention. Content will alternate among the following segments: 140A. Time and Space; 140B. The Picaresque Tradition; 140C. War and Revolution; 140D. The Hero and Anti-hero; 140E. The Artist Problem; 140F. Justice and Deception. May be repeated for credit in different subject area. Mr. Lindsay

#### **141. Theories of Literature and the Techniques of Literary Criticism. (4) III.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor and completion of 8 units of upper-division literature course work. Exploration of literary theories with emphasis on specific objectives and possibilities of comparative literature. May be repeated for credit. Mr. Blanchard

#### **\*163. Studies in the Nineteenth-Century Novel.**

(4) III.

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Form and style in some major European and American novels; discussion of such themes as good and

evil, social justice, freedom versus faith, ennui, the outsider and society, question of the absurd.

Mr. Isaak

**\*165. Intercultural Literary Colloquium: The Tragic Vision in Western Literature. (4) I.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. The development of tragic myth: study of works by Aeschylus, Sophocles, Euripides, Racine, Giraudoux, Cocteau, Sartre, O'Neill, Eliot, and Tennessee Williams. Discussions in English. Comparative Literature majors will read selections of at least one foreign literature in the original language. Miss Izokaitis, Mr. Grimm, Mr. Hays

**\*166. Intercultural Literary Colloquium: The Modern Novel and the Agony of Humanism. (4) II.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. The transformations of self, nature, and community in novels by Gogol, Dostoevski, Svevo, Pirandello, Moravia, Gide, and Robbe-Grillet. Discussions in English. Comparative Literature majors will read selections of at least one foreign literature in the original language.

Mr. Lindsay, Mr. Marelli, Miss Tumins

**\*167. Intercultural Literary Colloquium: Studies in Fantastic Reality. (4) III.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. The literary experience of mystery, the fantastic, and the demonic in Western tradition, including works by Borges, Beckett, and Kafka. Discussions in English. Comparative Literature majors will read selections of at least one foreign literature in the original language.

Messrs. Hicks, Hoermann, Jaén

**191A-D. Intercultural Literary Colloquium: Reality in Transition. (4) III.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Pivotal

works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, and writers of comparable scope or depth. Content will alternate among the following segments: A. Essential Reality; B. Existential Reality; C. Political Reality; D. Ironic Reality. May be repeated for credit in different subject area. (Same course as English, German, and Italian 191A-D. Messrs. Fetzer, Marelli, Silvey

**192A-E. Intercultural Literary Colloquium: Modern Literary Movements and Styles. (4) I.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Studies in popular taste, messianic vision, and elitist polarities. Content will alternate among the following segments: A. Romanticism; B. Symbolist Poetry and Poetics; C. Naturalism and Expressionism; D. Utopianism and Authoritarian Structures; E. Quests of Mystery and Science Fiction. May be repeated for credit in different subject area. (Same course as French, German, and Russian 192A-E.)

Miss Izokaitis, Mr. Menges, Mr. Patterson

**193A-D. Intercultural Literary Colloquium: The Avant Garde. (4) II.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Literary innovation and rebellion in Western culture since World War I. Content will alternate among the following segments: A. Dada and Surrealism; B. The Absurdist Tradition; C. The "New Novel"; D. Proletarian and Epic Theater. May be repeated for credit in different subject area. (Same course as Dramatic Art and French 193A-D.)

Messrs. Bossart, Kusch, Snyder

**198. Directed Group Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff

**CONSUMER ECONOMICS**

*Related Undergraduate Major.*—See page 78.

*Related Graduate Study.*—See page 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Upper Division Courses**

**141. Consumers and the Market. (4) II.**

Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures.

The structure of the market and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers. Miss Parker

**142. Consumer Economic Problems. (4) II, III.**

Lecture—4 hours. Prerequisite: Economics 1B. The management of income and expenditures by the household. The use of consumer credit, savings, investments, and insurance by households. Mrs. Lane

\* Not to be given, 1972-73.

**198. Directed Group Study. (1-5) I, II, III.**  
The Staff (Mr. Carter in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**  
The Staff (Mr. Carter in charge)

#### Graduate Courses

**247. Consumption and Standards of Living. (4) III.**  
Lecture—4 hours. Prerequisite: course 141.  
An analytical treatment of household consump-

tion behavior. The effects of income, prices, and household characteristics on expenditures. Standards of income and consumption adequacy.  
Mrs. Lane

**290. Seminar. (1) I, II, III.**  
Seminar—1 hour.  
Mrs. Lane

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

Related Courses: see Agricultural Economics.

## CONSUMER SCIENCE

*Major Advisers.*—See *Class Schedule* listing.  
*Related Major Program and Graduate Study.*  
—See pages 74 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

#### Upper Division Course

**100. Consumer Behavior. (3) II.**  
Lecture—3 hours. Recommended: introductory course in economics and/or psychology. Influence of psychological, sociological, and product attribute factors on consumer behavior. Description of consumer decision processes and methods of studying consumer behavior. Utilization of consumer behavior information by individual, marketers, and social organizations.  
Mr. Schutz

#### Graduate Courses

**200. Consumer Research Methods. (3) I.**  
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Topics will include consumer laboratory and field attitude research, consumer sampling, measurement techniques, scales, and methods of analysis.  
Mr. Schutz

**201A. Consumer Product Quality, Standards, and Labeling: Basic Principles. (2) I.**  
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. An overview of consumer product quality, standards for consumer products, informative product labeling, and the relationships of quality, standards and labeling are presented.  
The Staff (Mr. Needles in charge)

**201B. Consumer Product Quality, Standards, and Labeling: Textile Products and Hard Goods. (2) II.**  
Lecture—2 hours. Recommended: course 201A and Textiles and Clothing 160. Consumer product quality and standards for textile products; shelter, transportation, appliances, and repair are given more limited coverage.  
Miss Morris, Mr. Zeronian

**201C. Consumer Product Quality, Standards, and Labeling: Food and Nutrition Practices and Problems. (2) III.**

Lecture—1 hour; discussion—1 hour. Recommended: course 201A and upper division courses in Foods (100A, 100B or equivalent) and Nutrition (102A, 102B or equivalent). Relation of consumer problems in nutrition and food use to regulations and practices involving quality, standards, and labeling of food products. Topics include food grades and standards; identity standards; labeling for regulation and for information; fortification and enrichment of foods; nutritional supplements and substitutes; food additives. The Staff (Mr. Hill in charge)

**202. Consumer Protection. (4) II.**  
Lecture—3 hours; discussion—1 hour. Prerequisite: knowledge equivalent to Consumer Economics 141, 142. Consumer protective agencies and programs: federal, state, and local government programs; private consumer protective agencies and programs; nonprofit agencies and programs; consumer legal remedies; consumer protective legislation and enforcement of consumer protective regulation and legislation.  
Mrs. Lane

**290. Seminar in Consumer Science. (1) I, II, III.**  
Seminar—1 hour. Prerequisite: graduate standing. Selected topics related to the consumer, consumer problems, and consumer-oriented research will be presented. A broad spectrum of consumer topics will be presented over the three-quarter sequence.  
The Staff (Mr. Schutz in charge)

**298. Group Study. (1-5) I, II, III.**  
Prerequisite: graduate standing.  
The Staff (Mr. Schutz in charge)

**299. Research. (1-12) I, II, III.**  
Prerequisite: graduate standing.  
The Staff (Mr. Schutz in charge)

Related Courses: see Consumer Economics, Food Science and Technology, Foods, Nutrition, and Textiles and Clothing.

## DESIGN

*Major Advisers.*—See *Class Schedule* listing.  
*Major Program.*—See page 77.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

## Lower Division Courses

**6A-6B-6C. Introduction to Design. (4-4-4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Introduction to various fields of design. Consideration of the social, cultural, and physical needs of man influencing the design of objects. May be taken in any order.

I. Mr. Gotelli;

II. Mrs. Rossbach; III. Mrs. Butler

**30A-G. Exploration in Design. (4) I, II, III.**

Lecture—1 hour; laboratory—9 hours. Laboratory exploration in Design. Topic areas will rotate from quarter to quarter: 30A. Drafting and Perspective; 30B. Calligraphy; 30C. Figure Drawing; 30D. Structure of Materials; 30E. Personal Adornment; 30F. Non-Loom Textiles; 30G. Model Construction.

The Staff

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Thompson in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Thompson in charge)

## Upper Division Courses

**120A. Principles of Design. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Art 2, Psychology 1A. Principles of organization and composition in design. An exploration of the subjective process of awareness.

The Staff

**120B. Principles of Design. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A. Exploration of the principles of structure; development of approaches to the solution of problems involving multi-dimensional space and movement.

The Staff

**120C. Principles of Design. (3) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A. Visual perception and organization in the interaction of color phenomena; design problems dealing with the effects and functions of color as sensation, as light and as form.

The Staff

**140A. History of Design. (3) I.**

Lecture—3 hours. Prerequisite: Art 1A (may be taken concurrently). The history of Western design from Ancient Egypt and the Middle East through the Aegean and Classical civilizations to the waning of the Middle Ages.

**140B. History of Design. (3) II.**

Lecture—3 hours. Prerequisite: Art 1B or consent of instructor. The history of Western design from the Renaissance through the Baroque, the Rococo and Neoclassicism of the eighteenth century, nineteenth century, industrialization to the emergence of modernism.

**142A. World Textiles: Far East and Pacific. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Art 1A. An exploration through lectures and visual material of the textile arts of Japan, China, Korea, India, Indonesia and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of these cultures.

Mrs. Rossbach

**\*142B. World Textiles: Middle East, Europe, and United States. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Art 1A. An exploration through lectures and visual material of the textile arts of the Middle East, Europe, and the United States with emphasis on aesthetic and stylistic qualities. The influences of Eastern textiles on textiles of Europe and the United States.

Mrs. Rossbach

**143. History of Costume Design. (3) II.**

Lecture—3 hours. Prerequisite: Art 1A. The history of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

Mrs. Stabb

**144. History of Interior Design. (3) III.**

Lecture—3 hours. Prerequisite: one course in art history. The history of Western interior design from its beginnings in Ancient Egypt through the Classical, Medieval, and Renaissance worlds to modern times.

**160A-160B-160C. Textile Design. (3-3-3) I-II-III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A or consent of instructor. An exploration of the design and appreciation of hand printed textiles; emphasizes the unique qualities of the individual as producer.

Mrs. Rossbach

**170A-170B-170C. Costume Design. (3-3-3) I-II-III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A or consent of instructor. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historic, contemporary and projected image of man as expressed through costume.

Mrs. Stabb

**180A-180B-180C. Interior Design. (3-3-3) I-II-III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A or consent of instructor. Analysis, organization and solution of interior

\* Not to be given, 1972-73.

design problems involving the social, cultural, economic and aesthetic needs of man. Consideration of the interrelationship of interior design, architectural and landscape design.

I-III. Mr. Olsen, II. Mr. Gotelli

#### 196. Individual Problems in Design. (3) I.

Seminar—1 hour; laboratory—6 hours. Prerequisite: design major of senior standing. A proseminar in relationship to a senior thesis, a comprehensive design problem pursued under the direction of a member of the faculty.

The Staff (Mrs. Rossbach in charge)

#### 198. Directed Group Study. (1-5) I, II, III.

Prerequisite: upper division standing and consent of instructor.

The Staff (Mr. Thompson in charge)

#### 199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Thompson in charge)

Related Courses: see Engineering 110; Environmental Horticulture 1, 2; Environmental Planning and Management 136.

## DRAMATIC ART

Robert A. Fahrmer, Ph.D., *Chairman of the Department*

Department Office, 222 Dramatic Art Building

#### Professors:

Everard d'Harnoncourt, Ph. D.

Theodore J. Shank, Ph.D.

Daniel E. Snyder

Alan A. Stambusky, Ph.D.

#### Associate Professors:

Robert A. Fahrmer, Ph.D.

Alfred Rossi, Ph.D.

Robert K. Sarlos, Ph.D.

#### Assistant Professor:

David Copelin, D.F.A.



#### Lecturers:

Gene A. Chesley, M.A.

Harry C. Johnson, M.A.

Phyllis J. Kress, M.F.A.

David P. Wyatt, B.A.

*Major Adviser.*—Mr. Shank.

Lower Division Courses.—Twenty-two quarter units in Dramatic Art consisting of the following: 10A, 10B, 10C (Principles of Acting); 20 (Introduction to Dramatic Art); 24 (Visual Aspects of Dramatic Art); and 25 (Technical Aspects of Dramatic Art).

Upper Division Courses.—Thirty-eight quarter units in Dramatic Art including the following: 124A, 124B (Principles of Theatrical Design); 127A (Principles of Directing); 158A, 158B (World Drama); 159 (Contemporary Drama); 160A (Principles of Playwriting); either 127B (Principles of Directing) or 160B (Principles of Playwriting); 190 (Proseminar in Dramatic Art).

In exceptional cases, with the adviser's consent, the student may petition to substitute up to 8 units from other Dramatic Art courses for any of the above courses.

In addition each major student is required to

participate in departmental dramatic productions.

*Teaching Major.*—The requirements for the teaching major are the same as for the undergraduate major.

*Teaching Minor.*—At least 30 quarter units, including Dramatic Art 10A, 10B, 20, and 24; and 127A and two courses from the sequence 158A, 158B, 159. Participation in departmental dramatic productions is recommended.

*Subject Representative:* Mr. Shank

*Graduate Study.*—The Department of Dramatic Art offers programs of study and research leading to the M.A., M.F.A. and Ph.D. (Theatre Research) degrees. Detailed information may be obtained from the Graduate Adviser.

## 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 all students.

## Artists in Residence Program

The Department of Dramatic Art periodically engages professional artists-in-residence to work with students in productions and in creative workshops.

#### Lower Division Courses

#### 10A. Principles of Acting. (4) I.

Lecture—2 hours; laboratory—4 hours. The physical and psychological resources for acting; fundamentals of creative mime, improvisation, stage speech and movement. Reading and analysis of selective plays to illustrate principles involved. Field trips included. Mr. Johnson

#### 10B. Principles of Acting. (4) II.

Lecture—2 hours; laboratory—4 hours. Pre-

requisite: course 10A. Methods of characterization in the realistic style. Reading and analysis of contemporary plays; theory and practice of acting with emphasis on realistic and naturalistic character analysis and interpretation. Field trips included.  
Mr. Johnson

#### 10C. Principles of Acting. (4) III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 10B or consent of instructor. Methods of characterization in non-realistic styles. Reading and analysis of plays of different types and forms selected from various periods; theory and practice of acting with emphasis on period styles. Field trips included.  
Mr. Rossi

#### 15. The Art of the Cinema. (4) I, III.

Lecture—3 hours; laboratory—2 hours. The cinema as an art form; its relation to other arts; its evolution with emphasis on the significant modern contributions.  
Mr. d'Harnoncourt

#### 20. Introduction to Dramatic Art. (4) I, III.

Lecture—3 hours; discussion—1 hour. Understanding and appreciation of plays in their cultural contexts. The plays will be selected from the major periods of dramatic art.  
Mr. Fahrner, Mr. Copelin

#### 24. Visual Aspects of Dramatic Art. (4) III.

Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.  
Mr. Snyder

#### 25. Technical Aspects of Dramatic Art. (2) I, II, III.

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.  
Mr. Wyatt

#### 27. Creative Principles of Dramatic Art. (4) II.

Lecture—4 hours. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art.  
Mr. Copelin

#### 30. Theatre Laboratory. (1-5) I, II, III.

Prerequisite: course 25 or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.  
The Staff

#### 98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.  
The Staff (Chairman in charge)

#### Upper Division Courses

#### 110. Advanced Acting. (4) I.

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 10A, 10B and 10C, and consent of instructor. Advanced theory and practice of acting with emphasis on special problems. Detailed study of the Stanislavski system of acting and other acting theories. Field trips included.  
Mr. Rossi

#### 111. Voice and Speech for the Actor. (1) I, II, III.

Laboratory—2 hours. Fundamentals of voice production and speech through exercises in relaxation, diaphragmatic breathing, breath control and phrasing, articulation, resonance, and tone placement.  
Mr. Johnson

#### 112. Stage Movement. (1) I, II, III.

Laboratory—2 hours. Fundamental work in developing physical aspects of acting techniques used in stage movements.  
Mr. Johnson

#### 115. Advanced Study of Major Film Makers. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit.  
Mr. d'Harnoncourt, Mr. Baker

#### 124A. Principles of Theatrical Design. (3) I.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Scene design: drafting methods, working drawings, rendering techniques, scale models, methods and materials of scenery construction.  
Mr. Chesley

#### 124B. Principles of Theatrical Design. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 124A. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.  
Mr. Snyder

#### 124C. Principles of Theatrical Design. (3) III.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.  
Mr. Chesley

#### 124D. Principles of Theatrical Design. (3) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays.  
Miss Kress

#### \*125. History of Scene Design and Staging Methods. (4) II.

Lecture—4 hours. Study of scenic developments from the Renaissance to the present.  
Mr. Sarlos

\* Not to be given, 1972-73.

**127A. Principles of Directing. (5) I.**

Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: courses 10A and 10B. The director's creative approach to the play and to its staging. Mr. Stambusky

**127B. Principles of Directing. (3) II.**

Lecture—1 hour; laboratory—2 hours; rehearsal. Prerequisite: course 127A. The director's creative approach to the actor. Mr. Stambusky

**150. American Drama. (4) III.**

Lecture—4 hours. Selected plays and the history of the theatre from Colonial times to the present. Mr. Sarlos

**155. Black Theatre. (4) III.**

Lecture-discussion—4 hours. Black Theatre and drama today: the history, impact, and current direction of the work of Blacks in the theatre. Mr. Johnson

**158A. World Drama. (5) I.**

Lecture—4 hours; papers and conferences. Selected plays and the history of the theatre from ancient Greece to Neoclassicism. Mr. Sarlos

**158B. World Drama. (5) II.**

Lecture—4 hours; papers and conferences. Selected plays and the history of the theatre from Neoclassicism to Naturalism. Mr. Sarlos

**159. Contemporary Drama. (5) III.**

Lecture—4 hours; papers and conferences. Selected plays and the history of the theatre from Naturalism to the present. Mr. Fahrner

**160A–160B. Principles of Playwriting. (4–4) I–II.**

Lecture-Seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays. Mr. Shank

**180. Theatre Laboratory. (1–5) I, II, III.**

Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit. The Staff

**190. Proseminar in Dramatic Art. (4) III.**

Seminar—3 hours; individual research; term paper. Prerequisite: senior status in dramatic art. Comprehensive study of dramatic art. Mr. Fahrner

**193A–D. Intercultural Literary Colloquium: The Avant Garde. (4) II.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Literary innovation and rebellion in Western culture

since World War I. Content will alternate among the following segments: A. Dada and Surrealism; B. The Absurdist Tradition; C. The "New Novel"; D. Proletarian and Epic Theatre. May be repeated for credit in different subject area. (Same course as Comparative Literature and French 193A–D.)

Messrs. Bossart, Kusch, Snyder

**198. Directed Group Study. (1–4) I, II, III.**

Lecture—1–4 hours. Prerequisite: consent of instructor. The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1–5) I, II, III.**

Prerequisite: consent of instructor. The Staff (Chairman in charge)

**Graduate Courses****200. Methods and Materials in Theatre Research. (4) I.**

Seminar—3 hours. Essential research tools in theatre and related fields; bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field. Mr. Sarlos

**210A. Special Problems in Advanced Acting. (4) I.**

Seminar—2 hours; laboratory—4 hours. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the Renaissance. Mr. Rossi

**\*210B. Special Problems in Advanced Acting. (4) II.**

Seminar—2 hours; laboratory—4 hours. Advanced acting problems relating to plays selected from the Renaissance to Romanticism. Mr. Rossi

**210C. Special Problems in Advanced Acting. (4) III.**

Seminar—2 hours; laboratory—4 hours. Advanced acting problems in plays drawn from Romanticism to the present. Mr. Rossi

**211. Advanced Voice and Speech. (1) I, II, III.**

Laboratory—2 hours. Voice production and speech related to specific acting problems in classical plays, particularly in verse. Mr. Johnson

**212. Advanced Stage Movement. (1) I, II, III.**

Laboratory—2 hours. Rhythmic movement patterns relating to acting problems in classic and modern plays. Mr. Johnson

**224A. Advanced Principles and Theories of Theatrical Design. (4) I.**

Seminar—3 hours. Selected problems in the visual and auditory aspects of theatrical production. Mr. Snyder

**224B. Advanced Principles and Theories of Theatrical Design. (4) II.**

Seminar—3 hours. Selected problems in the

\* Not to be given, 1972–73.



design of stage scenery and costumes; practice in design. Mr. Chesley

**224C. Advanced Principles and Theories of Theatrical Design. (4) III.**

Seminar—3 hours. Design of a production for three different types of theatres: open stage, arena, and proscenium. Mr. Chesley

**\*226. History of Directing. (4) II.**

Seminar—3 hours. Survey of the theories and practice of internationally recognized stage directors from 1874 to the present. Mr. Stambusky

**227. Advanced Directing. (4) III.**

Seminar—2 hours; laboratory—2 hours. Advanced directing techniques; specialized procedures in styles of drama. Projects in directing scenes from dramas of different types and periods. Mr. Stambusky

**228A. Seminar in Directing. (4) III.**

Seminar—3 hours. Development of directorial conceptions for contemporary productions of selected plays from the Greek to the Renaissance periods. Mr. Copelin

**228B. Seminar in Directing. (4) II.**

Seminar—3 hours. Directorial conceptions for contemporary productions of selected plays from the Renaissance to Romanticism. Mr. d'Harnoncourt

**\*228C. Seminar in Directing. (4) I.**

Seminar—3 hours. Directorial conceptions for contemporary productions of selected plays from Romanticism to the present. Mr. Stambusky

**\*229A. Special Problems in Directing. (4) II.**

Seminar—2 hours; laboratory—2 hours. Specialized directorial procedures in styles of drama. Projects in directing scenes selected from plays of the Greek to Renaissance periods. Mr. Stambusky

**229B. Special Problems in Directing. (4) II.**

Seminar—2 hours; laboratory—2 hours. Projects in directing scenes from plays of the Renaissance to Romanticism. Mr. Rossi

**\*229C. Special Problems in Directing. (4) II.**

Seminar—2 hours; laboratory—2 hours. The direction of a full-length play from a classical period. Mr. Stambusky

**\*230A-230B. Classic and Medieval Theatre.**

(4-4) II, III.

Seminar—3 hours. The theatre of Greece, Rome and Middle Ages; emphasis on relationship of dramas of the period to physical circumstances of production. Course 230A includes

readings and discussion and may be taken separately; 230B emphasizes research culminating in a substantial scholarly paper. (Deferred grading only, pending completion of sequence, can be in effect.)

Mr. Sarlos, Mr. Stambusky

**\*235A-235B. Renaissance and Baroque Theatre. (4-4) II, III.**

Seminar—3 hours. The theatre of Italy, Spain, England, and France 1500-1660; emphasis on relationship of dramas of the period to physical circumstances of production. Course 235A includes readings and discussion and may be taken separately; 235B emphasizes research culminating in a scholarly paper. (Deferred grading only, pending completion of sequence, can be in effect.) Mr. Copelin, Mr. Sarlos

**240A-240B. Neoclassic and Romantic Theatre.**

(4-4) II, III.

Seminar—3 hours. The theatre of France, England, Germany, Italy, and America, 1660-1860; emphasis on relationship of dramas of the period to physical circumstances of production. Course 240A includes readings and discussion and may be taken separately; 240B emphasizes research culminating in a scholarly paper. (Deferred grading only, pending completion of sequence, can be in effect.)

Mr. Fahrner, Mr. Sarlos

**250. Modern Theatre. (4) I.**

Seminar—3 hours. The theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Mr. Copelin

**259. Contemporary Theatre. (4) II.**

Seminar—3 hours. World theatre since 1940, with emphasis on the relationship of the dramas of our period to the physical circumstances under which they are produced. Mr. Fahrner

**260. Advanced Playwriting. (4) I, II, III.**

Seminar—3 hours. Dramatic structure, character, and dialogue. Advanced projects in playwriting. Mr. Shank

**265. Theory of Dramatic Art. (4) I.**

Seminar—3 hours. Theory and aesthetic principles of dramatic art as a fine art. Mr. Fahrner

**280. Theatre Laboratory. (1-12) I, II, III.**

Advanced practice in acting, designing, directing, playwriting, and technical theatre. The Staff

**\*292. Contemporary Theatre Practice. (2) III.**

Seminar—2 hours. Seminar in the techniques

\* Not to be given, 1972-73.



and requirements for pursuit of a career as a theatre professional. Includes survey of Broadway, Off-Broadway, Regional, University, and Community theatres. The Staff

**298. Group Study. (1-4) I, II, III.**

Seminar—1-4 hours. Prerequisite: consent of instructor. The Staff (Chairman in charge)

**299. Individual Study. (1-12) I, II, III.**

The Staff (Chairman in charge)

## EAST ASIAN STUDIES

Kwang-Ching Liu, Ph.D., *Chairman of the Committee*  
Committee Office, \_\_\_\_\_

### Committee in Charge:

Kenne H-K Chang, Ph.D. (*Anthropology*)  
Joyce K. Kallgren, Ph.D. (*Political Science*)  
Key H. Kim, M.A. (*Oriental Languages*)  
Kwang-Ching Liu, Ph.D. (*History*)  
Richard J. Miller, Ph.D. (*History*)

The major in East Asian Studies is designed to give the student a better understanding of East Asia (especially China and Japan) through interdisciplinary studies and particularly by combining sustained work in an oriental language with courses on East Asian countries. The program is planned in such a way that the student can regard it either as training 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.

Each student will be required to develop a special field (for example, anthropology, history, oriental languages, or political science) in this major, to be chosen in consultation with the Committee in charge. Since seven quarters of language work is required, the interested student should apply to this program normally at the beginning of the sophomore year.

In addition to the requirements for the East Asian major, the student is urged to take courses that would provide a substantial background in Euro-American civilization (e.g., courses in Western history, government, or philosophy), as a basis for comparison and for a deeper un-

### Professional Courses

**413. Stage Make-Up. (1) I.**

Lecture-laboratory—2 hours. Lectures, demonstrations, and practical work in aspects of theatrical make-up. The Staff

**\*414. Swordplay for the Theatre. (1) II.**

Laboratory—2 hours. The techniques of the stage use of historical weapons; the choreography of stage duels with emphasis on safety and theatrical effectiveness. The Staff

derstanding of America's relations with East Asia.

Lower Division Courses.—Required: History 9A-9B (normally taken in freshman year), 90 or 4 units of Political Science—section on Comparative Government in East Asia. Recommended: Art 1D.

Language Requirements.—Required: Two years plus one quarter (28 units) of Chinese or Japanese to be satisfied by course work or examination, normally to be started no later than the fall of the sophomore year, and including one quarter of upper division work.

Upper Division Courses.—Required: History 192A-192B or 194A-194B, 148A-148B; Anthropology 190 or 191; and four courses to be chosen from: Agricultural Economics 125; Anthropology 109, 110, 111, 112, 119A, 119B, 120, 128A, 162, 165, 192; Economics 115A, 115B, 116; Geography 143; History 102C, 102H, 102N, 191A, 191B, 191C, 192A, 192B, 193, 194A, 194B; Oriental Languages 100, 101, 102, 121, 123A, 123B, 123C, 132A, 132B, 142; Political Science 132, 137, 142, 145, 148A, 148B; Sociology 118, 141, 142, 170.

Other appropriate courses as approved by the Committee in charge.

## ECOLOGY (A Graduate Group)

R. Merton Love, Ph.D., *Chairman of the Group*

Group Office, 255 Hunt Hall or Institute of Ecology

### Graduate Courses

**201A. Ecological Theory. (3) I.**

Lecture—2 hours; discussion—1 hour. Pre-

requisite: a course in ecology. The course will focus on the ecological community as a unit.

\* Not to be given, 1972-73.

The major generalizations concerning the structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic environment and its fluctuations. (Same course as Botany, Geology and Zoology 201A.)

The Staff (Mr. Salt in charge)

### 201B. Analysis of A Selected Ecosystem. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists from several fields. May be repeated for credit.

(Same course as Botany, Geology and Zoology 201B.) The Staff (Chairman in charge)

### 201C. The Changing Biosphere. (3) III.

Lecture—2 hours; 1 assigned problem. Prerequisite: courses 201A, 201B; or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes on living systems, changes in species diversity, effects on human population increase, and related topics. (Same course as Botany, Geology and Zoology 201C.) The Staff (Mr. Richerson in charge)

### 290. Seminar in Ecology. (1) I, II, III.

Seminar—1 hour. Topics in ecology and resource management.

The Staff (Chairman in charge)

## ECONOMICS

Frank C. Child, Ph.D., *Chairman of the Department*

Department Office, 380 Academic Office Building III

### Professors:

Andrzej Brzeski, Ph.D.  
Frank C. Child, Ph.D.  
Bruce Glassburner, Ph.D.  
Thomas Mayer, Ph.D.  
<sup>1</sup>Tsung-yuen Shen, Ph.D.  
<sup>1</sup>Elias H. Tuma, Ph.D.  
<sup>1</sup>Leon L. Wegge, Ph.D.

### Associate Professors:

Hiromitsu Kaneda, Ph.D.  
Martin P. Oettinger, Ph.D.

### Assistant Professors:

Victor P. Goldberg, Ph.D.  
W. Eric Gustafson, Ph.D.  
Thomas M. Lenard, B.A.  
Alan L. Olmstead, Ph.D.  
Refugio I. Rochin, Ph.D.  
C. Daniel Vencill, Ph.D.

◇ ◇ ◇

### Assistant Professor:

William G. Moss, B.A. (*Acting*)

*Departmental Major Advisers.*—Mr. Brzeski, Mr. Goldberg, Mr. Gustafson, Mr. Lenard, Mr. Moss, Mr. Oettinger, Mr. Olmstead, Mr. Rochin, Mr. Shen.

*Graduate Advisers.*—Mr. Glassburner, Mr. Kaneda, Mr. Mayer, Mr. Oettinger, Mr. Tuma, Mr. Vencill, Mr. Wegge.

*The American History and Institutions requirement* may be satisfied in part by Economics 111. (See also page 33.)

<sup>1</sup> Absent on leave. 1972-73.

### The Major Program

Lower Division Courses.—Required: Economics 1A, 1B, or the sequence, Economics 2A-2B-2C; Economics 12; and at least a C average in these courses. Students planning to major in economics should normally complete these courses by the end of the sophomore year.

Students considering graduate study in economics or business administration are strongly urged to take Mathematics 21A, 21B, 21C, and 22A.

Upper Division Courses.—Required: A total of 36 units of economics including (1) Economics 100 and 101; (2) either Economics 110A or 110B or 111; and (3) one of the following sequences of courses: 102A-102B; 110A-110B, 110A-111, or 110B-111; 115A-115B; 116-117; 121A-121B; 125A-125B; 130A-130B; 135A-135B-135C; 150-151, or 150-152; 160-161.

Economics 100 may be taken before, concurrently with, or after Economics 101. The Department recommends that these courses be taken as soon as possible after the introductory course. 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.

Economics is an appropriate major for undergraduates contemplating graduate study in business administration, law, regional planning or public affairs. For further information consult with a departmental adviser.

**Teaching Major and Minor.**—Economics is acceptable for the secondary credential.

**Teaching Major.**—Same as for the undergraduate major for the A.B. degree.

**Teaching Minor.**—Thirty units in economics including Economics 1A, 1B; or 2A, 2B, 2C; and 12. The student should consult with the subject representative.

**Subject Representative:** Mr. Brzeski.

**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 (Econometrics).

For information about admission to graduate study, degree requirements, and financial aid, students should consult the *Announcement of the Graduate Division* and contact the chairman of the departmental graduate committee.

#### Lower Division Courses

##### 1A. Principles of Economics. (5) I, III.

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.

Mr. Glassburner, Mr. Brzeski

##### 1B. Principles of Economics. (5) II, III.

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.

Mr. Glassburner, Mr. Oettinger

##### 2A-2B-2C. Principles of Economics. (4-3-3)

###### I-II-III.

Lecture—3-2-2 hours; discussion—1-1-1 hour. Same as Economics 1A and 1B. Students enrolling for a full year of Principles of Economics must complete either 1A-1B or 2A-2B-2C.

Mr. Gustafson

##### 11A. Elementary Accounting. (4) I.

Lecture—3 hours; laboratory—2 hours. The 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; social accounting. (Deferred grading only, pending completion of sequence.)

##### 11B. Elementary Accounting. (3) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 11A. Continuation of course 11A. (Deferred grading only, pending completion of sequence.)

##### 12. Introduction to Quantitative Methods in Economics. (5) I, III.

Lecture—4 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Not open to students having credit for Mathematics 13 (or Psychology 3). Methods of analyzing quantitative economic data including descriptive statistics; sampling and statistical inference index numbers, correlation, and time series. Emphasis on the logic of procedures, interpretation, and application.

Mr. Brzeski and Staff

##### 49. Lower Division Seminar. (1-3) II.

Seminar—1-3 hours. Prerequisite: lower division standing; consent of instructor.

The Staff (Chairman in charge)

##### 98. Group Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Child in charge)

##### 99. Individual Study for Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Child in charge)

#### Upper Division Courses

##### 100. Intermediate Micro Theory. (5) I, II, III.

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C or consent of instructor. Price and distribution theory under condition of perfect and imperfect competition. Welfare economics.

The Staff

##### 101. Intermediate Macro Theory. (5) I, II, III.

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C or consent of instructor. Theory of income, employment and prices under static and dynamic conditions.

The Staff

##### 102A. Advanced Micro Theory. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 12, 100, Mathematics 16A-16B; or consent of instructor. Selected topics in micro-economic theory.

##### 102B. Advanced Macro Theory. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 12, 101, Mathematics 16A-16B; or consent of instructor. Selected topics in macro-economic theory.

Mr. Lenard

##### 103. Theory of Economic Optimization. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100, 101; Mathematics 16A-16B. Analytics of economic optimizing behavior for consumers and firms, using linear algebra,

partial differentiation, quasi-concave functions, and the Kuhn-Tucker theorems. (Same course as Agricultural Economics 103.)

Mr. Rausser, Mr. Wegge

#### 105. History of Economic Thought. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, 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.

Mr. Glassburner

#### 110A. Economic History. (4) I.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, 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.

Mr. Tuma

#### 110B. Economic History. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Survey of economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

The Staff

#### 111. Economic History. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Survey of economic change in the United States beginning with the Colonial Period; reference to other regions of the Western Hemisphere; implications for contemporary economic problems.

Mr. Olmstead

#### 115A-115B. Economic Development. (4-4) I-II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Theories of economic development and underdevelopment, economic policy for growth and development. Contemporary and historical case studies.

Mr. Kaneda, Mr. Gustafson

#### 116. Economic Systems. (4) II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, 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.

Mr. Brzeski

#### 117. The Soviet Economy. (4) III.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Survey of Soviet economic

development: economic organization, methods of planning, and performance.

Mr. Brzeski

#### 121A. Industrial Organization. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C and course 100, or consent of instructor. An appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries.

Mr. Goldberg

#### 121B. Industrial Organization. (4) II.

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.

Miss Parker

#### 123. Ecology and Economics. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 2A-2B-2C; or consent of instructor. Economies and populations as self-regulating systems; economic regulation of man's interaction with his environment. Topics: population growth and its economic determinants; optimal rates of use of exhaustible and renewable resources; implications of common property in resources; prospects for agricultural growth.

Mr. Gustafson

#### 125A-125B. Urban Economics. (4-4) II-III.

Lecture—3 hours; one hour to be arranged. Prerequisite: courses 1A-1B or 2A-2B-2C or consent of instructor. Analysis of the structure and growth of the urban economy. Topics include: land use, residential and business growth, housing markets, transportation; metropolitan fiscal problems; urban decay and renewal, poverty, discrimination; public policy.

Mr. Moss

#### \*129. Issues in Political Economy. (4) II.

Lecture—2 hours; discussion—2 hours; study paper. Economic problems as political issues; the social process of reform; current issues in historical perspective. (Passed/Not Passed grading only.)

#### 130A-130B. Economics of the Public Sector. (4-4) I-II.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Impact of the public sector on income, employment, prices, allocation of resources, and distribution of income; related topics such as the budgetary process, public debt, revenue and expenditure problems, fiscal institutions.

#### 134. Corporation Finance. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C and course 11A. The corporation as a form of business organization; promotion, organization,

\*Not to be given, 1972-73.

operation, expansion, consolidation, failure, and reorganization; the capital market, financial instruments and institutions; security markets.

Mr. Sosnick

**135A. Money, Income, and Monetary Policy. (3) I.**

Lecture—3 hours. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Monetary institutions, the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

Mr. Vencill

**135B. Money, Income, and Monetary Policy. (4) II.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 101 and 135A. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

Mr. Vencill

**135C. Money, Income, and Monetary Policy. (3) III.**

Lecture—3 hours. Prerequisite: course 135B. Evaluation of monetary policy, its impact on the economy and past performance, the problem of inflation.

Mr. Mayer

**\*141. The Permanent Arms Economy. (3) II, III.**

Lecture-discussion—3 hours. Prerequisite: courses 1A, 1B. The economic impact of large and permanent military establishments. Stabilizing and destabilizing effects of arms expenditures in the West; impact of military technology; the Russian arms economy; defense and development in the Third World.

**150. Trade Unions and the Labor Market. (4) I.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. Theory and philosophy of labor movements in America, Western Europe and the developing world. The structure and government of labor unions. Current labor market issues.

Mr. Oettinger

**151. Wage Determination. (4) II.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 100 and 101; or consent of instructor. The theory and practice of wage determination on the micro and macro level. The impact of legal minimum wages. Wage-price and wage-employment relationships. Offered in odd-numbered years.

Mr. Vencill

**\*152. Labor and Public Policy. (4) III.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 150; or consent of instructor. The economic impact of labor legislation. Collective bargaining, strikes, dispute settlement and government intervention. Manpower and welfare programs. Offered in even-numbered years.

Mr. Oettinger

**160. International Trade. (4) I.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or

consent of instructor. International trade theory; impact of trade on the domestic and the world economies; public policy toward external trade.

Mr. Rochin

**161. International Finance. (4) II.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or 2A-2B-2C, or consent of instructor. International money and capital markets and their impact on the domestic and world economies; international financial institutions and policies.

Mr. Rochin

**189. Field Work in Economics. (5) III.**

Seminar—1 hour; variable field work. Prerequisite: upper division standing; consent of instructor. Applied economics: stresses research methods, empirical analysis, and the relevance of microeconomic theory for resolving government, labor, or business issues at the community or state level. Individual topics variable.

Mr. Vencill

**190. Senior Seminar. (5) I.**

Seminar—4 hours. Prerequisite: open only to economics majors with senior standing; consent of instructor. Selected topics in economic analysis and public policy.

Mr. Rochin

**197T. Tutoring in Economics. (1-5) I, II, III.**

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.

The Staff (Mr. Child in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Child in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Child in charge)

**Graduate Courses**

**200A. Microeconomic Theory. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or consent of instructor. Theory of the Firm under Perfect Competition; programming and dynamic models of the firm. (Same course as Agricultural Economics 200A.)

Mr. French

**200B. Microeconomic Theory. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A and Mathematics 16B or consent of instructor. Static and dynamic consumer behavior, imperfect competition, market and multi-market equilibrium, introduction to welfare economics and externalities. (Same course as Agricultural Economics 200B.)

\* Not to be given, 1972-73.

**200C. Microeconomic Theory. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103 and 200B. Linear economic systems, the static Leontief system, competitive general equilibrium, welfare economics, comparative statics, and risk. (Same course as Agricultural Economics 200C.)

**200D. Macroeconomic Theory. (4) II.**

Lecture—3 hours. Macro static theory of income, employment and prices. Mr. Mayer

**200E. Macroeconomic Theory. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103 and 200C, Math 16A-16B; or consent of instructor. Macrodynamical theory of income, employment and prices.

Mr. Lenard

**201. History of Economic Thought. (4) III.**

Lecture—3 hours; to be arranged—1 hour. Development of economic thought from classical Greece to modern times.

Mr. Glassburner

**202. Topics in Economic Theory. (4) I.**

Seminar—4 hours. Prerequisite: courses 200A, 200B, 200C, 200D; or consent of instructor. Recent developments in economic theory.

Mr. Child

**203A. Advanced Economic Theory. (4) II.**

Seminar—4 hours. Prerequisite: course 200B. Advanced topics in the theory of the firm; distribution theory; welfare economics.

The Staff

**203B. Advanced Economic Theory. (4) III.**

Seminar—4 hours. Prerequisite: courses 200B and 200C. General equilibrium theory; capital theory; growth theory.

Mr. Lenard

**207. Special Topics in Mathematical Economics.**

(4) III.

Seminar—3 hours. Prerequisite: courses 203A and 203B or consent of instructor. Advanced topics in mathematical economics. Contents may vary from one year to another.

The Staff

**210A. Economic History. (4) I.**

Seminar—3 hours. Method and theory of economic history. Critical analysis of the methodology of economic history and theories of economic change as illustrated by major economic phenomena drawn from the history of different countries.

Mr. Tuma

**\*210B. Economic History. (3) I.**

Lecture-discussion—3 hours. Problems in economic history of the eastern hemisphere from the beginning of the Middle Ages up to the end of the eighteenth century; emphasis on Europe.

Mr. Tuma

**210C. Economic History. (3) II.**

Lecture-discussion—3 hours. Problems in

economic history of the eastern hemisphere since the eighteenth century; emphasis on England, France, and Germany.

Mr. Olmstead

**210D. Economic History. (3) III.**

Lecture-discussion—3 hours. Problems in economic history of the western hemisphere since the eighteenth century; emphasis on United States.

Mr. Olmstead

**215A-215B. Economic Development. (4-4) I-II.**

Lecture—3 hours; to be arranged—1 hour. Theories of economic development, policies for growth, problems from selected areas.

Mr. Kaneda, Mr. Gustafson

**215C. Development Programming. (4) III.**

Seminar—4 hours. Prerequisite: courses 200B, 200E, 215B; consent of instructor. Analysis of development plans, programs, and policies; application of input-output, programming, and operations research methods to development planning.

Mr. Shen or Mr. Kaneda

**216. Economic Systems. (4) II.**

Lecture—4 hours. Comparative study of economic systems, with reference to their organization and institutions, their values and goals, and their economic performance.

Mr. Brzeski

**217. Economics of Planning. (4) III.**

Lecture—4 hours. Theories and principles of economic planning under various economic systems.

Mr. Brzeski

**221A. Industrial Organization. (4) I.**

Lecture—3 hours; to be arranged—1 hour. Analysis of market structure, business behavior, and economic performance under conditions of limited governmental interference.

Mr. Goldberg

**221B. Industrial Organization. (4) II.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 221A. Social standards and public policies toward the business sector of the economy.

Mr. Goldberg

**225. Urban Economics. (4) II.**

Lecture-discussion—4 hours. Prerequisite: course 200A. Application of economic theory and quantitative methods to the urban economy: structure, growth, and problems.

Mr. Moss

**230. Public Finance. (4) I.**

Lecture—3 hours; to be arranged—1 hour. Role of the public sector; tax and expenditure theories; related topics.

**231. Problems of the Public Sector. (4) III.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 230. Public sector institutions, problems, and policies.

\* Not to be given, 1972-73.

**235A-235B-235C. Monetary Economics. (3-3-3)**

I-II-III.

Lecture—3 hours. Monetary theory, policy, and problems. Mr. Mayer

**240A. Econometric Methods. (4) III.**

Lecture—4 hours; term paper. Prerequisite: Mathematics 130B and course in linear algebra. Statistical models and their use in estimation of economic relationships; single and multiple equation systems. (Same course as Agricultural Economics 210.) The Staff

**240B. Advanced Econometrics: Theory. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A; Mathematics 131A, 131B-131C recommended. Multivariate analysis, specification analysis, simultaneous equation models, identification, estimating methods, small sample properties. (Same course as Agricultural Economics 211.) Mr. Rausser

**240C. Advanced Econometrics: Applications. (3) II.**

Lecture—3 hours. Prerequisite: course 240A. Time series analysis and distributed lags, pooling of time series and cross-section data, Bayesian analysis, applications for prediction and policy. (Same course as Agricultural Economics 212.)

**250A. Labor Economics. (4) II.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 150 and 151. Philosophy and theory of the labor movement; union structure and organization under changing labor market conditions; labor market issues.

Mr. Oettinger

**250B. Labor Economics. (4) III.**

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 150 and 151. Theory of the labor market; analysis of wage-employment, wage-investment, and wage-price relationships.

Mr. Vencill

**260A. International Economics. (4) I.**

Lecture—3 hours; to be arranged—1 hour. Economic structure and factors that underlie international trade; policies for regulating external trade.

Mr. Child

**260B. International Economics. (4) II.**

Lecture—3 hours; to be arranged—1 hour. Significance of international transactions for the national income; international monetary mechanisms.

Mr. Kaneda

**260C. International Economics. (4) III.**

Seminar—4 hours. Prerequisite: courses 200C, 200E, 240A and 260A. Survey of current literature in International Trade theory.

The Staff

**298. Group Study. (1-5) I, II, III.**

Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**299. Individual Study. (1-6) I, II, III.**

Prerequisite: consent of instructor and graduate standing. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**299D. Dissertation Research. (1-6) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff

**EDUCATION**

Julius M. Sassenrath, Ph.D., *Chairman of the Department*

Douglas L. Minnis, Ed.D., *Head of Teacher Education*

Department Office, 174 Academic Office Building III

*Professors:*

Donald G. Arnstine, Ph.D.

Hugh C. Black, Ph.D.

<sup>1</sup>Julius M. Sassenrath, Ph.D.

*Associate Professors:*

Leroy F. Troutner, Ph.D.

George D. Yonge, Ph.D.

*Assistant Professors:*

Vincent A. Crockenberg, Ph.D.

Linnea C. Ehri, Ph.D.

Gustavo González, Ph.D.

D. Steven Lynch, Ph.D.

Carlton J. Spring, Jr., Ph.D.

◇ ◇ ◇

*Lecturers in and Supervisors of  
Teacher Education:*

Helen G. Bacon, Ed.D.

W. Augustus Davis, M.Ed.

Larry D. Estes, M.A.

Maryann E. Gatheral, B.A.

Robert E. Hapworth, M.A.

Burt Liebert, M.F.A.

Jack E. Lowry, M.A.T.

Walter T. Mara, M.S.

Douglas L. Minnis, Ed.D.

Susan A. Ostergard, M.A.

Victor A. Perkes, Ed.D.

S. Joan Skinner, M.A.

David R. Wampler, Ph.D.

*Credentials Counselors:*

*Elementary.*—Mrs. Bacon, Mrs. Gatheral, Mr. Hapworth, Mrs. Ostergard, Mrs. Skinner, Mr. Wampler.

<sup>2</sup>Absent on leave, fall quarter, 1972.



*Secondary.*—Mr. Davis, Mr. Estes, Mr. González, Mr. Liebert, Mr. Lowry, Mr. Mara, Mr. Perkes.

*Junior College.*—Mr. Mara.

*Curricula for Teacher Education.*—(See page 177.) For a statement of complete requirements and appointments with credential counselors, apply to the departmental office. Applicants for the credential program should consult the department early in the fall quarter of the senior year.

Required courses in the "Professional Preparation" part of the requirements:

For Secondary Teaching: courses 320A, 110, 120, 320C, and 320E.

For Elementary Teaching: courses 110, 120, 300, 302, 303, 330A, 330C, and 330E.

#### Lower Division Course

#### 98. Directed Group Study. (1-5) I, II, III.

Lecture—2 hours; discussion—2 hours.

The Staff (Chairman in charge)

#### Upper Division Courses

#### 100. Field Experience in Education. (2) I, II, III.

Discussion—1 hour; laboratory—3 hours (in schools and care centers). Prerequisite: upper division standing. A course designed to provide faculty assistance to students who work as tutors or teachers aides. Limited to 30 students per section. May be repeated only once for credit.

The Staff

#### 110. Introduction to Educational Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: upper division or graduate standing; Psychology 1A, 1C, or 10. The learning process; physical, mental, and social development; individual differences and their measurement; mental hygiene; the role of the teacher in guidance and counseling.

Mrs. Ehri, Messrs. Lynch, Sassenrath, Spring, Yonge

#### 114. Quantitative Methods in Educational Research. (4) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Emphasis will be on procedures suited to digital computers. Mr. Yonge

#### 117. The Psychology of Reading Disability. (3) III.

Lecture—1 hour; discussion—2 hours. Prerequisite: Psychology 1A or equivalent; upper division or graduate standing. Cognitive and motivational processes involved in the acquisition of reading ability. Processes which may be impaired in the slow reader will be identified.

Mr. Spring

#### \*119. Tests and Measurements. (4) II.

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). A critical survey

of teacher-made and standardized tests; principles and functions of measurement in education, current practices in school marks; supervised work in test administration, scoring and interpretation. Mr. Yonge

#### 120. Philosophical and Social Foundations of Education. (4) I, II, III.

Lecture—4 hours. Prerequisite: upper division or graduate standing. Philosophical, historical, and sociological study of education and the school in our society.

Messrs. Arnstine, Black, Crockenberg, Troutner

#### \*121. The Romantic Critics of Education. (4) I.

Lecture—2 hours; discussion—2 hours. A critical philosophic examination of the concept of the free school and of the assumptions about the educative process and prescriptions for educational reform of such writers as Rousseau, Tolstoy, Dewey, Neill, Goodman, Holt, Kohl, Denison, Leonard and others. Mr. Crockenberg

#### 150A. Educating and Tutoring Minority Children and Youth. (2) I.

Lecture—1 hour; laboratory—3 hours. Poverty as it affects a person's performance in the school with emphasis on how to deal with it in the school and community.

Messrs. Davis, González, Liebert

#### 150B. Educating and Tutoring Minority Children and Youth. (2) II.

Lecture—1 hour; laboratory—3 hours. Racism as it affects a person's performance in the school with emphasis on how to deal with it in the school and community.

Messrs. Davis, González, Liebert

#### 150C. Educating and Tutoring Minority Children and Youth. (2) III.

Lecture—1 hour; laboratory—3 hours. Youth cultures as they affect a person's performance in the school with emphasis on how to deal with them in the school and community.

Messrs. Davis, González, Liebert

#### 151. Language Problems of the Mexican-American Child. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: upper division standing. Problems of phonology, syntax, and lexicon encountered by the Mexican-American child in English-speaking public school systems. Mr. González

#### 163. Guidance and Counseling. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment. Mr. Lynch

\* Not to be given, 1972-73.



**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Chairman in charge)

**Graduate Courses****201. History and Philosophy of Education: Ancient Period. (4) I.**

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected ancient societies and cultures with emphasis upon the historical and philosophical contexts. Mr. Black

**202. History and Philosophy of Education: Middle Period. (4) II.**

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected societies and cultures of the middle period (through the eighteenth century) with emphasis upon the historical and philosophical contexts. Mr. Arnstine, Mr. Black

**203. Twentieth Century Issues Over the Schools. (4) III.**

Lecture—2 hours; discussion—2 hours. A study of John Dewey and contrasting theories of education in relation to controversies over the aims, organization, curriculum, and instructional practices in schools. Mr. Black, Mr. Crockenberg

**204. Existential Thought and Education. (4) II.**

Lecture—1 hour; discussion—1 hour; seminar—2 hours. A study and critical analysis of the implications of existential thought for education. Mr. Troutner

**205. The Concept of Mind in Teaching. (4) III.**

Seminar—4 hours. A philosophical analysis of the problems of educational practice which are created, aggravated, and sometimes solved by varying conceptualizations of mind and thinking. Mr. Arnstine

**210. Learning and Instruction. (4) I.**

Seminar—4 hours. Prerequisite: consent of instructor. A critical consideration of selected problems and procedures in the study of learning and instruction. Mr. Spring

**211. Thinking and Problem Solving. (4) II.**

Seminar—4 hours. Prerequisite: consent of instructor. Critical consideration of thinking with special reference to conceptual behavior, prob-

lem solving, creativity, home, school, and personality influences. Mr. Yonge

**212. Language and Intellectual Development. (4) II.**

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 education. Mrs. Ehri

**219. Human Differences and Educational Evaluation. (4) III.**

Seminar—4 hours. Prerequisite: consent of instructor. A critical study of individual and group differences in ability and personality as related to educational evaluation and measurement. Mr. Sassenrath

**263. Counseling Theories and Psychotherapy. (4) III.**

Seminar—4 hours. Prerequisite: course 163 or equivalent; Psychology 165, 168; and consent of instructor. Theory and research in psychotherapy and counseling systems. The major psychotherapeutic systems (psycho-analytic, behaviorist, client-centered, gestalt, etc.) will be examined with special attention given to the processes of change. Mr. Lynch

**270. Issues in English and Reading Instruction. (4) I.**

Seminar—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. An analysis and evaluation of instructional materials in reading, literature, composition, vocabulary development, spelling, and linguistics as elements of human communication. Mrs. Bacon, Mr. Liebert

**271. Recent Developments in Social Studies Education. (4) II.**

Seminar—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. An analysis of the rationales, goals and objectives, assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects. Mr. Wampler

**274. Analysis of Teacher Behavior. (2) II.**

Seminar—2 hours. Prerequisite: courses 330A or 320A; and consent of instructor. Study of major systems used to describe classroom behavior of pupils and teachers. Design of new systems to describe behavior in special classroom situations. Use of descriptive systems in developing teaching strategies. Mr. Minnis

**290. Seminar. (3) I, II, III.**

Seminar—3 hours.  
The Staff (Chairman in charge)

**299. Research. (1-6) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**Professional Courses****300. Reading and Language Arts in the Elementary School. (4) I, II, III.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Principles, procedures and curriculum materials for the teaching of reading and the oral and written language arts. Includes phonics and other developmental reading skills.

Mrs. Bacon, Mrs. Gatheral, Mrs. Skinner

**302. Elementary School Curriculum: Social Studies.**

(2) I, II, III.

Lecture—2 hours. Current conceptions of the elementary school curriculum, with emphasis on the contributions from the social sciences and on effective teaching methods.

Mr. Minnis, Mr. Wampler

**303. Elementary School Curriculum: Science. (2)**

I, II, III.

Lecture—2 hours. Current conceptions of the elementary school curriculum with emphasis on the role of science and on effective teaching methods.

Mr. Hapworth, Mrs. Ostergard

**309. Early Childhood and Kindergarten Education.**

(2) II.

Lecture—2 hours. Prerequisite: consent of instructor. Methods, materials, and history of nursery school and kindergarten education.

Mrs. Skinner

**313. Middle Grade School Curriculum: Science and Social Science. (3) I.**

Lecture—3 hours. Prerequisite: consent of instructor. Current conception of middle grade school curriculum and effective teaching in science and social science. Mr. Perkes, Mr. Estes

**\*320A. Introduction to Teaching in Secondary Schools. (3) I, II, III.**

Lecture—2 hours; laboratory—3 hours. Lectures, conferences, and laboratory work; observation of and participation in classroom activities in the public elementary schools and University experimental classroom.

The Staff

**\*†320C. Supervised Teaching in Secondary Schools. (4-12) I, II, III.**

Laboratory—4-12 hours. Prerequisite: course 320A; course 320E (must be taken concurrently). Directed teaching for candidates for the secondary credential. (Satisfactory/Unsatisfactory grading only.)

The Staff

**††320E. Methods of Teaching in Secondary Schools. (2-3) I, II, III.**

Seminar—3 hours. Prerequisite: course 320A; course 320C (must be taken concurrently). Methods of teaching in the secondary school: selection, organization, and evaluation of teaching materials including the use of audio-visual aids and the services of counseling and guidance programs. May be repeated for credit up to the total of 8 units.

The Staff

**323. Secondary School Curriculum: Science.**

(2) I, III.

Lecture—2 hours. Current conceptions of secondary school curriculum and effective teaching in the biological and physical sciences.

Mr. Perkes

**\*330A. Introduction to Teaching in Elementary Schools. (3) I, II, III.**

Lecture—2 hours; laboratory—3 hours. Lectures, conferences, and laboratory work; observation of and participation in classroom activities in the public elementary schools and the University experimental classroom.

The Staff

**\*††330C. Supervised Teaching in Elementary Schools. (2-12) I, II, III.**

Laboratory—2-12 hours. Prerequisite: course 330E (must be taken concurrently). Directed teaching for candidates for the elementary credential. May only be taken for credit for a total of 12 units. (Satisfactory/Unsatisfactory grading only.)

The Staff

**††330E. Methods of Teaching in Elementary Schools. (1-3) I, II, III.**

Lecture—1-3 hours. Prerequisite: course 330C (must be taken concurrently). Selection, organization, and evaluation of teaching materials including audio-visual aids. May be repeated for credit up to a total of 6 units.

The Staff

**\*††340. Supervised Teaching in Junior Colleges. (5) I, II, III.**

Discussion—1 hour; supervised teaching—minimum 45 clock hours. Prerequisite: consent of instructor. Directed teaching for candidates for the standard teaching credential with specialization in junior college teaching. (Satisfactory/Unsatisfactory grading only.)

Mr. Mara

\* Students must make their own transportation arrangements for observations and student teaching.

†† Open only to interns and student teachers. These 300 series courses are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the second semester in the public schools. Thus teaching assignments in the fall quarter, 1972, will begin on or about September 2. For the spring quarter, they will end on or about June 2. Students should make arrangements accordingly.

## ENGINEERING

John D. Kemper, Ph.D., *Dean of the College*  
 Roy Bainer, M.S., LL.D., *Dean of the College, Emeritus*  
 Don O. Brush, Ph.D., *Associate Dean—Undergraduate Study*  
 Warren H. Giedt, Ph.D., *Associate Dean—Graduate Study*  
 Ray B. Krone, Ph.D., *Associate Dean—Research*  
 College Office, 2132 Bainer Hall



### Associate Professors:

John R. Beljan, M.D. (*School of Medicine*)  
 G. Worden Waring, Ph.D. (*School of Medicine*)

### Lower Division Courses

#### 1. Plane Surveying. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: plane trigonometry. Not open to students in Engineering. Principles of measurement of horizontal distances, horizontal angles, elevations and leveling, including stadia methods. Field problems, including mapping with special reference to agricultural and landscaping applications. Mr. Goss

#### 3. Introduction to Engineering Systems. (3) I, II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A recommended (may be taken concurrently). An introduction to the profession of engineering and to the role of the engineer as a responsible agent for the planning and shaping of the human environment. (Passed/Not Passed grading only.) Mr. Herrmann

#### 4. Engineering Graphics in Design. (3) I, II.

Lecture—2 hours; laboratory—3 hours. Principles of descriptive geometry and of mechanical and free-hand drawing; their application in the representation, visualization, and solution of engineering problems. Computer aided graphics. Introduction to engineering design. Mr. J. M. Henderson

#### 5A. Engineering Applications of Computers.

(3) II, III.

Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 21B (may be taken concurrently); Physics 4A (may be taken concurrently); not open for credit to students who have completed Mathematics 29. Introduction to digital computer structure, computer languages, and time sharing systems; programming digital computers with applications to engineering problems of both numerical and non-numerical natures. Mr. Loomis, Mr. Kozdrowicki

#### 10. Technology and Society. (3) II.

Lecture—2 hours; discussion—1 hour. Types of technology: communication, computation, defense technology, information development, and transportation. World energy resources and society's energy needs. Effects of technology on

society: population control, personality development, technology and the economy. (Passed/Not Passed grading only.)

Mr. Chilton, Mr. Schroeder

#### 17. Circuits. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 4C. Basic circuit analysis techniques; transient and steady-state solutions using differential equations. Mr. LaPatra, Mr. Owen

#### 35. Statics. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 21C; Physics 4A. Force systems and equilibrium conditions with emphasis on engineering problems. The Staff

#### 45. Properties of Materials. (4) I, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore standing in engineering. An introductory course on the properties of engineering materials and their relation to the internal structure of the materials. Mr. Mukherjee, Mr. Munir

#### 92. Internship in Engineering. (1–5) I, II, III.

Work-learn experience. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. The Staff (Mr. Brush in charge)

#### 98. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor; lower division standing. Group study of selected topics. The Staff (Mr. Brush in charge)

### Upper Division Courses

#### 100. Electronic Circuits and Systems. (4) I, II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 17. An introduction to the theory and application of analog and digital circuits and systems. Mr. Mitra, Mr. Owen

#### 102A. Dynamics. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 35; Mathematics 22B, 22C. Kinematics and kinetics of particles, of systems of particles, and of rigid bodies applied to engineering problems. Mr. J. M. Henderson

#### 102B. Dynamics. (3) II, III.

Lecture—3 hours. Prerequisite: course 102A. Topics in rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods. Mr. J. M. Henderson

**103A. Elementary Fluid Mechanics. (3) I, II.**

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; laminar, transition, and turbulent flow regimes.  
Mr. Dwyer

**103B. Elementary Fluid Mechanics. (3) II, III.**

Lecture—3 hours. Prerequisite: course 103A. Potential flow; open channel flow; boundary layer flow; one dimensional compressible flow.  
Mr. Dwyer

**104A. Mechanics of Materials. (3) I, II.**

Lecture—3 hours. Prerequisite: course 35; Mathematics 22B, 22C (may be taken concurrently). Concepts of stress, strain, elasticity; stress and deformation analysis for axially loaded members, torsion of round shafts, bending and shear of beams; combined stresses. The Staff

**104B. Mechanics of Materials. (3) II, III.**

Lecture—3 hours. Prerequisite: course 104A. Beams: unsymmetrical loading, shear center, indeterminate problems, inelastic bending, buckling and lateral instability. Energy methods; failure theories; torsion of thin-walled sections.  
The Staff

**105A. Thermodynamics. (3) I, II.**

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C. Equations of state and thermodynamics of one-component systems; first and second laws; phase equilibria.  
Mr. Giedt

**105B. Thermodynamics. (3) II.**

Lecture—3 hours. Prerequisite: course 105A. Gas mixtures; work-producing and work-absorbing cycles (vapor and gas); measures of performance. Recent developments.  
Mr. Giedt

**106. Engineering Economics. (3) II.**

Lecture—3 hours. Prerequisite: upper division standing in engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.  
Mr. Garrett

**110. Introduction to Engineering Principles. (3) I.**

Lecture—3 hours. Prerequisite: open to all students not enrolled in the College of Engineering. Introduction to engineering principles and techniques for nonengineering students.  
Mr. J. M. Henderson

**115. Systems Diagnosis and Modeling. (3) I.**

Lecture—3 hours. Prerequisite: upper division standing. The systems approach to complex problem definition. Analysis optimization and simulation techniques. Implementation of re-

sults. Micro and macro modeling. Application areas studied as projects may include social processes, economics, urban problems, justice systems and others.  
Mr. LaPatra

**122. Introduction to Mechanical Vibrations. (3) I.**

Lecture—3 hours. Prerequisite: course 102B. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles.  
Mr. Beadle

**130. Solid-State Thermodynamics. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in Engineering, or consent of instructor. The thermodynamics of the solid state, relation between thermodynamic and physical properties, free energy of heterogeneous reactions, quasicheical approach to solutions, free energy of binary systems and thermodynamics of interfaces. Mr. Mukherjee

**140. Materials in Engineering Design. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in Engineering, or consent of instructor. Descriptive treatment of common engineering materials. Mechanical properties of typical materials including metals, woods, cements, polymers and glasses. Principles of heat treatment and fabrication as they affect design parameters, and applications in engineering will be emphasized. Mr. Munir

**142. Crystal Structure and X-Ray Diffraction. (3) I.**

Lecture—3 hours. Prerequisite: course 45 or consent of instructor. Crystallography, including crystal structure and symmetry operations. Stereographic projection. Reciprocal lattice. Physics of X-rays. Theory of diffraction for X-rays, electrons and neutrons. Mr. Mukherjee

**180. Engineering Analysis. (3) I, III.**

Lecture—3 hours. The 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.  
Mr. McKillop

**183. Intermediate Mechanics of Materials. (3) II.**

Lecture—3 hours. Prerequisite: course 104B; Mathematics 24. Stresses and deformations of curved beams; beams on elastic foundations; torsion of non-circular bars; introduction to plates and shells; thick-walled cylinders.  
Mr. Romstad

**184. Experimental Stress Analysis. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 104B. Experimental methods for the analysis of stress and strain, including photoelasticity, brittle lacquers, mechanical and electrical strain gages and instrumentation.  
Mr. Beadle

**187. Introduction to Theory of Elasticity. (3) I.**

Lecture—3 hours. Prerequisite: course 104B. Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexure and torsion of bars of various shapes.

Mr. Hutchinson

**188. Physical Metallurgy Principles. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 45, 105A or consent of instructor. The physical principles in metallurgy are outlined. The elementary theory of metals, rate of approach to equilibrium, thermal behavior of metals, structure and free energy of alloy phases, diffusion phenomenon and strengthening mechanisms in solids are discussed.

Mr. Mukherjee

**190. Professional Responsibilities of Engineers.**

(3) II, III.

Lecture—2 hours; discussion—1 hour. Organization of the engineering profession; engineering and management; introduction to contracts, specifications, and business law; oral presentations by class members on the interaction between engineering and society.

Mr. Beadle

**192. Internship in Engineering. (1-5) I, II, III.**

Work-learn experience. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. The Staff (Mr. Brush in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor, upper division standing. The Staff (Mr. Brush in charge)

**Graduate Courses**

**290A. Advanced Graduate Study in Systems.**

(1) I, II, III.

Seminar—1 hour. Primarily for advanced graduate students. Seminar on current and advanced topics in dynamic systems; oriented towards advanced students. Topics to change each quarter. Messrs. Amorocho, Bell, Karnopp, Mitra

**291. Seminar in Teaching. (1) III.**

Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (Satisfactory/Unsatisfactory grading only.) Mr. J. M. Henderson

**ENGINEERING: AGRICULTURAL—See also Agricultural Engineering**

**ENGINEERING: AGRICULTURAL†**

John R. Goss, M.S., *Chairman of the Department*  
Department Office, 2030 Bainer Hall

**Professors:**

- Roy Bainer, M.S., LL.D.  
(*Engineering and Agricultural Engineering, Emeritus*)
- William J. Chancellor, Ph.D.
- Robert B. Fridley, M.S.
- John R. Goss, M.S.
- S. Milton Henderson, M.S.
- Robert A. Kepner, B.S.
- Loren W. Neubauer, Ph.D., (*Engineering and Agricultural Engineering, Emeritus*)

**Assistant Professors:**

- Louis D. Albright, Ph.D.
- Thomas H. Burkhardt, Ph.D.



**Professors:**

- Norman B. Akesson, M.S. (*Agricultural Engineering*)
- Coby Lorenzen, Jr., M.S. (*Agricultural Engineering, Emeritus*)

†Courses listed here are in the College of Engineering. For further course offerings, see *Agricultural Engineering*, page 187.

- Michael O'Brien, Ph.D., (*Agricultural Engineering*)
- Wesley E. Yates, M.S. (*Agricultural Engineering*)

**Associate Professors:**

- Roger E. Garrett, Ph.D.  
(*Agricultural Engineering*)
- Stanton R. Morrison, Ph.D. (*Agricultural Engineering*)

**Lecturers:**

- Pictiaw (Paul) Chen, Ph.D.
- Henry E. Studer, M.S.

**Lower Division Courses**

**1. The Agricultural Engineer in Tomorrow's World. (1) II.**

Discussion—2 hours. Exploration of opportunities in Agricultural Engineering as they relate to society, environment, and biological systems, including interdisciplinary approaches. Discussions and demonstrations of agricultural engineering projects illustrating design, development, testing, and evaluation methods. (Passed/Not Passed grading only.)

The Staff (Mr. Goss in charge)

**98. Directed Group Study for Lower Division Students. (1-5) I, II, III.**

The Staff (Mr. Goss in charge)

**99. Special Study for Lower Division Students. (1-5) I, II, III.**

The Staff (Mr. Goss in charge)

**Upper Division Courses**

**114. Principles of Field Machinery Design. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Functional requirements, performance characteristics, basic principles, and design of field machines; use of instrumentation and computer techniques for analysis of specific machines. Mr. Yates

**116. Power Units for Agriculture, Industry and Transportation. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 105A. Energy sources and power units for transportation, industry, and agriculture. Operational and performance characteristics of internal combustion engines, electric motors, and alternative power units: fuels, solar energy, human and animal power. Pollution control devices. Mr. Burkhardt

**118. Development Engineering. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 150 (may be taken concurrently). Failure modes: determination of the causes of systems malfunction by analysis of interactions and variations in effects; experiment design; development procedures. Mr. Studer

**119. Hydraulic and Pneumatic Systems. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A. Design of hydraulic and pneumatic systems for powering, sensing and controlling machine functions. Characteristics of pumps, motors, control valves, fluidic devices, servo-mechanisms, and hydraulic fluid. Testing of component and system performance. Mr. Studer

**125. Agricultural Structures and Sanitation. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 35 and 104A. Functional and material requirements of storage and production structures; lighting, heating, insulating, and ventilating; water supply and sanitation for the farm home and for animal structures; methods and economics of farm waste disposal. Mr. Albright

**126. Design of Agricultural Structures. (3) III.**

Lecture—3 hours. Prerequisite: course 125; Civil Engineering 131. Agricultural building loads and codes; design with steel, concrete, and timber; glued-laminated and plywood box beams; pole buildings and connections; lumber rigid frames; arches. Offered in even-numbered years. Mr. Neubauer

**132. Unit Operations in Agricultural Processing. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103A and 105A. Thermodynamics and mass transfer principles applied to such processes as drying, dehydration, refrigeration, size reduction, separation, and materials handling. Mr. Henderson

**141. Engineering Properties of Agricultural Materials. (3) I.**

Lecture—2 hours; laboratory—3 hours. Selected topics, with emphasis on mechanical and rheological properties and design applications. Techniques for measuring and recording static and dynamic properties. Mr. Chen

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. The Staff (Mr. Goss in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Mr. Goss in charge)

**Graduate Courses**

**215. Soil-Machine Relations in Tillage and Traction. (3) I.**

Lecture—3 hours. Prerequisite: courses 114 and 116; Civil Engineering 171 and Soil and Water Science 101 recommended. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stresses and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems. Mr. Chancellor

**225. Advanced Agricultural Structures Design. (3) II.**

Lecture—3 hours. Prerequisite: course 126. Recommended: Civil Engineering 132B and 132C. Critical evaluation of codes as applied to agricultural structures; safe design criteria, load sharing, and statistical reliability concepts; computer analysis of indeterminate wood structures; stressed skin construction; ultimate strength design in reinforced concrete; applications of new materials and methods. To be given if sufficient number of students enroll. Mr. Neubauer

**235. Advanced Unit Operations in Agricultural Processing. (3) III.**

Lecture—3 hours. Prerequisite: course 132 or equivalent. Basic engineering procedures applicable to agricultural processing; e.g., size reduction, fluidization of granular particles, heat and mass transfer applications to drying and freezing, respiration of biomaterials. Mr. Henderson

**245. Agricultural Waste Management. (3) III.**

Lecture—2 hours; discussion—1 hour. Pre-

requisite: consent of instructor. Animal, crop and food processing wastes; pesticides, fertilizers, odors, dust and smoke in relation to environmental pollution. Disposal needs, present and future. Regulation, economics and public concern; coordination with municipal and industrial wastes management. Mr. Akesson

**255. Environmental Engineering in Agriculture.**  
(3) III.

Lecture—3 hours. Prerequisite: Mechanical Engineering 186. The description, methods of measurement and effect on man, animals and plants of physical environmental factors, and the design of systems for their control.

Mr. Morrison

**265. Design and Analysis of Engineering Experiments.** (4) II.

Lecture—3 hours; laboratory—3 hours. Pre-

requisite: at least one undergraduate course in statistics or consent of instructor. Design, management and analysis of engineering experiments with emphasis on criteria for the selection and utilization of statistical methods. Problems necessitating the use of campus and departmental computing facilities will be assigned.

Mr. Burkhardt

**290. Seminar.** (1) I, III.

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Fridley in charge)

**298. Group Study.** (1-5) I, II, III.

The Staff (Mr. Henderson in charge)

**299. Research.** (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Henderson in charge)

**ENGINEERING: APPLIED SCIENCE**

Harold P. Smith, Jr., Ph.D., *Chairman of the Department*

Frederick O. Wooten, Ph.D., *Vice-Chairman of the Department*

Department Office, 228 Walker Hall

*Professors:*

- Stewart D. Bloom, Ph.D.
- Richard J. Borg, Ph.D.
- John Killeen, Ph.D.
- Harold P. Smith, Jr., Ph.D.
- Edward Teller, Ph.D. (*Professor at Large*)

*Associate Professors:*

- <sup>1</sup>Carl A. Jensen, Ph.D.
- Wilson K. Talley, Ph.D.

*Assistant Professors:*

- John S. DeGroot, Ph.D.
- George D. Sauter, Ph.D.
- Lowell L. Wood, Ph.D.



*Professors:*

- Richard F. Post, Ph.D. (*In Residence*)
- Frederick O. Wooten, Ph.D. (*Adjunct*)

*Lecturers:*

- Berni J. Alder, Ph.D.
- Frank M. Chilton, Ph.D.
- Sidney S. Fernbach, Ph.D.
- Joseph A. Fleck, Ph.D.
- John G. Fletcher, Ph.D.
- John C. Garrison, Ph.D.
- Michael W. Guinan, Ph.D.
- Laurence Hall, Ph.D.

- Robert Harrach, Ph.D.
- William G. Hoover, Ph.D.
- Tony Huen, Ph.D.
- Montgomery H. Johnson, Ph.D.
- Roger N. Keeler, Ph.D.
- Ray E. Kidder, Ph.D.
- Cecil E. Leith, Ph.D.
- Gilbert Leppelmeier, Ph.D.
- Hans M. Mark, Ph.D.
- Kenneth D. Marx, Ph.D.
- Michael M. May, Ph.D.
- Kenneth G. Moses, Ph.D.
- William A. Newcomb, Ph.D.
- Jacques B. J. Read, Ph.D.
- Charles K. Rhodes, Ph.D.
- Edwin B. Royce, Ph.D.
- Harry L. Sahlin, Ph.D.
- C. Bruce Tarter, Ph.D.
- John J. Walton, Ph.D.
- Daniel W. Wilson, Ph.D.
- Yin Yeh, Ph.D.

**Davis**

**Upper Division Courses**

**115. Introduction to the Use of Computers.** (3)  
I, II, III.

Lecture—3 hours. Prerequisite: Engineering 5A; Mathematics 22B. Lectures and laboratory work on electronic computers and their application to engineering problems. The Staff

<sup>1</sup> Absent on leave, 1972-73.



**135A. Introductory Nuclear Science and Technology. (3) II.**

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, electrons, and heavy particles with matter; energy loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes. The Staff

**144. Introduction to Nuclear Technology. (3) III.**

Lecture—3 hours. Prerequisite: course 135A. Nuclear reactions and their applications: nuclear energy sources, radiation detection; nuclear instrumentation. Nuclear particle accelerators. High vacuum technology. The Staff

**Graduate Courses****217A. Introduction to Computational Physics. (3) I.**

Lecture—3 hours. Prerequisite: course 115. Finite difference techniques applied to the solution of problems in sound wave propagation, shock propagation and magnetohydrodynamic stability. Monte Carlo and quadrature techniques applied to problems in linear transport theory. (Courses 217A, 217B, 217C may be taken in any order.) The Staff

**217B. Introduction to Computational Physics. (3) II.**

Lecture—3 hours. Prerequisite: course 115. Numerical transform and finite difference techniques applied to the solution of problems in electromagnetic propagation in random media and plasma dynamical problems such as solutions of the Vlasov equation, the Fokker-Planck equation and plasma stability. The Staff

**217C. Introduction to Computational Physics.**

(3) III.

Lecture—3 hours. Prerequisite: course 115. Direct summation, importance sampling Monte Carlo, variational and special integration techniques for the solution of problems in statistical mechanics such as vibrational states of  $H_2$  and equation of the state with various potentials and of problems in quantum mechanics. The Staff

**230A-230B-230C. Structure of Matter.**

(3-3-3) I-II-III.

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. The Staff

**240A-240B-240C. Nuclear Reactor Analysis.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 205C. The physical concepts and mathematical techniques used in the analysis of nuclear reactors. The Staff

**245A-245B. Nuclear Reactor Systems. (3-3) I-II.**

Lecture—3 hours. Prerequisite: course 240A. Those aspects of fluid dynamics, thermodynamics, heat transfer, and thermal stress analysis that apply to the engineering design of nuclear reactors. Radiation shielding, fuel cycles, and isotope separation. The Staff

**246. Nuclear Explosives: Phenomenology. (3) II.**

Lecture—3 hours. Prerequisite: Mathematics 220A. The phenomenology of nuclear explosives; the theoretical and empirical laws for such effects; the scientific uses of such phenomena. Offered in odd-numbered years. The Staff

**260A-260B. Statistical Theory of Equilibrium and Transport Phenomena. (3-3) I-II.**

Lecture—3 hours. Prerequisite: courses 120B and 205A. Statistical mechanical formulation of thermodynamics with application to the various states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals. The Staff

**\*271. Electrodynamics of Continuous Media. (3) I.**

Lecture—3 hours. Prerequisite: course 230A; Electrical Engineering 230A; Chemistry 110A. Solutions of Maxwell's equations in continuous media. Stresses and mechanical potentials of matter in constant and time varying fields. Thermodynamically based phenomenological description of electromagnetic fields in matter. Quantum mechanical interpretation of the properties of conductive and dispersive media. Mr. Chilton

**280A-280B. Plasma Kinetic Theory with Applications. (3-3) II, III.**

Lecture—3 hours. Prerequisite: Electrical Engineering 240 or consent of instructor. Plasma kinetic equations; steady state solutions-plasma sheaths; linear plasma waves-Landau damping, plasma echoes, and beam-plasma interactions; nonlinear effects, large amplitude waves, plasma turbulence, shocks, and wave-particle interactions. Stability problems in controlled thermonuclear fusion. The Staff

**290. Seminar. (1-2) I, II, III.**

Seminar—2 hours. (Satisfactory/Unsatisfactory grading only.) The Staff (Chairman in charge)

**298. Group Study. (1-5) I, II, III.**

Lecture—1-5 hours. Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics. The Staff (Chairman in charge)

**299. Research. (1-12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

\* Not to be given, 1972-73.



**Livermore****Upper Division Courses****105. Special Topics in Applied Science. (2) I.**

Lecture—2 hours. Use of laws and concepts covered in undergraduate curricula in applied science. The variety of subjects covered will include problems of space physics, a discussion of gravity and capillary waves, and some problems in optics such as lasers. Mr. Teller

**\*110A. Vectors and Tensors. (4) I.**

Lecture—4 hours. Prerequisite: ordinary differential equations. Algebra and calculus of finite and infinite dimensional vectors; orthonormal functions; introduction to linear equations. Mr. Marx

**\*110B. Complex Variables and Calculus of Variations. (4) II.**

Lecture—4 hours. Prerequisite: course 110A. Analytic functions; contour integrals; power series, conformal mapping; Laplace transform; calculus of variations. Mr. Marx

**\*110C. Linear Equations. (4) III.**

Lecture—4 hours. Prerequisite: course 110B. Solution of linear algebraic, differential, and integral equations by orthonormal expansion and Green's functions; approximation methods. Mr. Marx

**115. Introduction to the Use of Computers. (3) I.**

Lecture—3 hours. Prerequisite: Engineering 5A; Mathematics 22B. Lectures and laboratory work on electronic computers and their application to engineering problems. Mr. Wood

**120A–120B. Chemistry for Physicists and Engineers. (3–3) I–II.**

Lecture—3 hours. Prerequisite: Chemistry 1C; Mathematics 22B. Concepts of chemistry and physical chemistry, including atomic and molecular structure and the properties of liquids and solids. Mr. Borg

**135A. Introductory Nuclear Science and Technology. (3) I.**

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, electrons, and heavy particles with matter; energy loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes. Mr. Bloom

**135B–135C. Introductory Nuclear Science and Technology. (2–2) II–III.**

Lecture—2 hours. Prerequisite: course 135A. Radiation detection, charged particle technology, radiation chemistry, neutron technology, magnetic moment and spin measurement, vacuum technology. Mr. Bloom

\* Not to be given, 1972–73.

**Graduate Courses****205A. Mathematical Methods. (3) I.**

Lecture—3 hours. Prerequisite: introductory courses in ordinary differential equations, vector analysis, infinite series, and functions of a complex variable. Calculus of finite and infinite dimensional vector spaces; orthonormal functions; linear equations. Applications of these analytical techniques to physical systems. Mr. Harrach

**205B. Mathematical Methods. (3) II.**

Lecture—3 hours. Prerequisite: course 205A 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. Mr. Harrach

**205C. Mathematical Methods. (3) III.**

Lecture—3 hours. Prerequisite: course 205B or equivalent. Eigenvalue problems; solution of linear differential and integral equations by expansions in orthonormal functions; Green's functions; approximation methods; applications to physical systems. Mr. Harrach

**210A–210B–210C. Methods of Computational Physics. (3–3–3) I–II–III.**

Lecture—3 hours. Prerequisite: course 205C. Classification of partial differential equations, elliptic and hyperbolic equations, initial value problems in two or more independent variables, difference and Monte Carlo methods; applications to problems in hydrodynamics, magnetohydrodynamics, shock waves, transport theory, and plasma physics. Mr. Killeen

**211. Computer Mathematics. (3) I.**

Lecture—3 hours. Prerequisite: course 205C; course 115 (may be taken concurrently). Review and survey of mathematical fields fundamental to computer science. Theory of sets, Boolean algebra and propositional calculus, predicate calculus, probability and statistics, mathematical programming, general number systems. Mr. Fletcher

**212A–212B. Computer Languages. (3–3) II–III.**

Lecture—3 hours. Prerequisite: course 211. The basic tools in the use of computers for processing data are covered. These include common subroutines such as sorting and filing, assemblies and relocatable codes, algorithmic notations and construction of algorithms. Considerations evolving from special hardware are discussed. Mr. Fletcher

**213. Switching Theory. (3) II.**

Lecture—3 hours. Prerequisite: course 211. Minimization techniques, switching function realization with electronic circuits, trees, storage devices, and elementary sequential machines. Offered in odd-numbered years. Mr. Fletcher

**214. Computing with Symbolic Expressions. (3) I.**

Lecture—3 hours. Prerequisite: course 211. Theory and practice of computing with symbolic expressions. The LISP programming language, function composition, conditional expressions, recursive functions. Writing programs to manipulate symbolic expressions. Interpreters, compilers, proving the equivalence of algorithms. Survey of symbol manipulation languages.

Mr. Fletcher

**215. Artificial Intelligence. (3) II.**

Lecture—3 hours. Prerequisite: course 211. An organized description of attempts to get computers to behave intelligently. Programs play games, solve problems, prove theorems, and deduce answers to questions from given facts. Programs that learn to make evaluations and to recognize patterns.

Mr. Fletcher

**216. Automata Theory. (3) III.**

Lecture—3 hours. Prerequisite: course 212A. This course will cover the elements of finite automata including models, graphical and table representation, equivalence, minimization, identification. Time permitting, infinite automata will be introduced and computability discussed.

Mr. Fletcher

**220. Physical Chemistry of Solids. (3) III.**

Lecture—3 hours. Prerequisite: courses 120B, 260B. Equations of state—heterogeneous equilibria—phase diagrams—two-body potential functions, the Debye model statistical thermodynamics of solid solutions, phase transformations and order—disorder phenomena—surface thermodynamics.

Mr. Borg

**221A–221B–221C. Materials Science. (3–3–3) I–II–III.**

Lecture—3 hours. Prerequisite: courses 120B, 260B. The 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.

Mr. Borg, Mr. Guinan

**230A–230B–230C. Structure of Matter.**

(3–3–3) I–II–III.

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.

Mr. Sahlin

**233A–233B–233C. Theory and Applications of Solid State Physics. (3–3–3) I, II, III.**

Lecture—3 hours. Prerequisite: course 230A–230B–230C or equivalent. Structure and properties of crystals; theory of dielectrics, metals and alloys; magnetism, superconductivity, and

semiconductors. Applications to various solid state devices.

Mr. Wooten

**235A–235B. Nuclear Physics. (3–3) II–III.**

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.

Mr. Bloom

**237A–237B. Neutron Physics. (3–3) II–III.**

Lecture—3 hours. Prerequisite: course 135A. Properties of neutrons, cross-sections and nuclear structure, fast neutrons, neutron resonances, fission process, thermal neutrons, neutron optics, diffraction, applications of neutron diffraction and optics to studies of the structure of matter. Offered in odd-numbered years.

Mr. Mark

**239A–239B. Nuclear Chemistry. (3–3) II–III.**

Lecture—3 hours. Prerequisite: course 135A. Radiochemistry as an analytical technique in the study of chemical and nuclear processes: activation analysis, fission, properties of the actinides, current theories of the properties of the transactinides, radiolysis, "hot atom" chemistry, and mechanisms of biological radiation damage. Offered in even-numbered years.

Mr. Read

**255. Classical Mechanics. (3) I.**

Lecture—3 hours. Prerequisite: consent of instructor. General principles of analytical mechanics; variational principles; Lagrange's and Hamilton's equations; kinematics; collisions.

Mr. Walton

**256. Continuum Mechanics. (3) II.**

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.

Mr. Walton

**257. Magnetohydrodynamics. (3) III.**

Lecture—3 hours. Prerequisite: course 270B. Fundamental MHD equations, MHD waves (both linear and nonlinear), shocks, Lagrangian formulation; theory of stability, gyroscopic effects, finite-resistivity effects.

Mr. Newcomb

**260A–260B. Statistical Theory of Equilibrium and Transport Phenomena. (3–3) III–I.**

Lecture—3 hours. Prerequisite: courses 120B and 205A. Statistical mechanical formulation of thermodynamics with application to the various states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals.

Mr. Hoover

**262. Advanced Statistical Thermodynamics. (3) II.**

Lecture—3 hours. Prerequisite: course 260B. Formulation of thermodynamics of many-component systems through the grand partition function. Distribution functions. Cluster expansion

and condensation. Monte Carlo. Molecular dynamics. Mr. Hoover

**263. Material Properties at High Pressures and Temperatures. (3) III.**

Lecture—3 hours. Prerequisite: course 262. Theory of the properties of matter at extremely high pressure and temperatures. Terrestrial and astrophysical applications. Mr. Keeler

**265A-265B-265C. Theory and Applications of Lasers. (3-3-3) I, II, III.**

Lecture—3 hours. Prerequisite: course 230C or equivalent and 270B or equivalent. Theory of lasers, properties of laser systems, electro-optical devices. Interaction of light with matter, laser spectroscopy, nonlinear optics. Theory of the coherent photon field, Fourier optics, holography, application of lasers in technology. Messrs. Yeh, Keeler, Leppelmeier

**270A-270B-270C. Electromagnetic Theory. (3-3-3) II-III-I.**

Lecture—3 hours. Prerequisite: Electrical Engineering 131B; ordinary differential equations. Electromagnetic field theory; physical properties of dielectrics and conductors; magnetic properties of materials, steady and quasi-steady currents, propagation of electromagnetic waves in vacuum and through matter. Mr. Marx

**275A-275B-275C. Plasma Physics. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 270C.

The basic equations governing the behavior of a fully ionized plasma in a magnetic field; simple plasma configurations in controlled fusion research and space applications. Theory of plasma waves and instabilities. Transport coefficients and radiation phenomena. Mr. Johnson

**285A-285B-285C. Advanced Plasma Physics. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 275C. Plasma kinetic theory; applications of the Fokker-Planck equation; advanced instability theory. Practical problems of plasma production and confinement. Nonlinear and relativistic effects including quasi-linear theory, relativistic beams, synchrotron radiation and laser heating of plasmas. Computer simulation of plasma phenomena. Mr. Post

**290. Seminar. (1-2) I, II, III.**

Seminar—1-2 hours. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**298. Group Study. (1-3) I, II, III.**

Lecture—1-3 hours. Such topics as computer science, plasma physics, materials science, laser applications, bio-medicine.

The Staff (Chairman in charge)

**299. Research. (1-12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

## ENGINEERING: CHEMICAL

Richard L. Bell, Ph.D., *Chairman of the Department*  
Department Office, 3092 Bainer Hall

*Professors:*

J. M. Smith, Sc.D.

Stephen Whitaker, Ph.D.

*Associate Professor:*

Richard L. Bell, Ph.D.

*Assistant Professors:*

Neil A. Dougharty, Ph.D.

Alan P. Jackman, Ph.D.

Benjamin J. McCoy, Ph.D.

**Lower Division Courses**

**1. The Scope of Chemical Engineering. (1) II.**

Lecture—1 hour; discussion—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, and service to society. (Passed/Not Passed grading only.) The Staff (Chairman in charge)

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. Group

study of selected topics. Students may enroll in more than one section.

The Staff (Mr. Bell in charge)

**99. Special Study for Undergraduates.**

(1-5) I, II, III.

Prerequisite: consent of instructor. (Passed/Not Passed grading only.)

The Staff (Mr. Bell in charge)

**Upper Division Courses**

**150A. Chemical Engineering Fluid Mechanics.**

(3) II.

Lecture—3 hours. Prerequisite: Engineering 102A. Fluid statics and one-dimensional laminar flows. Kinematics of point and integral functions. The stress vector-stress tensor relation. Newton's law of viscosity and application of the Navier-Stokes equations to laminar flow and dimensional analysis. Flow of non-Newtonian fluids. Students electing this course may not receive credit for Engineering 103A. Mr. Bell

**150B. Chemical Engineering Fluid Mechanics.**

(3) III.

Lecture—3 hours. 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. Students electing this course may not receive credit for Engineering 103B.

Mr. Bell

**151. Material and Energy Balances. (3) I.**

Lecture—3 hours. Prerequisite: Chemistry 110A (may be taken concurrently). Use of principles of conservation of mass and energy in chemical process calculations.

Mr. Whitaker

**152A. Chemical Engineering Thermodynamics. (3) II.**

Lecture—3 hours. Prerequisite: course 151; Chemistry 110A. Application of principles of thermodynamics to chemical processes.

Mr. Smith

**152B. Chemical Engineering Thermodynamics.**

(3) III.

Lecture—3 hours. Prerequisite: course 152A. Continuation of course 152A.

Mr. Smith

**153. Chemical Engineering Heat Transfer. (4) III.**

Lecture—4 hours. Prerequisite: course 150A. Steady and transient heat conduction. The thermal energy equation, analysis of forced and free convective heat transfer. Turbulence, macroscopic balances, and heat transfer coefficients. The photon transport equation and radiant energy exchange. The design of heat exchangers.

Mr. McCoy

**154A. Mass Transfer. (3) I.**

Lecture—3 hours. Prerequisite: Mechanical Engineering 186 (may be taken concurrently); Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

Mr. McCoy

**154B. Applications of Mass Transfer. (3) II.**

Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation and other separation processes.

Mr. Bell

**155A. Chemical Engineering Laboratory. (2) II.**

Laboratory—6 hours. Prerequisite: course 154B (may be taken concurrently). Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

Mr. Bell

**155B. Chemical Engineering Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: course 155A. Continuation of course 155A.

Mr. Bell

**156A. Chemical Engineering Kinetics. (3) II.**

Lecture—3 hours. Prerequisite: course 152B,

154A; and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

Mr. Dougharty

**156B. Chemical Engineering Kinetics. (3) III.**

Lecture—3 hours. Prerequisite: course 156A. Continuation of course 156A.

Mr. Dougharty

**157. Chemical Engineering Process Dynamics.**

(4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 154B and 156A. A study of stability and the transient state of chemical processing systems.

Mr. Jackman

**158. Chemical Engineering Process Design. (3) III.**

Lecture—3 hours. Prerequisite: courses 154B and 156A. Chemical Engineering process design; optimization and economics.

Mr. McCoy

**159. Chemical Engineering Analysis. (3) I.**

Lecture—3 hours. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus.

Mr. Jackman

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. Selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.

The Staff (Mr. Bell in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

Prerequisite: consent of instructor. (Passed/Not Passed grading only.)

The Staff (Mr. Bell in charge)

**Graduate Courses****252A. Advanced Thermodynamics. (3) I.**

Lecture—3 hours. Prerequisite: course 152B or Engineering 105B. A general treatment of the first and second laws; applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

Mr. Smith

**252B. Advanced Thermodynamics. (3) II.**

Lecture—3 hours. Prerequisite: course 252A. Continuation of 252A with an emphasis on statistical thermodynamics.

Mr. Dougharty

**253A. Advanced Transport Phenomena. (4) I.**

Lecture—4 hours. Prerequisite: Mechanical Engineering 186. Tensor and vector methods in the formulation of equations of mass, momentum, energy, and entropy in continuous media with particular emphasis on fluids. Applications to the formulation of rheological equations of state for viscoelastic fluids and fluid interfaces.

Mr. McCoy

**253B. Advanced Transport Phenomena. (4) II.**

Lecture—4 hours. Prerequisite: course 253A. Continuation of course 253A, with application to both differential and integral mass, momentum, and energy balances. Radiant energy transport and heat transfer in reacting systems.

Mr. Jackman

**253C. Advanced Transport Phenomena. (3) III.**

Lecture—3 hours. Prerequisite: course 253B. Continuation of course 253B with special emphasis on multicomponent systems. The laws of molecular diffusion and energy transport, including the effects of concentration, temperature, electric and pressure fields. Convective mass transfer and chemically reacting flows.

Mr. Bell

**254. Molecular Theory of Transport Phenomena.**

(3) II.

Lecture—3 hours. The transport of mass, momentum, and energy is considered from the molecular point of view. Derivations of the Boltzmann equation are considered, and solutions for special cases are discussed. Methods for calculating transport coefficients are presented.

Mr. McCoy

**255A–255B. Separation Processes. (3–3) III–I.**

Lecture—3 hours. Prerequisite: course 154B or equivalent; course 253C (concurrently) or consent of instructor. Analysis and design of chemical separation processes: adsorption, chromatography, reverse osmosis, dialysis, absorption, aerosol and colloid processes. Advances in distillation, extraction, crystallization, evaporation, drying, cooling, and humidification. Emphasis on petrochemical processes and pollution abatement design.

Mr. McCoy

**256A. Applied Kinetics and Reactor Design. (3) II.**

Lecture—3 hours. Prerequisite: courses 156B and 252A. Application of kinetics and molecular transport rates to the design of chemical reactors, with emphasis on homogeneous systems.

Mr. Dougharty

**256B. Applied Kinetics and Reactor Design. (3) III.**

Lecture—3 hours. Prerequisite: course 256A. Continuation of course 256A, with emphasis on convective transport and heterogeneous catalytic systems.

Mr. Smith

**257. Rheology of Fluids. (3) III.**

Lecture—3 hours. Prerequisite: course 253A. Non-Newtonian and viscoelastic behavior of polymer materials, suspensions and emulsions. Continuum theories of stress equations for materials with and without memory. Solution of simple boundary value problems and the evaluation of rheological experiments.

Mr. Whitaker

**258. Chemical Process Dynamics. (3) I.**

Lecture—3 hours. Prerequisite: courses 154B, 156B. Unsteady-state process analysis, examples of first and second order process systems, coupling of mixed order processes including chemical reaction kinetics, mass and heat transfer and fluid mechanics, simulation of chemical processes.

Mr. Bell

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**298. Group Study. (1–5) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1–12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**ENGINEERING: CIVIL**

Leonard R. Herrmann, Ph.D., *Chairman of the Department*  
Department Office, 2092 Bainer Hall

**Professors:**

Jaime Amoroch, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Don O. Brush, Ph.D.

Robert H. Burgy, M.S. (*Civil Engineering and Water Science and Engineering*)

Leonard R. Herrmann, Ph.D.

Ray B. Krone, Ph.D.

James N. Luthin, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Gerald T. Orlob, Ph.D.

Verne H. Scott, Ph.D. (*Civil Engineering and Water Science and Engineering*)

**Associate Professors:**

Kandiah Arulanandan, Ph.D.

James A. Cheney, Ph.D.

James R. Hutchinson, Ph.D.

<sup>1</sup>Bruce E. Larock, Ph.D.

Edward D. Schroeder, Ph.D.

Theodor S. Strelkoff, Ph.D., (*Civil Engineering and Water Science and Engineering*)

George Tchobanoglous, Ph.D.

**Assistant Professors:**

Melvin R. Ramey, Ph.D.

Karl M. Romstad, Ph.D.

Chih-Kang Shen, Ph.D.

Michael A. Taylor, Ph.D.

**Lower Division Courses****1. The Civil Engineer in Society. (1) I.**

Lecture—1 hour. A description of the field

<sup>1</sup>Absent on leave, 1972–73.

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. (Passed/Not Passed grading only.)

The Staff (Mr. Ramey in charge)

### 10. Introduction to Surveying. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: lower division standing in the College. 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.

Mr. Tchobanoglous

### 98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor; lower division standing. Group study of selected topics.

The Staff (Mr. Krone in charge)

### 99. Special Study for Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor; lower division standing. (Passed/Not Passed grading only.)

The Staff (Mr. Krone in charge)

#### Upper Division Courses

### 131. Structural Analysis. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Structural analysis of determinate and indeterminate beams, trusses and frames; influence lines, moving loads, deflection analysis. Mr. Romstad

### 132A. Structural Design: Metallic Elements. (3) II, III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metallic beams, columns, other members; analysis and design of riveted, bolted, and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

Mr. Romstad

### 132B. Structural Design: Concrete Elements. (3) I, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 132A (may be taken concurrently). Reinforced concrete beams, columns, slabs, and footings; elastic theory and ultimate design. Introduction to prestressed concrete and plastics. Mr. Taylor

### 132C. Structural Design: Timber Elements. (2) III.

Lecture—2 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

Mr. Ramey

### 133. Matrix Structural Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 131 or 135. General force and displacement methods of structural analysis using matrix methods.

Applications to civil and aerospace structures.

Mr. Romstad

### 134. Analysis and Design of Buildings. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131, 132B. Vertical dead and live loading; earthquake and wind forces. Building code and structural requirements for the use of timber, steel frame, reinforced concrete, and brick. Supervised classroom design.

Mr. Taylor

### 135. Aerospace Structures. (3) III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Analysis of stiffened and unstiffened shell structures; analysis of statically indeterminate box beams, rings and arches. Buckling of flat plates and shells.

Mr. Cheney

### 136. Properties of Concrete. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 45, Chemistry 4B. Introduction to the chemistry and physics of cement hydration; cements of different types; properties of hardened cement and concrete including strength, elasticity, shrinkage, and creep, and the influence of aggregates, environment, etc., upon these properties. Concrete mix design.

Mr. Taylor

### 137. Construction Principles. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in engineering. A study of the construction industry; its form, evolution, and methods of operation; fundamental principles underlying construction practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

Mr. Taylor

### 138. Dynamic Loads on Stationary Structures. (3) II.

Lecture—3 hours. Prerequisite: course 131; Engineering 102B, 103B. Determination of loads on structures due to base movements (earthquakes), steady and non-steady aerodynamic forces (wind and blast), and impact and vibration forces; comparison of dynamic loads with stationary loads and determination of equivalent load factors. Mr. Hutchinson

### 141. Engineering Hydromechanics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B. Application of principles of mechanics to flows of heavy, incompressible fluids. Flow visualization, configuration of free surfaces, streamlines, flow nets, separation, cavitation; pressure distribution in non-uniform, unsteady flow; turbulence; surface and form drag; conduit flow. Engineering approximations.

Mr. Strelkoff

### 142. Water Supply. (3) I, II.

Lecture—3 hours. Prerequisite: Engineering 103B (may be taken concurrently), or consent of instructor. Study of surface and ground water supplies; analysis for prediction of surface and



ground water yields; water requirements; water supply and distribution systems including dams, reservoirs, wells, pumping plants, open channels, and pipe lines; water treatment methods and processes. Mr. Schroeder

#### 143. Water Resources Engineering. (3) II.

Lecture—3 hours. Prerequisite: course 142. Basic concepts of water resources planning; water inventories, use, and control; water conservation measures and legislation; multiple-purpose project planning; domestic and foreign water development projects; simulation, optimization, and dynamic programming studies.

Mr. Scott

#### 144. Groundwater and Seepage. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103B. Elements of seepage through porous media, water chemistry, basic equations of groundwater flow, application to seepage under dams, drainage of airports and agricultural lands, well exploration and design. Reclamation procedures.

Mr. Luthin

#### 145. Hydraulic System Design. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103B. Principles of project planning; methods of analysis and hydraulic design of storage systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power, and flood control projects.

Mr. Larock

#### 146. Hydraulic Engineering Laboratory. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Engineering 103B (may be taken concurrently). Experimental analysis of flow about hydraulic structural elements such as gates, weirs, orifices, spillways and energy dissipators; centrifugal pump; open channel wave motion; measurements and instrumentation.

Mr. Burgy

#### 147. Solid and Radioactive Waste Management.

(3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103B. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment. Origin, nature, and management of radioactive wastes.

Mr. Tchobanoglous

#### 148. Waterborne Waste Management. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Introduction to industrial and domestic waterborne waste collection and treatment systems; methods of treated waste release.

Mr. Schroeder

#### 149. Air Pollution Control. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103A. Origins, characteristics, and amounts of air pollutants; atmospheric reactions and behavior of airborne wastes; methods of control.

Mr. Schroeder

#### 160. Highway Engineering. (3) III.

Lecture—3 hours. Prerequisite: course 171; senior standing in engineering. Highway planning, economy, surveys and plans; highway design to include highway capacity, cross section, vertical and horizontal alignment, intersections and drainage. Highway construction, grading and pavements.

Mr. Shen

#### 171. Soil Mechanics. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 104A (may be taken concurrently). Soil formations, mass-volume relationships, principle of effective stress, soil characteristics (classification and identification), compaction, capillarity and permeability, compressibility and consolidation, strength—state of stress and failure criteria.

Mr. Arulanandan

#### 172. Soil Properties, Soil Behavior and Engineering Applications. (2) I, III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171 (may be taken concurrently). Detailed study of the physical and mechanical properties of soils, including experimental determination of these properties and their engineering applications. Introduction to physicochemical principles and influence of physicochemical factors on soil behavior.

Mr. Shen

#### 173. Soil Mechanics and Foundation Design. (4) II.

Lecture—4 hours. Prerequisite: courses 132B and 171. Site exploration, bearing capacity, footing design, lateral earth pressures, retaining walls, slope stability, theory of consolidation and application of foundation design, methods of minimizing settlements and effect of settlement on structures.

Mr. Shen

#### 174. Nuclear Civil Engineering Laboratory. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing in engineering. Phenomenology and potentials of nuclear explosives as a construction tool. Hazards associated with underground detonation. Laboratory experiments on radioisotope transport in groundwater, cratering with explosives, and slope stability. Offered in odd-numbered years.

Mr. Cheney, Mr. Talley

#### 175. Introduction to Geologic Engineering. (3) III.

Lecture—2 hours; laboratory—3 hours. Introduction to the principles of geology, and study of geologic features that affect engineering structures. Discussion of geological aspects of engineering construction problems by means of case history studies.

Mr. Shen

#### 177. Steady Flow in Open Channels. (3) II.

Lecture—3 hours. Prerequisite: course 141; Mathematics 22B, 22C. Recommended: a short

course in Fortran programming (may be taken concurrently). Backwater curves; qualitative surface profiles; free surface flow; resistance in uniform flows; gradually and rapidly varied flows; critical depth; supercritical flows. Analytical and digital-computer solutions. Offered in odd-numbered years. Mr. Strelkoff

#### 181. Plastic Analysis of Structures. (3) I.

Lecture—3 hours. Prerequisite: course 132A. Structural behavior in the plastic range; methods of predicting strength and deformation in the inelastic range; analysis and design of continuous beams and frames; rules of practice for plastic design of structures. Mr. Romstad

#### 182. Prestressed Concrete. (3) II.

Lecture—3 hours. Prerequisite: course 132B. Analysis and design of prestressed concrete structures; statically determinate and indeterminate structures; principles and applications of ultimate strength; applications to buildings, bridges and tanks. Mr. Taylor

#### 198. Directed Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: consent of instructor. Selected topics. Students may enroll in one or more separate sections.

The Staff (Mr. Krone in charge)

#### 199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: senior standing in engineering and at least a B average. (Passed/Not Passed grading only.) The Staff (Mr. Krone in charge)

#### Graduate Courses

#### 225. Theory of Elasticity. (3) II.

Lecture—3 hours. Prerequisite: Engineering 187. Tensor formulation of the elastic field equations. Variational principles. Introduction to nonlinear elasticity. Approximate and exact solutions for plane stress and plane strain problems. Introduction to three-dimensional problems. Offered in even-numbered years.

Mr. Hutchinson

#### 226A. Theory of Elastic Stability. (3) II.

Lecture—3 hours. Prerequisite: Engineering 187. Basic concepts of the stability of elastic systems. Adjacent-equilibrium and minimum potential energy theories of stability. Application to bars, frames, and rings. Offered in even-numbered years. Mr. Brush

#### 226B. Theory of Elastic Stability. (3) III.

Lecture—3 hours. Prerequisite: courses 226A, 227. Continuation of course 226A. Application to plates and shells. Offered in even-numbered years. Mr. Brush

#### 227. Theory of Plates. (3) II.

Lecture—3 hours. Prerequisite: Engineering 187. Stress and deformation analysis of plates

bent by transverse loads; applications to circular, rectangular, and other shapes.

Mr. Herrmann

#### 228. Theory of Shells. (3) III.

Lecture—3 hours. Prerequisite: Engineering 187. Direct stresses in shells with axial symmetry. Applications to shell roofs, tanks, cylindrical shells, pipelines; bending stresses in shells. Offered in odd-numbered years. Mr. Brush

#### 229. Theory of Plasticity. (3) III.

Lecture—3 hours. Prerequisite: Engineering 187. Fundamentals of plasticity, the concept of yield and the associated constitutive equations in the theory of elastic-plastic solids. Variational theorems, the piecewise linear loading functions and related minimum principles. Application to earth structures, torsion and plane problems of plasticity. Offered in odd-numbered years.

Mr. Hutchinson

#### 230. Theory of Viscoelasticity. (3) III.

Lecture—3 hours. Prerequisite: Engineering 187. Fundamentals of viscoelasticity, representation of linear viscoelastic material behavior in integral and differential operator forms. Application to earth structure, buckling, plane and axisymmetric problems. Introduction to nonlinear viscoelasticity. Offered in even-numbered years.

Mr. Herrmann

#### 231. Advanced Analysis Procedures in Solid Mechanics. (4) I.

Lecture—4 hours. Prerequisite: course 133, Engineering 187 (may be taken concurrently). Fundamentals of the finite element and related procedures. Application to torsion, plane stress, plane strain, axisymmetric, plate and shell bending, thermal stress and soil mechanics problems. Consideration of inelastic and nonlinear problems.

Mr. Herrmann

#### 240. Water Quality. (3) I.

Lecture—3 hours. Prerequisite: course 141, Chemistry 110A (may be taken concurrently). Water quality requirements for domestic, industrial, agricultural, and recreational and wild-life water uses; properties of natural surface and groundwaters; transport and fates of waterborne pollutants; methods of analysis. Mr. Orlob

#### 241. Land Quality. (2) II.

Lecture—2 hours. Prerequisite: Chemistry 110A. Factors determining land quality for use in man's activities; land modification for temperature control; out-of-doors noise and its control; interrelations of land and vegetation on qualities of air and water. Mr. Krone

#### 242. Air Quality. (3) III.

Lecture—3 hours. Prerequisite: Engineering 105A; Chemistry 110A recommended. Properties of the air and the atmosphere; atmospheric phenomena; factors determining air quality;



origins, transport and degradation of atmospheric pollutants; effects of pollutants on man, plants, soil, and water. Mr. Krone

#### 243A. Water and Waste Treatment. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B; courses 148, 149 recommended. Characteristics of water- and airborne-wastes; treatment processes and process kinetics; treatment system design. Mr. Tchobanoglous

#### 243B. Water and Waste Treatment. (3) II.

Lecture—3 hours. Prerequisite: course 243A. Continuation of course 243A. Mr. Tchobanoglous

#### 243C. Water and Waste Treatment Laboratory.

(2) III.

Laboratory—6 hours. Prerequisite: course 243B. Operation of model treatment units; measurements of waste and process effluent characteristics; evaluation of process parameters. Mr. Tchobanoglous

#### 244. Environment Quality Management. (2) III.

Lecture—2 hours. Prerequisite: courses 240, 241, 242 (may be taken concurrently). Fates of pollutants in the overall environment; requirements for environment quality; monitoring methods; environment quality control methods. Mr. Orlob, Mr. Krone

#### 247. Nuclear Civil Engineering. (3) III.

Lecture—3 hours. Prerequisite: Applied Science 246. The engineering uses of nuclear explosives; earthmoving for canals, harbors, highways and water resource development; mining; petroleum; desalinization. Offered in odd-numbered years. Mr. Cheney

#### 251. Advanced Matrix Structural Analysis. (3) III.

Lecture—3 hours. Prerequisite: course 133. Analysis of indeterminate structures by displacement and force methods; development of large-capacity computer program for frameworks; treatment of tapered and curved members and semi-elastic connections; emphasis on efficient digital-computer solutions; introduction to matrix stability analysis and structural optimization. Mr. Romstad

#### 252. Advanced Topics in Metal Structures. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor. Residual stresses, recent developments in welded structures and high-strength bolt connections, light gage and alloy steels, aluminum and other metals; aerospace structures, three dimensional space frames. Offered in odd-numbered years. Mr. Ramey

#### 253. Advanced Topics in Concrete Structures.

(3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Advanced analysis and design of concrete folded plates, thin shells and gravity

dams; yield line theory; lift slabs; effects of shrinkage and creep upon stress and deflection. Mr. Taylor

#### 257. Analysis of Structures under Dynamic

Loading. (3) I.

Lecture—3 hours. Prerequisite: course 138. Analysis of earthquake and blast resistant structures; method of lateral forces; current research about earthquake and blast loading and structural effects. Offered in even-numbered years. Mr. Hutchinson

#### 271. Advanced Topics in Surface Water Hydrology.

(2) III.

Lecture—2 hours. Prerequisite: course 142; Water Science 141; consent of instructor. Analysis of hydrologic processes and procedures in water supply investigations including topics in atmospheric relationships, research methods, water balances, and water yield prediction methods. Offered in odd-numbered years. Mr. Burgy

#### 272. Groundwater Flow and Seepage. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Flow of fluids through porous media. Anisotropy. Solution of steady state problems by: mathematical analysis, models, analogs, graphical methods. Dupuit-Forchheimer assumptions. Method of images. Boussinesq's equation for transient problems, solution by Laplace transform. Seepage under dams. Mr. Luthin

#### 273. Groundwater Hydrology. (3) III.

Lecture—3 hours. Prerequisite: course 272. Analyses and methods of groundwater development; geophysical exploration and analysis; artificial recharge concepts; hydraulics of wells, including analytical treatment of transient flow problems; and problems of well design. Numerical and experimental methods of groundwater flow. Mr. Scott

#### 274. Hydraulics of Pipe Lines. (3) I.

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently); Engineering 5A or equivalent, or consent of instructor. Mechanics of liquid flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Introduction to stability and resonance phenomena. Offered in even-numbered years. Mr. Larock

#### 275. Stochastic Hydrology. (2) III.

Lecture—2 hours. Prerequisite: course 142 or Water Science 141 or equivalent. Application of modern statistical analysis in hydrology: time series analysis, stochastic models, simulation by Monte Carlo methods, statistical assessment of predictive capacity of models. Mr. Amoroch

#### 276. Hydrologic Systems Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 142 or Water Science 141 or equivalent; Mathe-

matics 22A, 22B, 22C, 24. Theory and application of the methods of modern systems analysis and mathematical statistics to problems of hydrological prediction. Emphasis on current developments in parametric and stochastic hydrologies. Mr. Amorcho

### 277. Unsteady Flow in Open Channels. (3) III.

Lecture—3 hours. Prerequisite: course 177, short course in Fortran programming. Long waves in open-channel systems; Saint-Venant equations; method of characteristics; explicit and implicit finite-difference solutions, stability of numerical schemes, double-sweep method; influence of hydraulic structures; flood routing; bores; dam break; long waves in two-space dimensions. Mr. Strelkoff

### 278. Hydrodynamics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 24, 185A; Mechanical Engineering 185. Recommended: a short course in Fortran programming (may be taken concurrently). General equations of continuity, momentum, and energy. Stream functions; velocity potential; conformal mapping. Direct solutions for irrotational flow around bodies and in conduits; gravitational effects. Offered in even-numbered years. Mr. Larock

### 279. Advanced Mechanics of Fluids. (4) I.

Lecture—4 hours. Prerequisite: Mathematics 22B, 22C, 24; Mechanical Engineering 185. Rotational flows. Navier-Stokes equations and solutions for laminar, viscous flows; turbulent flow and Reynolds equations, isotropy simplification, diffusion, phenomenological theories; the boundary layer approximation. Offered in odd-numbered years. Mr. Larock

### 281A. Advanced Soil Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 173. Theories of consolidation, secondary compression, stress distribution, bearing capacity, lateral earth pressures, shear strength, yielding of soils, creep, effect of type of compaction on the behavior of compacted clays. Mr. Arulanandan

### 281B. Advanced Soil Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 281A. Theories of slope stability. Analysis of slope stability problems for static and dynamic loading conditions. Anisotropic stress conditions in

soils. Lateral earth pressure theories. Design of anchored bulkheads. Mr. Arulanandan

### 282. Advanced Soil Laboratory. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 281A. Subsurface exploration, advanced laboratory techniques including consolidation, shear strength, pore water pressure measurement, electrical properties measurement, pavement design tests, field strength and load bearing tests. Mr. Shen

### 283. Physicochemical Properties of Soils and Soil Behavior. (3) I.

Lecture—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. Conduction phenomena, deformation mechanisms, strength, swelling, compaction. Microscopic theories to explain yielding of soils. Mr. Arulanandan

### 285. Pavement Design and Soil Stabilization. (3) II.

Lecture—3 hours. Prerequisite: course 171 or equivalent. Principles and methods of pavement design for highway and airport pavements; purposes, principles, and methods of soil stabilization and design of stabilized pavement layers. Offered in even-numbered years. Mr. Arulanandan

### 286. Seepage and Earth Dams. (3) II.

Lecture—3 hours. Prerequisite: course 171 or equivalent. Groundwater flow around dams; principles of earth dam design, types of failure, and design and construction procedures. Offered in odd-numbered years. Mr. Arulanandan

### 290. Seminar. (1) I, III.

Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. (Satisfactory/Unsatisfactory grading only.) Mr. Krone

### 298. Group Study. (1-5) I, II, III.

Lecture—1-5 hours.  
The Staff (Mr. Krone in charge)

### 299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Krone in charge)

## ENGINEERING: ELECTRICAL

Herschel H. Loomis, Jr., Ph.D., *Chairman of the Department*  
Department Office, 3118 Bainer Hall

### Professors:

Herman J. Fink, Ph.D.  
Sanjit K. Mitra, Ph.D.  
John B. Powers, Ph.D.  
Ronald F. Soohoo, Ph.D.

### Associate Professors:

Vidal R. Algazi, Ph.D.  
Tien C. Hsia, Ph.D.  
Jack W. LaPatra, Ph.D.

<sup>1</sup> Absent on leave, 1972-73.

Herschel H. Loomis, Jr., Ph.D.  
Earle W. Owen, D.Sc.

*Assistant Professors:*

John N. Churchill, Ph. D.  
Lansing Hatfield, Ph.D.  
Hartley J. Jensen, Ph.D.  
Edward W. Kozdrowski, Ph.D.  
P. James Stoll, Ph.D.  
Myron F. Uman, Ph.D.

**Lower Division Courses**

**1. Introduction to Electrical Engineering. (1) III.**

Lecture—1 hour. Electrical 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. A presentation of basic ideas and their applications. Examination of some case studies. (Passed/Not Passed grading only.) The Staff (Mr. Algazi in charge)

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Loomis in charge)

**99. Special Study for Lower Division Students.**

(1-5) I, II, III.

The Staff (Mr. Loomis in charge)

**Upper Division Courses**

**110A. Electronic Circuits. (3) I.**

Lecture—3 hours. Prerequisite: Engineering 100. Analysis of linear amplifiers; single stage and multistage amplifiers, tuned amplifiers, oscillators. Mr. Jensen

**110B. Electronic Circuits. (3) II.**

Lecture—3 hours. Prerequisite: course 110A. Nonlinear electronic circuits; large signal amplifiers, oscillators, and switching circuits. Mr. Jensen

**111A. Electronics Laboratory. (2) I.**

Laboratory—6 hours. Prerequisite: course 110A (may be taken concurrently); Engineering 100. Properties of transistors and vacuum tubes. Small-signal analysis of single-stage and multistage resistance-coupled and transformer-coupled class A amplifiers. Mr. Jensen

**111B. Electronics Laboratory. (2) II.**

Laboratory—6 hours. Prerequisite: courses 110B (may be taken concurrently), 111A. Tuned amplifiers and oscillators. Switching circuits and large signal amplifiers. Mr. Jensen

**112A. Linear Systems Analysis. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 17. Properties and classification of linear systems. Signal representation by discrete, continuous, and generalized exponentials: Fourier series, Fourier and Laplace transform methods. Convolution integral. State space techniques. Mr. LaPatra

**112B. Linear Systems Analysis. (3) III.**

Lecture—3 hours. Prerequisite: course 112A or equivalent. Frequency analysis of linear, electrical, mechanical, and electromechanical systems. System function. Natural response and stability concepts. Introduction to feedback systems and to communication systems. Mr. LaPatra

**113. Digital and Sampled Data Systems. (3) I.**

Lecture—3 hours. Prerequisite: course 112A or equivalent. Introduction to digital and sampled data systems. Difference equations and Z transformation and their applications to linear discrete systems analysis. State variable methods, discrete models of continuous systems. Digital computer simulation and analysis techniques. Mr. Hsia, Mr. Hatfield

**114. Electronic Integrated Circuit Applications.**

(3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110B. Analysis and design of monolithic integrated circuits emphasizing circuit and system aspects rather than fabrication. Mr. Jensen

**116. Network Analysis. (3) I.**

Lecture—3 hours. Prerequisite: course 112A. Topics in modern network analysis, including two-port networks, matrix methods, graph theory, nonlinear circuits, and computer solutions. Mr. Stoll

**117. Network Synthesis. (3) III.**

Lecture—3 hours. Prerequisite: course 112A. An introduction to modern network synthesis techniques. Topics include one- and two-port networks, approximation problems, realization procedures, and filter theory. Mr. LaPatra

**130A. Introductory Electromagnetics. (3) I.**

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C. Static electric and magnetic fields, properties of materials, time-varying electromagnetic phenomena, Maxwell's equations. Mr. Uman

**130B. Introductory Electromagnetics. (3) II.**

Lecture—3 hours. Prerequisite: course 130A. Propagation of plane electromagnetic waves, guided waves, transmission lines, antennas. Mr. Uman

**131A. Electromagnetic Fields and Waves. (3) I.**

Lecture—3 hours. Prerequisite: course 130B or equivalent. Propagation and reflection of plane waves in isotropic media. Guided electromagnetic waves. Rectangular and circular wave guides. Mr. Fink

**131B. Electromagnetic Fields and Waves. (3) II.**

Lecture—3 hours. Prerequisite: course 131A or equivalent. Dielectric guides. Helix and slow-wave structures. Wave propagation in media with anisotropic permittivity and permeability. Mr. Fink

**131C. Electromagnetic Fields and Waves. (3) III.**

Lecture—3 hours. Prerequisite: course 131B or equivalent. Resonant cavities; microwave network components; antennas; ionospheric propagation. Mr. Fink

**133. High-Frequency Laboratory. (2) III**

Laboratory—6 hours. Prerequisite: course 130B. Steady-state and transient transmission line behavior; wave propagation in linear and nonlinear artificial lines; rudimentary experiments with reflex klystrons and wave guides. Mr. Stoll

**140A. Introduction to Physical Electronics. (3) II.**

Lecture—3 hours. Prerequisite: course 130A, Engineering 105A. Introduction to fundamental physics of electronic conduction, developing models to explain operation of modern devices; equilibrium and nonequilibrium statistical mechanics conductivity, diffusion, gaseous and beam electronics, plasmas, quantum mechanics. Mr. Uman

**140B. Introduction to Physical Electronics. (3) III.**

Lecture—3 hours. Prerequisite: course 140A. Electrons in solids, band theory, electrons and holes, semiconductors, junction device physics and models. Mr. Churchill

**145A. Solid-State Electronics. (3) I.**

Lecture—3 hours. Prerequisite: Physics 121. Electric and magnetic properties of solids. Topics discussed include electrical conductivity, dielectric constant, and various types of magnetism in solids. Mr. Churchill, Mr. Soohoo

**145B. Solid-State Electronics. (3) II.**

Lecture—3 hours. Prerequisite: course 145A. Electrical characteristics of dielectric and semiconducting materials, with application to such solid-state electronics devices as transistors, tunnel diodes, parametric amplifiers, and their associated circuits. Mr. Churchill, Mr. Soohoo

**145C. Solid-State Electronics. (3) III.**

Lecture—3 hours. Prerequisite: course 145A. Characteristics of magnetic materials, with application to such magnetic devices as ferrite cores, thin films, and their associated computer memory and logic circuits. Mr. Churchill, Mr. Soohoo

**150. Instrumentation Systems. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 100. Analytical and design methods common to all instrumentation systems; dynamic response; transducers; signal conditioning. Mr. Owen

**155A. Electronic Instrumentation for Biology****Majors. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 16A, 16B and a freshman physics course. Mathematical description of instruments, static errors, dynamic errors, the

external characteristics of amplifiers. Laboratory projects illustrate the use of electronic instruments and the properties of sensors. Not open to engineering majors. Mr. Owen

**155B. Electronic Instrumentation for Biology****Majors. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 155A. Amplifiers, the use of feedback, digital instrumentation. Laboratory projects illustrate the properties of amplifiers and the use of analog and digital computers as a component of an instrumentation system. Not open to engineering majors. Mr. Owen

**157A. Control Systems. (3) II.**

Lecture—3 hours. Prerequisite: course 112B. 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. Mr. Hsia, Mr. Owen

**157B. Control Systems. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157A. Introduction to nonlinear and sampled data systems. Applications of digital and analog computers. Mr. Hsia, Mr. Owen

**161. Introduction to Biomedical Systems. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 100. Introduction to the function of regulatory mechanisms in living organisms from an engineering systems point of view. Specific topics include heart and circulation, respiration, nerve and muscle, temperature regulation. Mr. Stoll

**172. Switching Circuit Theory. (3) I.**

Lecture—3 hours. Prerequisite: Engineering 100. The analysis and design of switching circuits, considering relay, electronic and magnetic realizations. Introduction to sequential machines. Mr. Loomis

**173. Digital Computer Design. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 174. A study of the logic design and hardware implementation of digital computers; a laboratory project involving the design, simulation and realization of a digital computer subsystem. Mr. Hatfield

**174. Computer Organization. (3) II.**

Lecture—3 hours. Prerequisite: course 172; Engineering 5A. The structure and operation of a simple stored program digital computer; data representations and algorithms for operating on data; digital computer subsystems including processors, control units, memory units; data channels and input/output units; special structures. Mr. Hatfield

**175. Computer Devices and Systems. (3) III.**

Lecture—3 hours. Prerequisite: course 140B. Essential elements of the computer and their

interdependence. Characteristics of computer input and output devices, main and auxiliary storage including magnetic cores; films, drums, and discs, and the central processor. Computer integrated circuits and large scale integration (LSI). Mr. Soohoo

**176. Programming Languages. (3) I.**

Lecture—3 hours. Prerequisite: Engineering 5A. Limits of FORTRAN; display terminal language; job control language; FORMAC; COBOL and SNOBOL. Use of languages for maximum computer performance. Emphasis on applications of various languages. Symbolic differentiation and integration. Treatment of natural language by machine. Mr. Kozdrowicki

**177. Programming Techniques and File Manipulation. (3) III.**

Lecture—3 hours. Prerequisite: Engineering 5A. Basic programming techniques, scatter tables or hash coding, lists, searching and insertion, sorting, string processing, input-output fundamentals, indexed sequential files, relative files, swapping of files, system programming techniques, multiprocessing software, program utilities. Offered in odd-numbered years. Mr. Kozdrowicki

**182. Probabilistic Systems Analysis. (3) I.**

Lecture—3 hours. Probabilistic models in engineering. Elements of probability theory and applications to engineering problems. Mr. Algazi, Mr. Hatfield

**184. Principles of Communications. (3) II.**

Lecture—3 hours. Prerequisite: course 182. Probabilistic analysis of digital and analog communication systems; elements of information theory. Mr. Algazi, Mr. Hatfield

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics. Students may enroll in one or more separate subjects. The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Chairman in charge)

**Graduate Courses**

**201. Optimization Techniques with Applications. (3) II.**

Lecture—3 hours. Prerequisite: knowledge of FORTRAN programming and graduate status. The theory of computer oriented optimization techniques with applications in system design. Offered in odd-numbered years. Mr. Mitra

**204. Digital Processing of Signals. (3) III.**

Lecture—3 hours. Prerequisite: course 112B or graduate status. The theory of digital signal-processing operations with emphasis on the fre-

quency domain description of digital filtering. Examples of applications to spectrum analysis and to the processing of images. Mr. Algazi, Mr. Mitra

**212A-212B. Systems Analysis. (3-3) I-II.**

Lecture—3 hours. Prerequisite: course 112A. Properties of systems and their mathematical characteristics; state space concepts, matrix methods; multivariable systems, time-invariant systems; real time analysis, frequency methods, the identification problem, adaptive systems. Mr. Hsia, Mr. Owen

**214. Nonlinear Electronic Circuits. (3) I.**

Lecture—3 hours. Prerequisite: course 110B. The design and analysis of nonlinear electronic circuits under transient conditions. Emphasis on devise models used in computer transient analysis programs. A study of some of the numerical methods employed. Application to sampling and sweep circuitry. Mr. Jensen

**\*216. Network Theory. (3) II.**

Lecture—3 hours. Prerequisite: course 112B or equivalent. Foundations of network theory. Generalized network analysis, state-variable approach, energy functions, equivalent networks and normal coordinates, scattering matrices, integral theorems and network limitations. Offered in even-numbered years. Mr. Mitra

**\*217. Passive Network Synthesis. (3) I.**

Lecture—3 hours. Prerequisite: course 117 or equivalent. Advanced topics in synthesis of passive networks. Driving-point and transfer function realizations, matching networks, n-port realizations, approximation techniques. Offered in odd-numbered years. Mr. Mitra

**218. Active Network Synthesis. (3) III.**

Lecture—3 hours. Prerequisite: course 117 or equivalent. Advanced topics in synthesis of active networks with lumped R,C and distributed R,C elements. Realization using monolithic integrated operational amplifiers of driving-point and transfer functions. Sensitivity and stability considerations. Offered in odd-numbered years. Mr. Mitra

**226A. Quantum Electronics. (3) I.**

Lecture—3 hours. Prerequisite: course 130B (or equivalent), course 140B (or equivalent). Some basic concepts of quantum theory, density operator, Hamiltonian and parity. Electric dipole transition; equation of motion of magnetic dipole; resonant processes, absorption, dispersion and saturation; transient behavior of electric dipole transitions, coupled amplitude equations and rate equations. Offered in even-numbered years. Mr. Fink, Mr. Soohoo

**226B. Quantum Electronics. (3) II.**

Lecture—3 hours. Prerequisite: course 226A. Laser, masers: population inversion, threshold

\* Not to be given, 1972-73.

requirement, steady-state and transient behavior, Q-switching. Interaction between radiation and phonons. Offered in odd-numbered years.

Mr. Fink, Mr. Soohoo

**\*227A. Microwave Electronics. (3) I.**

Lecture—3 hours. Prerequisite: course 130B (or equivalent), course 140B (or equivalent). Theory of microwaves, waveguides and cavities. Interaction between electromagnetic fields and the electron charge. Lorentz force law, energy levels in matter and Zeeman splitting. Comparison between conventional and microwave tubes and other new types of microwave oscillators and amplifiers. Offered in odd-numbered years.

Mr. Soohoo, Mr. Fink

**\*227B. Microwave Electronics. (3) II.**

Lecture—3 hours. Prerequisite: course 227A or 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.

Mr. Soohoo, Mr. Fink

**\*230A. Advanced Electromagnetic Theory. (3) I.**

Lecture—3 hours. Prerequisite: course 131C or equivalent. The exact formulation of electromagnetic problems by using vector potentials and Green's functions. Applications of these techniques to radiation and transmission problems.

**\*230B. Advanced Electromagnetic Theory. (3) II.**

Lecture—3 hours. Prerequisite: course 230A. Advanced topics in propagation such as propagation through anisotropic media, duct theory of propagation over the earth, ray tracing through the ionosphere. Offered in even-numbered years.

**\*230C. Advanced Electromagnetic Theory. (3) III.**

Lecture—3 hours. Prerequisite: course 230A. Advanced topics in radiation and scattering such as reception of statistically varying signals, diffracted ray theory, and quasi static solutions.

**240. Engineering Problems in Plasma Physics. (3) III.**

Lecture—3 hours. Prerequisite: courses 130B and 140B. Plasma oscillations and sheaths, measurement of plasma parameters, magnetized plasmas, kinetic and fluid descriptions, waves; applications to problems in communications, devices, power generation, propulsion and controlled thermonuclear fusion research. Mr. Uman

**245A. Applied Solid-State Physics. (3) I.**

Lecture—3 hours. Prerequisite: course 145C or equivalent. The physics of solids relevant to solid-state applications. Topics include classical

statistics, band theory of solids, electric polarization, conductivity, and magnetism in solids.

Messrs. Fink, Soohoo, Churchill

**245B. Applied Solid-State Physics. (3) II.**

Lecture—3 hours. Prerequisite: course 245A. The theory of semiconductors with application to transistors. Topics include electrons, holes, mobility, and transistor circuitry. Brief discussion of superconductivity and superconducting solenoids. Offered in even-numbered years.

Messrs. Fink, Soohoo, Churchill

**\*245C. Applied Solid-State Physics. (3) III.**

Lecture—3 hours. Prerequisite: course 245A. The 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. Offered in odd-numbered years.

Messrs. Fink, Soohoo, Churchill

**\*251. Nonlinear Control Systems. (3) III.**

Lecture—3 hours. Prerequisite: course 157B and 212B. Techniques for solving nonlinear control problems; state space methods, stability theorems; Lyapunov's methods; sinusoidal describing function and on-off systems. Offered in even-numbered years.

Mr. Owen

**252. Control System Optimization. (3) III.**

Lecture—3 hours. Prerequisite: course 157B and 212B. Optimization of systems by the adjustment of parameters; deterministic inputs, stochastic inputs. Optimization of systems by the calculus of variations: Pontryagin's maximum principle, Bellman's principle of optimality. Offered in odd-numbered years.

Mr. Hsia

**261. Biological Signals and Systems. (3) III.**

Lecture—3 hours. Prerequisite: Human Physiology 260 or the combination of course 157A and a basic physiology course such as Zoology 2 or Physiology 110B. Measurement and analysis of biological system dynamics by power spectral methods, with application to the cardiorespiratory and other systems. Methods of simulation and identification of linear and nonlinear biological system transfer relationships.

Mr. Stoll

**270. Sequential Machines. (3) II.**

Lecture—3 hours. Prerequisite: course 172. A study of the algebraic structure theory of sequential machines and the development of sequential machine synthesis techniques.

Mr. Loomis

**271. Advanced Digital System Design. (3) III.**

Lecture—3 hours. Prerequisite: course 174. Advanced topics in the design of digital systems; high speed and high rate arithmetic; the state assignment problem.

Mr. Loomis

\* Not to be given, 1972-73.



**276. Symbol Manipulation Languages. (3) II.**

Lecture—3 hours. Prerequisite: course 176 or equivalent language experience. The mathematical programming language LISP; recursive programming using LISP and SNOBOL. Use of SNOBOL to write a LISP compiler. ALGOL-68; PL/I; compiler-compilers; algorithms for compilers and interpreters; compilation *vs.* interpretation; algorithms for automatic differentiation and integration. Offered in odd-numbered years.

Mr. Kozdrowicki

**279A–\$279B. Artificial Intelligence. (3–3) II–III.**

Lecture—3 hours. Prerequisite: consent of instructor. The achievement of artificial intelligence through attempted realization of macroscopic descriptions of intelligent behavior; heuristic programming; game playing; mechanical theorem proving; concept formation by machine; perception of geometrical figures; analogical reasoning; natural language processors; the brain-modeling problem.

Mr. Kozdrowicki

**284A. Noise, Communication and Information****Theory. (3) II.**

Lecture—3 hours. Prerequisite: course 182 or equivalent. Fundamentals of the theory of random processes pertinent to communications, control and other physical applications. Review of probability theory. Characterization of random processes. Correlation functions and power spectra. Linear and nonlinear operations on random processes.

Mr. Algazi

**284B. Noise, Communication and Information Theory. (3) III.**

Lecture—3 hours. Prerequisite: course 284A. Application of statistical techniques to the areas of detection, estimation, and modulation theory. Detection problem and application to radar and digital communication. Estimation theory for signals described by finite parameter sets. Linear and nonlinear modulation and efficient demodulators.

Mr. Algazi

**284C. Noise, Communication and Information Theory. (3) I.**

Lecture—3 hours. Prerequisite: course 182. Information theory and coding. Definition of a measure of information and study of its properties. Introduction to channel capacity and error free communications over noisy channels. Encoding and decoding of data for transmission over noisy channels. Offered in even-numbered years.

Mr. Algazi

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Discussion of current research. Written and oral reports will be given. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**298. Group Study. (1–5) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1–12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**ENGINEERING: MECHANICAL**

Harry Brandt, Ph.D., *Chairman of the Department*

Department Office, 2020 Bainer Hall

**Professors:**

Harry Brandt, Ph.D.

Clyne F. Garland, M.S. (*Emeritus*)

Warren H. Giedt, Ph.D.

<sup>1</sup>Myron A. Hoffman, Sc.D.

Dean C. Karnopp, Ph.D.

John D. Kemper, Ph.D.

Allan A. McKillop, Ph.D.

<sup>1</sup>Amiya K. Mukherjee, D.Phil.

An Tzu Yang, D.E.Sc.

**Associate Professors:**

Charles W. Beadle, Ph.D.

Harry A. Dwyer, Ph.D.

Jerald M. Henderson, D.Engr.

(*Mechanical Engineering and Food Science and Technology*)

Paul S. Moller, Ph.D.

**Assistant Professors:**

John W. Brewer, Ph.D.

Walter V. Loscutoff, Ph.D.

Donald L. Margolis, Ph.D.

**Associate Professors:**

Jack L. White, Ph.D. (*Acting*)

Zuhair A. Munir, Ph.D. (*Visiting*)

**Lower Division Courses****1. Mechanical Engineering. (1) II.**

Lecture—1 hour. A description of the field of mechanical engineering with examples taken from industrial applications; discussion of the practice with respect to engineering principles, ethics and responsibilities. (Passed/Not Passed grading only.)

The Staff (Mr. Karnopp in charge)

**99. Special Study for Undergraduates. (1–5) I, II, III.**

Prerequisite: consent of instructor; lower division standing. The Staff (Mr. Brandt in charge)

**Upper Division Courses****111. Engineering Principles Laboratory. (4) III.**

Discussion—2 hours; laboratory—4 hours. Prerequisite: Engineering 103A, 104A, 105B. Experimental investigation of the steady-state and transient behavior of thermal, mechanical, structural, and fluid systems.

Mr. Brandt

§ Not to be given spring quarter, 1973.

**114. Kinematics of Mechanisms. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Classification of kinematic elements and mechanisms; graphical and analytical determination of displacements, velocities, and accelerations within planar mechanisms involving turning, sliding, and higher pairs. Kinematic design of cams, gears, and gear trains; intermittent-motion mechanisms.

Mr. Yang

**115. Dynamics of Machinery. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 102B. Analysis of dynamic response of machine elements such as cams, springs, gears, and links, with emphasis on high speed operation; gyroscopic forces in machines; balancing of machinery.

Mr. Yang

**121. Manufacturing Methods. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104A. Introduction to the methods employed in modern manufacturing, with particular emphasis on the interrelationships between engineering design and manufacturing methods. Introduction to the theoretical basis of metal forming.

Mr. Henderson

**123A-123B. Experimental Engineering.**

(2-2) I-II; II-III.

Laboratory—6 hours. Prerequisite: senior standing in engineering. Performance of a two-quarter long project which includes the design, construction, and evaluation of a mechanical engineering system or related experiment intended to give the student experience in theoretical modelling and experimental evaluation.

Mr. Henderson

**125. Fluid and Gas Dynamics. (4) I.**

Lecture—4 hours. Prerequisite: Engineering 103B. Development of the basic equations of inviscid fluid flow in control volume and differential form. Extensive applications to gas dynamics: wave propagation, shock waves, Prandtl-Meyer flow, flow in ducts. Further applications to aerofoils, cavitation, water hammer and geophysical flow.

Mr. Dwyer

**126A-126B-126C. Experimental Aeronautical Engineering. (2-2-2) I-II-III.**

Laboratory—6 hours. Prerequisite: Engineering 102B, 103B, 105B. Projects are chosen to acquaint students with experimental methods in aeronautical design as they relate to aerodynamics, stability, control, structures and overall vehicle performance.

Mr. Moller

**127. Vehicle Aerodynamics. (3) I.**

Lecture—3 hours. Prerequisite: Engineering 103B. Modeling and dimensional analysis. Instrumentation in experimental work. Aerodynamic loading on vehicle structures, boundary layer control, compressibility effects, static and elementary dynamic stability, propulsion.

Mr. Moller

**128A-128B. Aeronautical Design. (2-2) II, III.**

Lecture—1 hour; discussion—1 hour. Prerequisite: Engineering 104B. Design of aeronautically related systems, including the influence of aerodynamic and inertial loading on structural integrity, stability, and control.

Mr. Moller

**134. Vehicle Stability. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Introduction to the static and dynamic stability characteristics of transportation vehicles with examples drawn from aircraft, high-performance automobiles and water-borne vehicles including hovercraft. Laboratory experiments illustrate response to various inputs such as gusts, surface roughness and control deflections.

Mr. Loscutoff

**135. Gas Turbine Power Plants. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B. Study of gas turbines with principal emphasis on their application to aircraft propulsion. Analysis of both the idealized jet engine performance and the more realistic performance including component losses. Comparison of turbojet, turbofan and ramjet engines for various aircraft applications. Brief look at use of gas turbines for power generation.

Mr. Hoffman

**137. Modern Power Generation. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B. Study of new concepts for generating electrical power with higher efficiency and lower pollution of the environment. Emphasis on the fluid mechanics, heat transfer and thermodynamics of high temperature energy converters such as magnetohydrodynamic (MHD) generators and advanced gas turbines with nuclear reactor heat sources.

Mr. Hoffman

**150. Mechanical Design. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 4, 104A; course 121 recommended. Applications of the principles of engineering mechanics in the design of mechanical components, with special emphasis on stress concentration, theories of failure, fatigue, and fluctuating stresses.

Mr. Beadle

**151. Advanced Mechanical Design. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 150. Continuation of course 150 with special emphasis on advanced design analysis. Computer aided design methods. Noise control in machinery.

Mr. Beadle

**155. Engineering Systems Design. (3) III.**

Lecture—2 hours; discussion—1 hour. The engineering design process and its use; design projects; engineering case studies.

Mr. Henderson



**171. Analysis, Simulation, and Design of Dynamic Systems. (4) I, II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in engineering. Structural models for dynamic systems. Design of control systems to improve linearity, accuracy and speed of response. Design of feedback systems which maintain quality of performance in spite of parameter variations. Analog and digital computer simulation.

Messrs. Brewer, Karnopp, Loscuttoff

**172. Analysis, Simulation, and Design of Dynamic Systems. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Phenomenological models for dynamic systems. Control system design using frequency domain methods. Stability of nonlinear control systems. Introduction to state space techniques.

Messrs. Brewer, Karnopp, Loscuttoff

**175. Introduction to Socio-Technological System Analysis. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in engineering. Description of transient and steady-state models of population, pollution and violence. Application of engineering thermodynamics and system theory to the analysis of social and ecological systems. Review of current social criticisms of technology. Interactions of society with technology.

Mr. Brewer

**\*178. Controls Laboratory. (1) III.**

Laboratory—3 hours. Prerequisite: course 172 (to be taken concurrently). Laboratory demonstrations in automatic control. Analog and digital computer experiments in feedback control.

Mr. Loscuttoff

**185. Real Fluid Flow. (4) II.**

Lecture—4 hours. Prerequisite: Engineering 103B. An introduction to the properties of real fluids. Derivation of the Navier-Stokes equations and dynamical similarity. Low Reynolds number flow. Boundary layer concepts. Turbulent flow.

Mr. Dwyer

**186. Heat Transfer. (4) III.**

Lecture—4 hours. Prerequisite: Engineering 103B (may be taken concurrently). Fundamental concepts of heat transfer: conduction, convection and radiation.

Mr. McKillop

**198. Directed Group Study. (1-5) I, II, III.**

Lecture—1-5 hours. Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics.

The Staff (Mr. Brandt in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor. (Passed/Not Passed grading only.)

The Staff (Mr. Brandt in charge)

**Graduate Courses****204. Heat Conduction. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 180, course 186. Steady-state and transient problems in heat conduction, using both mathematical and numerical methods of solution. Offered in even-numbered years.

Mr. Giedt

**205. Thermal Radiation. (3) II.**

Lecture—3 hours. Prerequisite: course 186 or consent of instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Offered in odd-numbered years.

Mr. Brandt

**210A. Advanced Fluid Dynamics. (4) I.**

Lecture—4 hours. Prerequisite: graduate standing. Derivation of Navier-Stokes and energy equations. Exact solutions of both equations. Low Reynolds number flow. Boundary layers for two-dimensional flow. Similarity solutions of boundary layer equations. Axially symmetric and three-dimensional boundary layers. Heat transfers in boundary layers.

Messrs. Dwyer, Brandt, Giedt, McKillop

**210B. Advanced Fluid Dynamics. (4) II.**

Lecture—4 hours. Prerequisite: course 210A. Advanced topics in boundary layer theory, including higher order theory, geophysical flows and jets and wakes. Free convection flows, derivation and analysis of the mean flow equations of turbulent flow and development of transport coefficient analysis.

Messrs. Dwyer, Brandt, Giedt, McKillop

**210C. Numerical Methods in Boundary Layer Flows. (3) III.**

Lecture—3 hours. Prerequisite: course 210B. Development of the basic finite difference schemes for the Navier-Stokes equations, laminar and turbulent boundary layer equations, and the potential flow equations. Analysis of the stability and convergence of these schemes with practical examples.

Mr. Dwyer, Mr. McKillop

**211. Transitional and Turbulent Flows. (3) I.**

Lecture—3 hours. Prerequisite: course 210B. Wave motion in fluids; stability of Couette flow, plane Poiseuille flow and boundary layers; description of turbulent flow; structure of the turbulent energy spectrum; turbulent transport phenomena; turbulent shear flows and their measurement; new theories in turbulence. Offered in even-numbered years.

Mr. Dwyer

\* Not to be given, 1972-73.

**213. Theory of Jets. (3) III.**

Lecture—3 hours. Prerequisite: course 210A or consent of instructor. Turbulent jets of incompressible and compressible fluids; free jets and jets confined to finite spaces; wakes behind bluff bodies; practical applications of turbulent jets. Offered in even-numbered years.

Mr. Brandt

**214. Aerodynamics. (3) III.**

Lecture—3 hours. Prerequisite: courses 125, 127, 185. Development and examination of the potential and viscous flow concepts useful in evaluating the aerodynamic loads and performance of flight vehicles. Applications of these concepts will be made through complete system analysis and optimization with particular emphasis on V.T.O.L. aircraft.

Mr. Moller

**215. Gas Dynamics. (3) I.**

Lecture—3 hours. Prerequisite: course 125 or equivalent. Derivation and analysis of the basic equations of motion of inviscid gases at subsonic and supersonic speeds. Prandtl-Meyer flow and the method of characteristics; applications to unsteady transonic and hypersonic flow; shock theory. Offered in odd-numbered years.

Mr. Dwyer

**216. Physical Gas Dynamics. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 103B, 105B. Analysis of high-temperature gas dynamics with real gas effects; review of classical thermodynamics; study of quantum statistical mechanics of monatomic, diatomic and ionized gases; applications to equilibrium and frozen nozzle flows, shock waves and Prandtl-Meyer flows. Offered in even-numbered years.

Mr. Dwyer, Mr. Hoffman

**217. High Temperature Gas Transport Phenomena. (4) III.**

Lecture—3 hours. Prerequisite: Engineering 103B, 105B. Development and calculation of free molecule and continuum transport property models. Free molecular heat transfer and flow. Derivation of the Boltzmann Eq. with application to pure gases, gas mixtures and ionized gas. Chapman-Enskog and Lorentz solutions. Offered in even-numbered years.

Mr. Dwyer, Mr. Hoffman

**\*218. MHD Energy Conversion. (4) III.**

Lecture—4 hours. Prerequisite: Engineering 103B, 105B. Study of the direct conversion of thermal energy to electrical energy utilizing a magnetohydrodynamic (MHD) generator with chemical and nuclear heat sources. Evaluation of complete MHD power systems for both public utility power and space power supplies. Offered in odd-numbered years.

Mr. Hoffman

**220A-220B. Mechanical Vibrations. (3-3) II-III.**

Lecture—3 hours. Prerequisite: Engineering

\* Not to be given, 1972-73.

122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

Mr. Karnopp

**222. Advanced Dynamics. (3) I.**

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.

Mr. Beadle

**224. Kinematic Design of Mechanisms. (3) II.**

Lecture—3 hours. Prerequisite: course 114. Introduction to Bernster 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.

Mr. Yang

**226. Acoustics and Noise Control. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; applications in design of mufflers, acoustic enclosures, room acoustics, design of quiet machinery.

Mr. Beadle, Mr. Karnopp

**240. Theory of Crystal Dislocations. (3) I.**

Lecture—3 hours. Prerequisite: Engineering 142 or 187, or consent of instructor. Edge, screw and mixed dislocation concepts. The stress field and energy of dislocations. Force on a dislocation. Motion of dislocations and its relation to plastic deformation. Dislocation multiplication and interaction with point, line, and surface defects. Offered in odd-numbered years.

Mr. Mukherjee

**241. Applications of Dislocation Theory. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240; Engineering 188 or consent of instructor. Concepts of dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, imperfect dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Offered in even-numbered years.

Mr. Mukherjee

**242. Advanced Mechanical Properties of Materials. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 188 or consent of instructor. Strength and structure of engineering materials. The dependence of their mechanical properties on time, stress and temperature. Generalized concepts of dislocation theory in plastic deformation, including fracture, and creep.

Influence of microstructure in optimizing the mechanical strength properties. Offered in odd-numbered years. Mr. Mukherjee

#### 243. Solid-State Phase Transformation. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 188, 105A; or consent of instructor. The theory of alloying, kinetics of phase changes, homogeneous and heterogeneous transformation, transformation by shear, order-disorder reactions and the phase changes during the heat treatment of iron-carbon alloys are discussed. Offered in odd-numbered years.

Mr. Mukherjee

#### 250. Engineering Case Studies. (2) II.

Discussion—2 hours. Studies of selected problems which illustrate various methods of the design process and management in advanced mechanical engineering systems. Mr. Henderson

#### 270. Modeling and Simulation of Engineering Systems. (3) I.

Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Multiport models of mechanical, electrical, hydraulic and thermal devices; bond graphs, block diagrams and state space equations; Hamilton's principle for complex systems; formulation for analog and digital simulation; identification; instrumentation; approximate models of distributed systems.

Messrs. Karnopp, Brewer, Loscutoff

#### 271. Analysis and Control of Multivariable Systems. (3) II.

Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Analysis of multi-input, multi-output systems and synthesis of linear control; comparison of transfer functions and state space methods in feedback control design; application to physical systems for hardware realization. Messrs. Karnopp, Brewer, Loscutoff

#### 272. Analysis and Design of Control Systems. (3) III.

Lecture—3 hours. Prerequisite: course 271 or consent of instructor. Synthesis of automatic control of mechanical engineering systems; both lumped and distributed parameter systems and

continuous and discrete time control will be considered. Messrs. Karnopp, Brewer, Loscutoff

#### 275. Application of Modern Systems and Control Theory to Environmental Problems. (4) III.

Lecture—2 hours; seminar—1 hour; laboratory—3 hours. Prerequisite: courses 175, 270; or consent of instructor. Analysis, simulation, and planning for social, geophysical, and ecosystem environments. Observability, controllability and optimality in socio-technological systems. Large, dynamic systems theory. General systems theory. Emphasis on interdisciplinary research. Offered in odd-numbered years.

Mr. Brewer

#### 280. Advanced Engineering Analysis. (3) III.

Lecture—3 hours. Prerequisite: Engineering 180 or equivalent. Applications in mechanical engineering of advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, classification of differential equations, and advanced numerical methods.

Mr. Dwyer, Mr. Karnopp

#### 289. Presentation of Thesis Research. (1) III.

Seminar—1 hour. Prerequisite: substantial progress toward completion of master's or doctor's thesis. Presentation of the results obtained in a thesis research project. Critical evaluation of experimental and analytical approaches and critique of presentation.

Mr. Giedt

#### 290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion of current graduate research with particular attention to validity of experimental procedures.

The Staff (Mr. Brandt in charge)

#### 295. Engineering Case Study Preparation. (3) III.

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 250. Preparation of case studies of selected on-going or completed engineering projects from industry. (Satisfactory/Unsatisfactory grading only.) Mr. Henderson

#### 298. Group Study. (1-5) I, II, III.

The Staff (Mr. Brandt in charge)

#### 299. Research. (1-12) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Brandt in charge)

## ENGLISH

James L. Woodress, Ph.D., *Chairman of the Department*  
Department Office, 100 Sproul Hall

#### Professors:

Everett Carter, Ph.D.  
Thomas A. Hanzo, Ph.D.  
Gwendolyn B. Needham, Ph.D.  
\*Karl J. Shapiro  
Linda Van Norden, Ph.D.  
\*Brom Weber, Ph.D. (*English and*

#### *American Studies*)

Robert A. Wiggins, Ph.D.  
\*James L. Woodress, Ph.D.  
\*Celeste T. Wright, Ph.D.

<sup>2</sup> Absent on leave, fall quarter 1972.

<sup>3</sup> Absent on leave, winter quarter 1973.

<sup>4</sup> Absent on leave, spring quarter 1973.

*Associate Professors:*

William E. Baker, Ph.D.  
 Elliot L. Gilbert, Ph.D.  
 Wayne C. Harsh, Ph.D. (*English and Linguistics*)  
 John O. Hayden, Ph.D.  
 \*Michael J. Hoffman, Ph.D.  
 †Elizabeth R. Homann, Ph.D.  
 Robert H. Hopkins, Ph.D.  
 Arthur E. McGuinness, Ph.D.  
 Daniel Silvia, Ph.D.

*Assistant Professors:*

Arthur K. Amos, Jr., Ph.D.  
 †Sidney Berger, Ph.D.  
 †Peter L. Hays, Ph.D.  
 †Diane L. Murray, Ph.D.  
 David A. Robertson, Ph.D.  
 David S. Wilson, Ph.D. (*English and American Studies*)

*Assistant Professors:*

Caesar B. Adams, B.A. (*Acting*)  
 Thomas P. Campbell, III, B.A. (*Acting*)  
 Walter J. Hicks, M.A. (*Acting*)  
 Paul D. Johnson, M.A. (*Acting*)  
 Robert M. Silvey, M.A. (*Acting*)

*Lecturers:*

W. Georg Isaak, M.A.  
 Mary O'Connor, M.A.

*Departmental Major Advisers*—Mr. Adams, Mr. Amos, Mr. Baker, Mr. Berger, Mr. Campbell, Mr. Gilbert, Mr. Hanzo, Mr. Hayden, Mr. Hays, Mr. Hicks, Mr. Hoffman, Mr. Johnson, Mr. Hopkins, Mr. McGuinness, Mrs. Murray, Mr. Silvey, Mr. Silvia, Mr. Wilson, Mrs. Wright.

*The Major Program*

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.

*Lower Division Courses.*—Required: one course from 1, 2, 3, 4A, or 4B; course 45; 46A, 46B, 46C (these courses should be taken in order). Recommended: courses in the Freshman offerings other than the one chosen to meet the requirements; courses 30A, 30B, 30C; a course in philosophy; and a course in classics.

*Upper Division Courses.*—Required: Thirty-

six units of upper-division courses, which must include at least one in each of the following groups: Period courses, Genre courses, Author courses, Special Subjects.

Majors must also take at least one upper-division course in four of the following five periods of British literature: 1) Medieval; 2) Renaissance; 3) Restoration and Eighteenth Century; 4) Romantics and Nineteenth Century; 5) Twentieth Century; and at least one upper-division course in American literature. Courses specified in this paragraph may be combined with courses specified in the preceding paragraph (e.g., a course in Chaucer would serve both as courses in Medieval literature and a single author).

In addition, the student must choose one of four areas of emphasis: General English and American Literature; Writing; Language and Linguistics; Preparation for Teaching. The student must consult with his adviser for specific requirements of each area of emphasis.

*General Major.*—Requires a minimum of 32 units of literature and four units of language.

*Teaching Major.*—The English teaching major in the teacher-training curriculum requires not only the core requirements but also courses 103, 105A, 105B, and 300 (which counts as 3 units of credit in education). All credential candidates majoring in English must complete courses 103, 105A, and 105B before being assigned to student teaching or intern programs.

*Teaching Minor.*—The teaching minor consists of 32 units, including courses 45, 46A, 46B, 46C, 30A or 30B or 30C, and at least 12 units of upper-division work including English 103, 117A or 117B, and 155B or 155C. Course 300 (which counts as 3 units of credit in education) must be taken in the senior or postgraduate year. Recommended in addition to the required 32 units, especially in preparation for course 300: course 105A.

*Writing Major.*—Core requirements of 20 distributed units of English and American literature; English 100A, 100B, 100C and a 198 seminar in writing techniques.

*Linguistics Major.*—Core requirements of 20 distributed units of English and American literature; four courses in Linguistics.

*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.*—See page 148.

*Graduate Study.*—The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Detailed information may be obtained from the Graduate Adviser or from the Chairman of the Department.

*Subject A.*—Students must have passed Subject A before taking any course in English.

<sup>1</sup> Absent on leave, 1972-73.

<sup>2</sup> Absent on leave, fall quarter 1972.

<sup>4</sup> Absent on leave, spring quarter 1973.

**Prerequisite:** one course from courses 1, 2, 3, 4A, 4B is required for admission to courses 20, 30A, 30B, 30C, 45, 46A, 46B, 46C, 47, and all upper-division courses. Course 45 is recommended as preparation for the 30 and 46 series.

#### Lower Division Courses

### R. Communications Skills Workshop. (no credit) I, II, III.

Lecture—3 hours; discussion—3 hours; laboratory—3 hours. Workshop in language skills for students from nonstandard-English backgrounds who do not qualify for English for Foreign Students. Course worth 6 units toward minimum study list unit requirement. (Deferred grading only, pending completion of sequence.)

The Staff (Chairman in charge)

#### 1. Expository Writing. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made.

The Staff (Mr. Isaak in charge)

#### 2. Language and Stylistics. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. An introduction to modern inquiries into the nature and forms of the English language. Frequent writing assignments will be made.

The Staff (Mr. Harsh in charge)

#### 3. Introduction to Literature. (4) I, II, III.

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.

The Staff (Mr. Isaak in charge)

#### 4A, 4B. Backgrounds for English Literature.

(4, 4) A: I, II, III; B: I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement; course 4A is not prerequisite to 4B. This course, designed to introduce English majors to essential background material, will concentrate on such major literary works as *The Iliad*, *The Bible*, *The Aeneid*, and *The Divine Comedy*. Frequent writing assignments will be made.

The Staff (Mr. Isaak in charge)

#### 5. Introduction to Creative Writing. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement and consent of instructor. A course in the elementary principles of writing fiction and poetry. Students will be expected to experiment with a variety of forms and will be encouraged to do

free and independent work in addition to the restricted assignments of the course.

The Staff (Mr. Isaak in charge)

#### \*20. Intermediate Composition. (4) I, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Designed primarily for non-majors who wish to improve their skills in expository writing; the content of the course includes basic principles of rhetoric and rules of usage in present-day English.

#### 25. English for Foreign Students. (5) I, II, III.

Lecture—2 hours; discussion—2 hours; laboratory—1 hour. For foreign students only; required of those who do not pass the examination in English. May be repeated for credit.

Miss Cooley

#### \*26. English for Foreign Students. (5) I, II, III.

Lecture—2 hours; discussion—2 hours; laboratory—1 hour. Continuation of course 25.

#### 30A. Survey of American Literature: Literary Traditions. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The origins and development of the traditions of expression, persuasion, entertainment, and reportage in American literature from Captain John Smith to LeRoi Jones, with attention to the ways in which individual writers both function within and modify the traditions.

The Staff (Chairman in charge)

#### 30B. Survey of American Literature: Social-Cultural Issues. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Social-cultural issues, such as religion, class, democracy, technology, slavery, regionalism, and nationalism in American literature, with attention to the ways in which writers have functioned within and modified socio-cultural traditions from colonial times to the present.

The Staff (Chairman in charge)

#### 30C. Survey of American Literature: Major Writers. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Study of four to ten major writers representing Colonial, Pre-Civil War, Post-Civil War, Early and Late Twentieth-Century periods.

The Staff (Chairman in charge)

#### 45. Critical Reading of Poetry. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Close reading of selections from English and American poetry. Frequent written exercises.

The Staff (Mrs. Wright in charge)

\* Not to be given, 1972-73.

**46A. Masterpieces of English Literature. (4) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected works of principal writers to 1640. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

The Staff (Chairman in charge)

**46B. Masterpieces of English Literature. (4) II.**

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected works of principal writers from 1640 to 1800. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

The Staff (Chairman in charge)

**46C. Masterpieces of English Literature. (4) III.**

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected works of principal writers from 1800 to the present. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

The Staff (Chairman in charge)

**\*47. Introduction to Modern Literature. (4) II.**

Lecture—2 hours; discussion—2 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Chief twentieth-century writers of England and America.

Mr. Shapiro

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**99. Special Study for Undergraduates. (1-5)**

I, II, III. The Staff (Chairman in charge)

**Upper Division Courses**

Note: Each upper-division course is listed under one of the following groups:

- a) Period courses
- b) Genre courses
- c) Author courses
- d) Special subjects
- e) Writing courses
- f) Language and linguistics
- g) Senior seminars

a) **PERIOD COURSES:** *studies of the major writers, the literary traditions and forms they worked in, and the influencing events of an age.*

**\*111. Old English and Early Medieval Literature.**

(4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. 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

strain, courtly love and its impact, and the development of Arthurian literature. Mostly in translation.

Mr. Campbell

**112. The Age of Chaucer. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The literary, religious, and social movements of the later fourteenth century in England as they are reflected in the writings of Chaucer, Langland, the *Gawain* poet, and their contemporaries; the fifteenth-century Chaucerians.

Mr. Berger

**\*115. The English Renaissance. (4) III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected poetry and prose: More, Spenser, Hooker, Bacon, and others. The New Learning; the Reformation; psychological and moral concepts of the age.

Mr. Amos

**\*116. The Age of Elizabeth. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Poetry of Marlowe, Shakespeare, Sidney and others; fiction of Gascoigne, Lyly, Lodge; representative plays.

Mr. Silvey

**\*120. Earlier Seventeenth-Century Poetry and Prose. (4) I.**

Lecture—3 hours; term paper or equivalent. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major authors, forms, and styles. Donne, Jonson, Marvell, Bacon, Browne, Hobbes. Tradition and revolution.

Mr. Silvey

**\*123. Dryden and His Contemporaries. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The Restoration in English Literature; Neoclassicism, Ancients versus Moderns, Pyrrhonism, the New Philosophy. Drama, criticism, and satire. Emphasis on the work of John Dryden.

Mr. McGuinness

**125. The Age of Swift and Pope: Prose and Poetry. (4) III.**

Lecture—3 hours; term paper or equivalent. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The Augustan Age: reason and imagination. Readings in Swift, Addison, Steele, Defoe, Pope, Gay, Thomson, and others.

Mr. McGuinness

**127. Johnson and His Contemporaries. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sense and Sensibility in poetry, biography, journals, fiction, comedy, and criticism. Readings in Johnson, Boswell, Goldsmith, Fielding, and others.

Mr. Hopkins

**\*128. Prose and Poetry of the Later Eighteenth Century. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sense and Sensi-

\* Not to be given, 1972-1973.



bility in criticism, history, philosophy and the novel. Readings in Hume, Burke, Gibbon, Sterne, Cowper, and others. The mysticism of Blake. Mr. Hopkins

### 130. Early Romantic Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Blake, Burns, Wordsworth, Coleridge, Scott; the eighteenth-century background and the development of Romantic concepts of the imagination. Mr. Hayden

### 132. Later Romantic Literature. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Byron, Shelley, Keats. Individualism and revolt. Mr. Hayden

### 133. Early Victorian Literature. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Tennyson, Browning, Arnold, and selected prose writers. The Victorian temper; the individual and society; the search for faith. The impact of scientific thought upon creative thinkers. Mr. Gilbert

### \*134. Later Victorian Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Ruskin, Hardy, Hopkins, and others. The Oxford movement; the Pre-Raphaelites; art and sociology; aestheticism and decadence; pessimism. Tendencies continuing into the Edwardian period. Mr. Gilbert

### 136. British Literature from 1880 to 1918. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Yeats, Conrad, Joyce. Aestheticism, naturalism, symbolism, and impressionism. The transition from Victorian to twentieth-century styles and attitudes. Mrs. O'Connor

### 137. British Literature from 1918 to 1940. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Lawrence, Eliot, Forster, and others. Post-war attitudes. Modern psychology and the awareness of myth. Mr. Hoffman

### \*138. British Literature from 1940 to the Present. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Literature of England and Ireland from World War II to the present. Major themes in the novel, poetry, and short story. Mr. Hanzo

### 139. Modern Anglo-Irish Writers. (4) II.

Lecture—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. A study of Yeats, Joyce, George Moore, John Synge, James Stephens and others. Mr. McGuinness

### 140. Origins of American Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Seventeenth-century American literature; special attention to European literary-intellectual traditions, dominant American forms (poems, sermon, history), and major writers (Ann Bradstreet, Edward Taylor, and others).

### 141. The American Enlightenment and Its Reaction. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. 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. Mr. Wilson

### 142. Early Nineteenth-Century American Literature. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Beginnings of American romanticism, sentimentalism, Gothic vogue, cultural nationalism, Southwestern humor; prose and poetry of Brown, Bryant, Irving, Cooper, Poe, and Longstreet. Mr. Johnson

### 143. Transcendentalism and Its Reaction. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Flowering of American romanticism; the metaphysical tradition, Oriental and European antecedents, philosophical idealism, and literary achievement of Transcendentalism (Emerson, Thoreau, Whitman); the critical tempers of Hawthorne and Melville; Emily Dickinson. Mr. Johnson

### 144. American Literature from 1865 to 1914. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Religion, local color, social criticism, naturalism, *fin de siècle* aestheticism; Twain, James, Crane, Dreiser, Howells. Mr. Carter

### 146. Modern American Literature: 1914 to 1940. (4) III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. 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. Mr. Robertson

### 147. Modern American Literature: 1940 to the Present. (4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Contemporary fiction, poetry, and drama. The impact of World

\* Not to be given, 1972-73.

War II on the younger writers; experimentation and formalism in poetry and the drama.

Mr. Hicks

**b) GENRE COURSES:** *studies of major literary forms.*

**\*150A. English Drama to Marlowe. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The development of the drama from its beginnings to the Renaissance. Miracle and mystery plays; the morality tradition. Early comedy, tragedy, and chronicle plays.

Mr. Campbell

**150B. English Drama from Marlowe to 1642. (4) III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Shakespeare's contemporaries in the drama, including Webster, Jonson, Beaumont and Fletcher, and others. The revenge play and tragicomedy; post-Shakespearean development of dramatic action and blank verse.

Mr. Berger

**\*150C. English Drama from 1642 to 1890. (4) III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Restoration comedy, eighteenth-century sentimental comedy, and nineteenth-century melodrama, with particular attention to plays of Congreve, Sheridan, and Boucicault.

Mrs. Homann

**150D. British Drama from 1890 to the Present.**

(4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The rise of dramatic realism; the chief reactions against it. Emphasis on Shaw, O'Casey, and Osborne.

Mrs. Homann

**\*152. American Drama from Its Beginnings to the Present. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Critical and historical survey of drama in America from its eighteenth-century origins with emphasis on Boucicault, Rice, O'Neill, Williams, and Miller.

Mr. Hays

**155A. The English Novel: 1700-1770. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Realism and the rise of the modern novel. Defoe, Richardson, Fielding, Sterne, and Smollett.

Mrs. Needham

**155B. The English Novel: 1770-1850. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sense and Sensibility in the novel. Walpole, Radcliffe, Austen, Scott, Dickens, Bronte sisters.

Mr. Baker

**155C. The English Novel: 1850-1900. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major Victorian

novelists: their theory and practice. Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy.

Mr. Gilbert

**155D. The English Novel: 1900 to the Present.**

(4) I.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major figures including Conrad, Joyce, and Lawrence. Impressionism, the revolt against naturalism; the experimental novel; the anti-modernist reaction.

Mr. Hanzo, Mr. Hoffman

**158A. The American Novel to 1900. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The rise and development of the American novel from its eighteenth-century beginnings. Cooper, Hawthorne, Melville, Howells, Twain, James, Crane.

Mr. Carter

**158B. The American Novel from 1900 to the Present. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Major American novelists of the twentieth century. Wharton, Dreiser, Faulkner, Hemingway, Fitzgerald, Bellow.

Mr. Hays

**160. The English Lyric. (4) III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The history of poetic style from the sixteenth to the twentieth centuries. Major examples of the short poem in relation to intellectual history, to foreign influences, and to the development of poetic forms.

Mrs. Wright

**\*170A. The Epic. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Studies in the development of the epic.

Miss Van Norden

**c) AUTHOR COURSES:** *studies of the works and development of an author or authors.*

**113. Chaucer. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. *Troilus and Criseyde*, selected *Canterbury Tales*; central ideas in the fourteenth century.

Mr. Silvia

**117A. Shakespeare. (4) I, II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected major works.

Mrs. Wright, Messrs. Amos, Adams, Silvey

**117B. Shakespeare. (4) II, III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected major works not included in course 117A.

Mrs. Wright, Messrs. Amos, Adams, Silvey

\* Not to be given, 1972-73.



**122. Milton. (4) III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Selected major works, including *Paradise Lost*.

Miss Van Norden

**189. Study of a Major Writer. (4) I, III.**

Seminar—3 hours. Prerequisite: junior or senior standing; English major or consent of instructor. The artistic development of one major writer. Limited enrollment.

The Staff (Chairman in charge)

d) **SPECIAL SUBJECTS:** *studies in a special problem in literature.*

**110A. Introduction to Principles of Criticism.**

(4) II.

Lecture—3 hours. Prerequisite: course 45 or equivalent. Methods and assumptions of critical theory from Aristotle to the present. Emphasis on major contributions to the history of literary criticism.

Mr. Hayden

**\*110B. Introduction to Principles of Criticism.**

(4) III.

Lecture—3 hours. Prerequisite: course 45. Continuation of course 110A.

Mr. Robertson, Mr. Hayden

**\*170B. European Influences on the English and American Novel. (4) I.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Studies in the English and American novel, with special reference to continental influences.

Mr. Carter

**171. English Bible as Literature. (4) III.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Old Testament poetry and prophecy; the Gospels and certain Epistles.

Miss Van Norden

**175. American Literary Humor. (4) II.**

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. The American humorous vision as expressed in such modes as comedy, satire, irony, and their combinations from the seventeenth century to the present, with attention given to such matters as the nature of humor and the cultural influences affecting its development.

Mr. Woodress

**180. Literature for the Elementary and Secondary Schools. (4) I.**

Lecture—3 hours; papers. Prerequisite: a first-year English course and one of the following: 30A, 30B, 30C, 45, 46A, 46B, 46C. Intensive study of literature used frequently in elementary and secondary English classes, including such works as *Charlotte's Web*, *Tom Sawyer*, *Red Badge of Courage*, and short stories, drama, poetry; selections from regional, national, and world literature written in English.

Mr. Wiggins

**181. Black Literature. (4) II.**

Lecture—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. A study of the writings of black Americans, including Chesnutt and Dunbar in the 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.

Mr. Hicks

**183. Film as Narrative. (4) III.**

Lecture—1 hour; discussion—2 hours; laboratory—2 hours; film showings. Prerequisite: Dramatic Art 15 or consent of instructor. A close study of modern cinema (1930–60) as a storytelling medium. Emphasis on the work of American and British artists (Ford, Huston, Hitchcock, Welles).

Mr. Baker, Mr. d'Harnoncourt

**\*185. Intercultural Literary Colloquium. (4) II.**

Lecture—2 hours; discussion—1 hour; readings in English or the language of the original text; term paper. Prerequisite: consent of instructor. Interdepartmental inquiry into such European and American themes as the anti-hero, guilt and judgment, escape, and utopia. Specific topics to be chosen by instructors. Limited enrollment. (To be given jointly with German 185 and Russian 185.)

The Staff (Chairman in charge)

**188. Special Topics in Literary Studies. (4) I, II, III.**

Seminar—3 hours. 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. The course will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment.

The Staff (Chairman in charge)

**191A–D. Intercultural Literary Colloquium: Reality in Transition. (4) III.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Pivotal works of artists in the Western mainstream such as Dante, Shakespeare, Cervantes, Goethe, and writers of comparable scope or depth. Content will alternate among the following segments: A. Essential Reality; B. Existential Reality; C. Political Reality; D. Fantastic Reality. May be repeated for credit in different subject areas. (Same course as Comparative Literature, German, and Italian 191A–D.)

Messrs. Fetzer, Marelli, Silvey

**e) WRITING COURSES:****100A. Creative Writing. (4) I.**

Lecture—3 hours; evaluation of written materials and conferences with individual students—1 hour. Prerequisite: one course from

\* Not to be given, 1972–73.

courses 1, 2, 3, 4A, 4B; consent of instructor. Writing of poetry and fiction. May be repeated for credit with consent of instructor. No final examination. The Staff (Mr. Shapiro in charge)

#### 100B. Creative Writing. (4) II.

Lecture—2 hours; evaluation of written materials and individual student conferences. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sophomores may enroll with consent of instructor. The writing of poetry and fiction. May be repeated for credit with consent of instructor. No final examination.

The Staff (Mr. Shapiro in charge)

#### 100C. Creative Writing. (4) III.

Lecture—2 hours; evaluation of written materials and individual student conferences. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Sophomores may enroll with consent of instructor. The writing of poetry and fiction. May be repeated for credit with consent of instructor. No final examination.

The Staff (Mr. Shapiro in charge)

#### 103. Advanced Composition. (4) I, II, III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Survey of prose styles, the principles of prose rhetoric, and the usage patterns of present-day English grammar. Frequent written composition stressing the principles studied. Required of prospective high school English teachers.

The Staff (Mr. Harsh in charge)

### f) LANGUAGE AND LINGUISTICS:

#### 105A. Language. (4) I, III.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. Present-day English grammar and pronunciation according to the perspectives of traditional grammar and contemporary linguistics. Preparation for stylistic analysis and historical study of English language and literature. Required of prospective high-school English teachers.

Mr. Campbell, —

#### 105B. Language. (4) II.

Lecture—3 hours. Prerequisite: one course from courses 1, 2, 3, 4A, 4B. History of the English language. Examination of the language as recorded in literary texts from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of prospective high-school English teachers.

Mr. Harsh

#### \*105C. Language Change Reflected in Literature.

(4) II, III.

Lecture—3 hours; term paper. Prerequisite: courses 105A–105B. 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. (Same course as Linguistics 105C.) Mr. Harsh, Mr. Campbell

#### \*105D. Linguistics, Literature, and Composition.

(4) III.

Lecture—3 hours; term paper. Prerequisite: courses 105A, 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 belletristic and non-belletristic written materials.

Mr. Harsh

#### 192. Theory and Methods in Modern Linguistics.

(4) II.

Lecture—3 hours; term paper. Prerequisite: courses 105A–105B. Survey of scholarship in linguistic studies from European backgrounds to present, concentrating primarily but not exclusively on descriptions of the English language. Contrastive analysis with other Germanic languages. (Same course as Linguistics 192.)

Mr. Campbell

#### \*195. Language, Thought, and Expression. (4) II, III.

Seminar—3 hours; term paper. Prerequisite: course 192. Investigation of a range of theories on the relationship between language structure and thought, from philosophical, linguistic, and historical points of view. Readings will include Chomsky, Empson, Hayakawa, Ogden, Richards, Vygotsky, Whorf, et al. (Same course as Linguistics 195.)

#### 196. Stylistics. (4) I.

Seminar—3 hours; term paper. Prerequisite: course 192. Analysis of linguistic stylistic variations in specific works to be selected from the corpus of writings in English. (Same course as Linguistics 196.)

Mr. Baker

### g) SENIOR SEMINARS

#### 188. Special Topics in Literary Studies. (4)

I, II, III.

Seminar—3 hours. 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. The course will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment.

The Staff (Chairman in charge)

#### 189. Study of a Major Writer. (4) I, III.

Seminar—3 hours. Prerequisite: junior or senior standing, English major or consent of instructor. The artistic development of one major writer and his intellectual and literary milieu. Limited enrollment.

The Staff (Chairman in charge)

\* Not to be given, 1972–1973.

**\*194H. Special Study for Honors Students.**

(2) I, II, III.

Prerequisite: honors status; one course from courses 1, 2, 3, 4A, 4B. Individual directed study leading to preparation of a long paper. May be repeated once for credit.

The Staff (Chairman in charge)

**197T. Tutoring in English. (1-4) I, II, III.**

Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit.

The Staff (Chairman in charge)

**197TC. Community Tutoring in English. (1-4)**

I, II, III.

Prerequisite: upper-division standing and a major in English; consent of instructor. May be repeated for credit.

The Staff (Chairman in charge)

**198. Directed Group Study. (4) I, II, III.**

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses****200. Techniques of Literary Scholarship. (4) I.**

Lecture—3 hours. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others.

Mr. Woodress

**201. Literary Criticism. (4) I.**

Lecture—3 hours. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

Mr. Hayden

**205. Introduction to Old English. (4) I.**

Lecture—3 hours; written reports; individual conferences. The language of Anglo-Saxon England; readings in Old English prose and poetry.

Mr. Campbell

**206. Beowulf. (4) III.**

Lecture—3 hours. A study of the poem and the Heroic Age of Germanic literature.

Mr. Campbell

**207. Middle and Early Modern English. (4) III.**

Lecture—3 hours. Earlier dialects; the new vocabulary; the later sound shifts and changes to the seventeenth century. Readings in illustrative documents.

Mrs. Homann

**\*210. Readings in English and American Literature.**

(4) I, II, III.

Discussion—3 hours. Prerequisite: upper division English course in area to be studied. Offered

in multiple sections each quarter. Content varies according to specialty of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

The Staff (Chairman in charge)

**\*215. Arthurian Romance. (4) I.**

Lecture—3 hours. The sources of Arthurian Romantic literature; Continental and English literary treatment; Malory's synthesis; significant changes of attitudes in post-Malory literature.

Mrs. Homann

**\*225. Topics in Irish Literature. (4) I, II, III.**

Seminar—3 hours. Prerequisite: course 139. Course will vary from quarter to quarter and will include such topics as the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author.

**\*230A. Studies in Major Writers: Chaucer. (4) III.**

Seminar—3 hours.

Mr. Silvia

**\*230B. Studies in Major Writers: Milton. (4) II.**

Seminar—3 hours.

Miss Van Norden

**\*231. American-European Literary Relations. (4) I.**

Lecture—3 hours. The interchange of ideas and forms between America and Europe.

Mr. Carter

**\*232A. Problems of English Romantic Literature.**

(4) III.

Seminar—3 hours. Selected issues in the current study and critical assessment of Romantic literature.

Mr. Hayden

**\*232B. Problems of English Victorian Literature.**

(4) II.

Seminar—3 hours. Selected issues in the current study and critical assessment of Victorian literature.

Mr. Gilbert

**233. Problems in American Literature. (4) II.**

Seminar—3 hours. Selected topics for intensive investigation.

Mr. Carter

**234. Dramatic Literature. (4) III.**

Seminar—3 hours. A historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

**\*235. Fiction. (4) I.**

Seminar—3 hours. Theories of fiction as reflected in the practice of writers from the eighteenth century to the present.

Mrs. Needham

**\*236. Poetics. (4) II, III.**

Seminar—3 hours. Metaphor, style, and structure in English poetry from the sixteenth century to the present.

Mr. Shapiro

\* Not to be given, 1972-73.

**237. Modern Critical Theory. (4) II.**

Seminar—3 hours. Examination of problems in the theory underlying the practice of literary criticism from I. A. Richards and T. S. Eliot to the present.  
Mr. Ainos

**240A–240B–240C. Medieval Literature.**

(4–4–4) I–II–III.

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Silvia

**\*242A–242B–242C. Sixteenth-Century Literature.**

(4–4–4) I–II–III.

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)

**\*244A–244B–244C. Shakespeare. (4–4–4) I–II–III.**

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)

**\*246A–246B–246C. Seventeenth-Century Literature.**

(4–4–4) I–II–III.

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Miss Van Norden

**248A–248B–248C. Eighteenth-Century Literature.**

(4–4–4) I–II–III.

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Hopkins, Mrs. Needham

**\*250A–250B–250C. Romantic Literature.**

(4–4–4) I–II–III.

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Hayden

**\*252A–252B–252C. Victorian Literature.**

(4–4–4) I–II–III.

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mrs. Murray

**\*254A–254B–254C. Twentieth-Century British Literature. (4–4–4) I–II–III.**

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Hanzo

**256A–256B–256C. Early American Literature.**

(4–4–4) I–II–III.

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Weber

**\*258A–258B–258C. American Literature: 1800 to the Civil War. (4–4–4) I–II–III.**

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Hoffman

**\*260A–260B–260C. American Literature: Civil War to 1914. (4–4–4) I–II–III.**

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Woodress

**\*262A–262B–262C. American Literature after 1914. (4–4–4) I–II–III.**

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Weber

**264A–264B–264C. Studies in Modern British and American Literature. (4–4–4) I–II–III.**

Seminar—2 hours; conference—1 hour. (Deferred grading only, pending completion of sequence.)  
Mr. Hanzo

**289. Study of a Major Writer. (4) II, III.**

Seminar—3 hours. The artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

The Staff (Chairman in charge)

**\*298. Directed Group Study. (1–5) III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Weber in charge)

**299. Individual Study. (1–4) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Chairman in charge)

**299D. Special Study for the Doctoral Dissertation.**

(1–8) I, II, III.

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Chairman in charge)

**Professional Courses****300. Problems in Teaching English Language, Literature and Composition in Secondary Schools. (3) III.**

Lecture—2 hours. Prerequisite: senior or graduate standing; an English teaching major or minor. This course should be completed before practice teaching. The course is accepted in partial satisfaction of the requirement in education for the general secondary credential.

Mr. Harsh

**\*301. The Teaching of English as a Foreign Language. (4) II.**

Lecture—3 hours. Methods for the use of applied linguistics in the teaching of English to nonnative speakers.

\* Not to be given, 1972–73.

§ Not to be given, spring quarter 1973.

**390A. Teaching English at the College Level. (2) I.**

Lecture-discussion—2 hours; observation of freshman English courses—2 hours. Prerequisite: graduate standing. A consideration of the problems and techniques of teaching English composition at the college level. (Satisfactory/Unsatisfactory grading only.) Mr. Isaak

**390B. Teaching English at the College Level. (2) III.**

Lecture-discussion—2 hours; observation of freshman English courses—2 hours. Prerequisite: graduate standing. A consideration of the problems and techniques of teaching literature at the college level. (Satisfactory/Unsatisfactory grading only.) Mr. Isaak

**ENTOMOLOGY**

*Major Advisers.*—See *Class Schedule* listing. *Major Program and Graduate Study.* See pages 80 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses****1. An Introduction to Entomology. (5) III.**

Lecture—3 hours; laboratory—6 hours. A basic study of insects: their biology, anatomy, classification and relation to human welfare.

Mr. Strong

**10. Natural History of Insects. (3) I, III.**

Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course I but students who have taken this course may take course I for credit. Biology, taxonomy and behavior of insects. A cultural and technical course providing an introduction to the insects. Mr. Bacon

**Upper Division Courses****101. Introduction to Structure and Function in Insects. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course I. General principles of insect morphology with emphasis on the functional approach. Comparative anatomy of selected insect types. Mr. Summers

**102. Insect Physiology. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course I or equivalent; Chemistry 8B; course 101 recommended. Vital functions of insects and related organisms. Mr. Judson

**103. Systematic Entomology. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in zoology or entomology. The principles of taxonomy in animals; speciation; introduction to classification and nomenclature. Mr. Bohart

**104. Insect Ecology. (4) II.**

Lecture—4 hours. Prerequisite: upper division standing in one of the biological sciences. Principles of ecology with examples from the insects; analysis of the insect environment; population dynamics. Mr. Cothran

**105. Insect Classification. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course I. Principles and methods of classification of insects to the family level with emphasis on identification.

Messrs. Thorp, Bohart, Grigarick

**106. Field Entomology. (2) III.**

Laboratory—6 hours. Prerequisite: course 105 or consent of instructor. Collection and comparative analyses of insect faunas from selected ecological zones in California. Offered in odd-numbered years. Mr. Thorp

**\*109. Field Taxonomy and Ecology. (5) (Extra Session—Summer).**

Lecture—2 hours; laboratory—24 hours. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology. Offered in even-numbered years.

Mr. Bohart

**110. Economic Entomology. (4) III.**

Lecture—2 hours; laboratory—6 hours. An introductory course dealing with the identification, biology, and control of economic insects, with emphasis on those attacking agricultural crops. Mr. Grigarick

**112. Principles of Agricultural Entomology. (4) II.**

Lecture—4 hours. Prerequisite: an introductory course in entomology or consent of instructor. Principles and problems in the control of insects and mites; integrated control, residues, considerations of application equipment, philosophy of sampling. Mr. Lange

**\*116. Biology of Aquatic Insects. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: an introductory course in entomology or consent of instructor. A study of the life histories, ecology, and identification of insects associated with streams, ponds, and lakes. Offered in even-numbered years. Mr. Grigarick

**117. Chemistry of Insecticides. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B or consent of instructor. Chemical composition and reactions of insecticides; their physiological effects on plant and animal tissues. Mr. Stafford

\* Not to be given, 1972-73.

**119. Apiculture. (3) II.**

Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities.

Mr. Laidlaw, Mr. Gary

**119L. Apiculture Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: course 119. Biology and behavior of honeybees (especially communicative behavior); fundamentals of colony management necessary for efficient agricultural use; utilization of bees in research and teaching.

Mr. Gary, Mr. Laidlaw

**121. Insect Behavior. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. Evolution of behavior, sense organs, specific types and patterns of behavior, comparative behavior, learning, and applied aspects of behavioral phenomena. Analysis of movies on behavior.

Mr. Gary

**123. Classification of Immature Insects. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in entomology. Criteria used to identify the immature forms of the principal orders and families of insects; primary emphasis on economic groups. Offered in even-numbered years.

Mr. Lange

**125. Insect Vectors of Plant Pathogens. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in entomology or plant pathology, or consent of instructor. The role of insects and mites in the transmission of plant pathogens with emphasis on the biological relationships between insect vectors and plant viruses they transmit. Virus transmission techniques and approaches to control.

Mr. McLean

**127. Acarology. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 103 or 110. The morphology, taxonomy, and ecology of mites, with emphasis on plant and animal parasites. Offered in odd-numbered years.

Mr. Summers

**\*130. Biological Control of Insect and Weed Pests. (4) II.**

Lecture—4 hours. Prerequisite: introductory course in entomology or consent of instructor. Theories and practices of biological control; population phenomena, and the biology of entomophagous insects. Offered in even-numbered years.

Mr. Bacon

**153. Medical Entomology. (3) III.**

Lecture—3 hours. Prerequisite: one course in entomology or consent of instructor. The worldwide relationships of insects and other

arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne diseases of man and principles of their control.

Mr. McClelland

**170. Insect Pest Management. (6) (Extra Session)—Summer.**

Lecture—60 hours total; laboratory and field trips—100 hours total. Prerequisite: upper division standing and at least one course in agricultural entomology or insect ecology. A field course in pest management principles and practices. Students participate in detection and sampling for pest and beneficial species and evaluation of damage; and also plan and conduct experiments utilizing biological, chemical, and cultural control methods.

Messrs. Doust, Leigh, Rice, Summers

**198. Directed Group Study. (1-5) I, II, III. (Summer)**

Prerequisite: consent of instructor.

The Staff (Mr. Bacon in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III. (Summer).**

The Staff (Mr. Bacon in charge)

**Graduate Courses****202. Advanced Insect Physiology. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 102 or Zoology 112, or consent of instructor; Biochemistry 101A or 101B recommended. Selected topics of insect physiology. Intensive study of topics of current interest, which will vary from year to year. The course may be repeated for credit. Offered in odd-numbered years.

Mr. Judson

**\*203. Principles of Systematic Entomology. (3) II.**

Lecture—3 hours. Prerequisite: course 103. Theory and philosophy of taxonomy with emphasis on phylogeny, zoogeography, and nomenclature of insects. Offered in even-numbered years.

Mr. Bohart

**\*219. Advanced Apiculture. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119 or consent of instructor. Advanced topics in bee biology with special consideration of morphology, genetics, caste differentiation, and artificial insemination. Offered in even-numbered years.

Mr. Laidlaw

**253. Advanced Medical Entomology. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: one upper division course in entomology other than 153 and one course in microbiology; course 153 is recommended. A study in depth of one or more selected arthropod-borne diseases of man with emphasis on the relationship of the physiology, behavior and

\* Not to be given, 1972-73.

population dynamics of the vector to the ecology of the disease. Emphasis in the laboratory on epidemiologic techniques relating to vectors and taxonomy of a selected group. Mr. McClelland

**\*255. Electronic Principles Related to Entomological Research. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course in college physics or chemistry. Basic electronic principles of a-c and d-c circuits discussed without mathematical emphasis. Methods of electrical measurements presented. The operation of vacuum tubes and semiconductor devices and their uses in power supplies, amplifiers, oscillators, and switching discussed and demonstrated. Offered in odd-numbered years.

Mr. McLean

**275. Principles and Methods of Entomological Research. (4) II.**

Lecture—2 hours; laboratory—6 hours. Techniques and purposes of the scientific

method as related to the field of entomological research with emphasis on problem selection, methods of attack, and the accompanying collection, evaluation, and presentation of data. Offered in odd-numbered years. Mr. Strong

**290. Seminar. (2) I, II, III.**

Seminar—2 hours.

The Staff (Mr. Strong in charge)

**291. Seminar in Medical Entomology. (2) I.**

Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals. Mr. McClelland

**298. Group Study. (1-5) I-II-III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Bacon in charge)

**299. Research. (1-12) I, II, III. (Summer)**

The Staff (Mr. Summers in charge)

## ENVIRONMENTAL HORTICULTURE

*Related Major Programs and Graduate Study.*

—See pages 81, 91, and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Lower Division Courses

**1. Introduction to Landscape Design. (3) II.**

Lecture—3 hours. Recommended for non-majors. Design principles and criteria used in analyzing, evaluating, and developing the visual and functional aspects of landscaped areas.

Mr. Deering

**2. Introduction to Landscape Design Laboratory. (2) III.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1. Practice in analysis and design with reference to landscape problems.

Mr. Deering

**5. Introduction to Environmental Plants. (2) I, III.**

Lecture—1 hour; laboratory—3 hours. Recommended for non-majors. The course introduces plants commonly used in the landscape. The origin, domestication and breeding of cultivated plants is discussed. Students learn to identify the more important environmental plants of California.

Mr. Hackett, Mr. Harding

**10. Landscape Horticulture for the Home and Community. (3) III.**

Lecture—2 hours; discussion—1 hour. Recommended for non-majors. The influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

Mr. Kofranek, Mr. Hackett

**47. Introduction to Environmental Horticulture.**

(1) III.

Field Study—30 hours. Prerequisite: consent of instructor. An introduction to environmental horticulture including parks and recreation; landscape architecture; urban and resource planning; landscape construction and contracting; nursery production; commercial floriculture; arboriculture; sales and services; teaching, research and extension. Offered in odd-numbered years. (To be given between the winter and spring quarters. Considered a spring quarter course for preenrollment.)

Mr. Harris

**98. Directed Group Study for Lower Division Students. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Kofranek in charge)

**99. Special Study for Lower Division Students.**

(1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Kofranek in charge)

### Upper Division Courses

**104. Landscape Construction. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 1, 2; Engineering 1 recommended. Analysis of the physical, mechanical, functional and aesthetic properties of materials used in landscape development with emphasis on construction techniques, methods and specifications.

Mr. Madison

**105. Taxonomy and Ecology of Environmental Plants. (4) II.**

Lecture—2 hours; laboratory—6 hours; field

\* Not to be given, 1972-73.



trips. Prerequisite: course 5 or one course in taxonomy. Taxonomy of the important plants used in the western landscape. Emphasis will be placed on the identification, nomenclature, characteristics and uses of woody plants in man's environment. Mr. Leiser

**107. Herbaceous Environmental Plants. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 5 or one course in taxonomy. The identification, ecology, and use of herbaceous environmental plants, with emphasis on floricultural and foliage plants, garden annuals, and perennials. Mr. Madison

**115. Advanced Taxonomy and Ecology of Environmental Plants. (4) III.**

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 105 or consent of instructor. Identification, nomenclature and classification of plants for man's environment are studied in relation to extensive variations and ecological modification. Emphasis is placed on the use of plants in western climatic zones. Nomenclatural codes are discussed. Mr. Leiser

**125. Floriculture and Nursery Management. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles in planning, establishing and maintaining container grown crops with special consideration of green house production. Several field trips during scheduled laboratory hours and one all-day Saturday field trip required. Mr. Hackett, Mr. Kofranek

**128A. Landscape Horticulture. (3) I.**

Lecture—2 hours; laboratory—2 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles of planting, establishing, and maintaining plantings in the landscape with

emphasis on turf. Laboratory methods are used to analyze problems related to nutrition, salinity and water quality. Mr. Madison, Mr. Paul

**128B. Landscape Horticulture. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Principles and practices for the development and management of plants in urban and natural landscapes with emphasis on trees and shrubs. Mr. Harris

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. Selected problems in floriculture, nursery management, and landscape horticulture. The Staff (Mr. Kohl in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. The Staff (Mr. Kohl in charge)

**Graduate Courses**

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Selected topics in floriculture, nursery management, and environmental horticulture. The Staff (Mr. Kohl in charge)

**298. Group Study. (1-5) I, II, III.**

Group study on advanced topics in floriculture, nursery management, and environmental horticulture. The Staff (Mr. Paul in charge)

**299. Research. (1-12) I, II, III.**

Prerequisite: graduate standing. Research in floriculture, nursery management, and landscape horticulture. The Staff (Mr. Paul in charge)

**Related Courses:** see Plant Science.

**ENVIRONMENTAL PLANNING AND MANAGEMENT**

*Major Advisers.*—See *Class Schedule* listing.

*Major Program.*—See page 81.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Course**

**1. Environmental Quality. (3) I.**

Lecture—3 hours; one Saturday field trip. Components of environmental quality, significant issues, relationships and implications for planning, design, management and interpretation of urban and natural environments. Mr. Gold

**Upper Division Courses**

**110. Urban and Regional Planning. (3) II.**

Lecture—3 hours; one Saturday field trip.

The history, nature, scope, and significance of planning in America including definitions and concepts, the planning process, significant problems, policy issues and the future. Mr. Gold

**116. Outdoor Recreation. (3) III.**

Lecture—3 hours; one Saturday field trip. The history, nature, scope, and significance of outdoor recreation in American life, with emphasis on user-resource relationships, special problems, policy issues, and innovation. Mr. Gold

**122. Recreation Policy. (3) II.**

Lecture—3 hours; one Saturday field trip. Prerequisite: course 116. Development of public policy and the decision process of recreation resource allocation, development and management at the national, state, and local levels. Offered in odd-numbered years.



**124. Leisure Systems. (3) III.**

Lecture—3 hours; one Saturday field trip. Prerequisite: course 116 (may be taken concurrently). Analysis of public and private means used to provide leisure opportunities in urban and natural areas emphasizing outdoor recreation as one component of a social service system including means-ends relationships, policy, planning and development of social indicators. Offered in odd-numbered years.

**\*134. Planning of Recreation Environment. (3) I.**

Lecture—3 hours; one Saturday field trip. Prerequisite: course 116; course 124 recommended. Concepts, principles, techniques, and methods used in the planning, analysis and evaluation of leisure environments with emphasis on public outdoor recreation resources, landscape analysis, resource allocation, rationalization and the decision process. Offered in odd-numbered years. Mr. Jardins

**\*136. Design of Recreation Environments. (3) III.**

Lecture—3 hours; one Saturday field trip. Prerequisite: course 1 and Environmental Horticulture 1 and 2. Concepts, principles, techniques, problems and potentials in the design, analysis and evaluation of recreation environments with emphasis on public outdoor recreation resources, form and function, visual quality and the implications of design alternatives on the urban and natural landscape. Offered in even-numbered years. Mr. Deering

**144. Park Operations. (3) III.**

Lecture—2 hours; laboratory—3 hours; one Saturday field trip. Prerequisite: course 116, Environmental Horticulture 128A, 128B. Planning, execution and supervision of field maintenance and operations with emphasis on performance budgeting, personnel practices and scheduling. Familiarization with different areas, techniques and technology to develop and maintain park and recreation areas. Mr. Harris

**160. Environmental Interpretation. (3) III.**

Lecture—2 hours; laboratory—2 hours; two field trips. Prerequisite: course 1 recommended. Principles and analysis of interpretative techniques, media, materials and programs of public park and recreation agencies, museums, botanical and zoological gardens, schools and organizations, including the planning, construction and use of interpretive devices and facilities. Mr. Kuehner

**196. Outdoor Recreation Field Studies. (1-6) I.**

Field study. Prerequisite: course 116; course 124 recommended. Survey, analysis and evaluation of the planning, design, management and program of public and private recreation environments with emphasis on field observation of administrative practices, user behavior, environmental design and program innovations. To be given prior to the fall quarter. Considered a fall quarter course for preenrollment. The Staff (Mr. Gold in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. The Staff (Mr. Gold in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

Prerequisite: 3 units of upper division work in park administration; consent of instructor. The Staff (Mr. Gold in charge)

**Graduate Courses****222. Recreation Policy. (3) II.**

Lecture—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of the development and application of public policy of recreation resource allocation, development and management. Offered in even-numbered years. Mr. Gold

**\*234. Planning Recreation Environments. (3) III.**

Lecture—2 hours; laboratory—2 hours; weekend field trip. Prerequisite: course 134 or consent of instructor. Application of concepts, techniques, and methods to the analysis, evaluation, and planning of recreation environments. A multidisciplinary, team approach to actual situations. Offered in even-numbered years. Mr. Gold

**290. Seminar. (1-2) I, II, III.**

Seminar—1-2 hours. An interdisciplinary seminar on selected current topics related to environmental planning, leisure behavior and environmental quality. The Staff (Mr. Gold in charge)

**299. Research. (1-6) I, II, III.**

Research—3-18 hours. The Staff (Mr. Gold in charge)

**Related Courses:** see Agricultural Economics 147, 148; Environmental Studies 12, 102, 160; Resources Sciences 100.

**ENVIRONMENTAL STUDIES†**

Leonard O. Myrup, Ph.D., *Chairman*  
Division Office, 554 Hutchison Hall

**Professors:**

Charles R. Goldman, Ph.D.

<sup>1</sup>William J. Hamilton, III, Ph.D.

\* Not to be given, 1972-73.

† Intercollege division.

<sup>1</sup> Absent on leave, 1972-73.

**Associate Professor:**

Leonard O. Myrup, Ph.D.

**Assistant Professors:**

- John W. Brewer, Ph.D.
- Warren R. Cothran, Ph.D.
- Thomas E. Dickinson, Ph.D.
- Theodore C. Foin, Jr., Ph.D.
- Wilson B. Goddard, Ph.D.
- James McEvoy, Ph.D.
- Robert A. Johnston, Ph.D.
- Thomas M. Powell, Ph.D.
- Peter J. Richerson, Ph.D.
- Seymour I. Schwartz, Ph.D.
- Geoffrey A. Wandesforde-Smith, Ph.D.



**Professor:**

Robert Sommer, Ph.D. (*Psychology*)

**Associate Professor:**

Alvin D. Sokolow, Ph.D. (*Political Science*)

**Assistant Professors:**

- Ruth Dixon, Ph.D. (*Sociology*)
- Jess F. Kraus, Ph.D. (*Community Health*)

**Lecturer:**

William A. Harvey, M.S.

The Intercollege Division of Environmental Studies presents undergraduate and graduate programs relating to environmental and resource management problems, including theory and principles. Opportunities to learn methods for analysis and applications for problem-solving are provided through regular courses, workshops, and directed group studies. The goals of these programs provide a concentration of broad focus courses that may be elected by students from any college or school to help establish the relevance of their discipline to environmental problems as well as a core program in environmentally oriented general studies for graduate and undergraduate students who are developing professional depth in such areas as resource sciences, ecology, environmental planning, engineering, or other fields important to environmental management.

For the latest information on current undergraduate and graduate programs in environmental studies, contact the Division of Environmental Studies.

**Lower Division Courses**

**5. Applied Mathematics for Environmental Studies. (4) II.**

Lecture—4 hours. Elements of calculus and computer simulation. Introduction to the con-

cept of state, the classical theories of modeling socio-ecosystems; urban dynamics, and Richardson's theories of deadly quarrels. Emphasis on the axiomatic approach to model building. Criticisms of social system models. Mr. Brewer

**6. Applied Probability Theory for Environmental Studies. (4) III.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 5. Elements of probability theory and Monte Carlo simulation. Emphasis on the experimental approach to model building. Examples of functional models of socio-systems and ecosystems. Analysis of variance and hypothesis testing. Mr. Brewer

**10. Introduction to Environmental Studies. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Recommended: elementary biology. A survey of the importance of ecology and systems behavior for man-environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and conservation are covered. Includes several integrative case studies, and features individual reading in environmental problems.

**12. Environmental Planning. (4) II.**

Lecture—3 hours; discussion and field trips—1 hour. Elementary concepts of the planning process with application to environmental problems. Mr. Johnston

**98. Directed Group Study. (1-5) I, II, III.**

Mr. Myrup

**Upper Division Courses**

**100. General Ecology. (4) I.**

Lecture—4 hours. Prerequisite: course in biology. Principles of basic animal and plant ecology emphasizing population dynamics and the environmental relationships involved in communities and ecosystems. Includes a unit on the applications of basic ecological theory to the management of pest populations with emphasis on the insects. Mr. Harding, Mr. Foin

**101. Social Processes. (4) II, III.**

Lecture—3 hours; discussion—1 hour. An examination of the problem of determining what are the crucial variables in the social processes that relate man to the environment. Economic theory, human ecology and general systems theory are examined to evaluate their utility in isolating strategic social variables. (Same course as Sociology 101.) Mr. McEvoy, Mr. Richerson

**102. Environmental Decision Making. (4) III.**

Lecture—3 hours; discussion—1 hour. A survey and examination of approaches and concepts in decision making relevant to environmental problems. Discussion of collective action, problems of institutional design, the implications of public sector entrepreneurship, and the effects of technology on alternative decision structures. Mr. Wandesforde-Smith, Mr. Schwartz

**\*110. Social Systems of Animals and Man. (5) II.**

Lecture—3 hours; discussion—1 hour; term paper. Recommended: course 100 or equivalent. 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. Mr. Hamilton

**111. Cultural Ecology. (4) III.**

Lecture—3 hours; discussion—1 hour. A comparative survey of the interaction between diverse human cultural systems and the environment of the peoples that practice them. Primary emphasis is given to the people living in rural and relatively undeveloped environments as a basis for interpreting more complex environments. Mr. Richerson

**112. Environmental Law. (4) II.**

Lecture—4 hours; discussion—1 hour. Introduction for non-Law School students to principle theories and concepts of environmental law and to development of judicial institutions for environmental management and policy making. Analysis of selected federal and state legislation and its effectiveness in problem solving. Mr. Ayer

**131. Environmental Health. (4) II.**

Lecture—3 hours; discussion—1 hour. Contemporary problems in environmentally dependent aspects of individual and public health. Diseases associated with pollution of air, water, soil and food; infectious diseases such as malaria and encephalitis and stress phenomena related to urban crowding, noise and occupation will be considered. Mr. Kraus

**133. Population Analysis. (4) III.**

Lecture—3 hours; laboratory—3 hours. A comparative and historical examination of interrelations between population dynamics and social organization, technology, and the environment; statistical analysis of the relation of demographic processes of fertility, mortality, and migration to variations and changes in human population size, composition, and distribution. Miss Dixon

**140. Limnology. (4) III.**

Lecture—3 hours; special project. Prerequisite: junior standing; Biological Sciences I. The biology and productivity of inland waters with emphasis on the physical and chemical environment. Mr. Goldman

**140L. Limnology Laboratory. (3) III.**

Laboratory—6 hours. Prerequisite: course 140 (may be taken concurrently). Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology. Mr. Goldman

**144. Oceanography. (4) II.**

Lecture—3 hours; discussion—1½ hours; demonstration; term paper. Prerequisite: Biological Sciences I. Biological, chemical, physical, and geological aspects of the marine environment. Consideration of biological communities, productivity, the distribution of currents and tides, the origin of ocean basins, and marine sedimentation. Mr. Goldman

**\*160. Public Mechanisms for Controlling Land Use. (4) II.**

Lecture-discussion—4 hours. Prerequisite: an introductory course in planning. 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. Mr. Johnston

**162. Planning and Decision Making in Small Urban Communities. (4) III.**

Lecture-discussion—4 hours. Examination of urban processes in small U.S. communities, with particular attention to how local governments respond in their structures and programs to community growth, or non-growth, and development. The political consequences of excessive subdivision development, overburdened utility plants, and alternative taxation strategies. Mr. Sokolow

**166. Case Studies in Institutional Failure and Reform. (4) I.**

Lecture-discussion—4 hours. Selected case studies demonstrating the institutional constraints faced in environmental problem-solving in the public sector. Cases of legislative, regulatory, and administrative-management agencies covering national, international and subnational problems in environmental management will be discussed. Mr. Wandesforde-Smith

**168. Environmental Problems and Market Failure. (4) III.**

Lecture-discussion—3 hours. Prerequisite: course 102 or 1 course in microeconomic theory and political science. Analyses of environmental problems as examples of market failure. The application of political and economic theories to external costs and irreversibilities in problems such as urban sprawl, depletion and pollution. Mr. Dickinson, Mr. Schwartz

**170. Environmental Awareness. (4) III.**

Lecture—3 hours; discussion—1 hour. Interactions of people with man-made environments. Research methods for evaluating designed environments and reviews of current research in

\* Not to be given, 1972-73.

environmental psychology. Illustrations include the connection between the design of schools, parks, hospitals, and dormitories on the behavior of occupants. (Same course as Psychology 170). Mr. Sommer

**185. Methods for Analysis of Complex Systems.**  
(4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: elementary programming, calculus, and statistics. The strategy and tactics of ecosystem analysis is combined with analytical and simulation procedures to explore the problem-solving capability of mathematical model build-up for complex environmental problems. Students will be exposed to simulation languages and will be expected to apply their training in individual projects. Mr. Schwartz

**186. Population Dynamics and Simulation.** (4) II.

Lecture—2 hours; laboratory—4 hours. Prerequisite: elementary calculus, statistics, and programming; elementary ecology; or consent of instructor. The dynamics of population systems and the use of simulation to attack theoretical problems treated through several case studies and individual/team projects. Different types of mathematical modeling compared. Mr. Foin

**190. Workshops on Environmental Problems.** (1-8) I, II, III.

Laboratory—2-16 hours. Prerequisite: consent of instructor. Workshops featuring empirical analyses of contemporary environmental prob-

lems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application. Mr. Myrup in charge

**192. Internships in Environmental Management.**  
(2-4) I, II, III.

Prerequisite: consent of instructor. A supervised program of student internships with public agencies having responsibility for environmental control. Deals with the application and evaluation of theoretical concepts through work experience and systematic observation. Mr. Dickinson

**198. Directed Group Study.** (1-5) I, II, III.

Mr. Myrup in charge

**199. Special Study for Advanced Undergraduates.**  
(1-5) I, II, III.

Prerequisite: consent of instructor. Directed study of a topic selected by the student and an instructor. Mr. Myrup in charge

**Graduate Courses**

**298. Directed Group Study.** (1-5) I, II, III.

Mr. Myrup in charge

**299. Research.** (1-12) I, II, III.

Prerequisite: graduate standing. (Satisfactory/Unsatisfactory grading only.)

Mr. Myrup in charge

**ENVIRONMENTAL TOXICOLOGY**

*Related Undergraduate Majors.*—See pages 76 and 81.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**10. Protecting the Quality of the Environment.**  
(3) III.

Lecture—3 hours. Prerequisite: open to science and nonscience majors. A discussion of man-made hazards in the world around us, including how they might be minimized. Topics to be covered: air, water and soil pollution; food safety, waste disposal. Included are household, domestic and agricultural chemicals and industrial toxicants. Mr. Kilgore, Mr. Krieger

**98. Directed Group Study.** (1-5) I, II, III.

Prerequisite: consent of instructor.  
The Staff (Mr. Kilgore in charge)

**99. Special Study for Undergraduates.**  
(1-5) I, II, III.

Prerequisite: consent of instructor.  
The Staff (Mr. Kilgore in charge)

**Upper Division Courses**

**110. Air Pollutants.** (3) II.

Lecture—3 hours. Prerequisite: Chemistry 1C and Biological Sciences 1, or equivalents; course 10 recommended. The physical and chemical properties and biological functions of air contaminants; their behavior in the atmosphere, movement and fate; their effects on man, crops and animals; economic, social and legislative considerations. Mr. Hsieh

**180. Principles of Environmental Toxicology.** (3) I.

Lecture—3 hours. Prerequisite: Chemistry 8B or 128C (or equivalent); Biochemistry 101A recommended. A unified introduction to principles underlying the use and environmental consequences of pesticides, food additives, and other chemicals; their regulation; and their health significance. Mr. Crosby, Mr. Krieger

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Kilgore in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Kilgore in charge)

**Graduate Courses****203. Environmental Toxicants. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C (or equivalent), or Chemistry 8B and consent of instructor. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance.

Mr. Crosby

**214. Mechanisms of Toxic Action. (3) II.**

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

Mr. Kilgore

**220. Analysis of Toxicants. (3) III.**

Lecture—3 hours. Prerequisite: course 180 and consent of instructor; course 203 recom-

mended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

Mr. Seiber

**220L. Analysis of Toxicants Laboratory. (2) III.**

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.

Mr. Seiber

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Current topics in environmental toxicology. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Kilgore in charge)

**298. Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxicants, and new pesticides.

The Staff (Mr. Kilgore in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Kilgore in charge)

**EPIDEMIOLOGY AND PREVENTIVE MEDICINE**Walter W. Sadler, D.V.M., M.P.H., *Chairman of the Department*

Department Office, 2075 Haring Hall

**Professors:**

Henry E. Adler, D.V.M., Ph.D.  
Raymond A. Bankowski, D.V.M., Ph.D.  
Livio G. Raggi, D.V.M., Ph.D.  
Hans P. Riemann, D.V.M., Ph.D.  
Walter W. Sadler, D.V.M., M.P.H.  
Calvin W. Schwabe, D.V.M., M.P.H., Sc.D.  
Richard Yamamoto, Ph.D.

**Associate Professor:**

Charles E. Franti, Ph.D.

**Assistant Professor:**

Alvin D. Wiggins, Ph.D.

◇ ◇ ◇

**Professors:**

Ralph J. Audy, M.B., Ph.D. (*San Francisco Campus*)  
Nemat O. Borhani, M.D., M.P.H. (*Internal Medicine and Community Health*)  
Stewart H. Madin, D.V.M., Ph.D. (*Berkeley Campus*)  
Nicholas L. Petrakis, M.D. (*San Francisco Campus*)

**Assistant Professor in Residence:**

Constantin Genigeorgis, D.V.M.,  
M.S., Ph.D.

**Lecturers:**

Robert B. Bushnell, D.V.M.  
Fred N. Cooper, B.S.P.H.  
George L. Crenshaw, D.V.M.  
Fredric L. Frye, D.V.M.  
Murray B. Gardner, M.D.  
George L. Humphrey, D.V.M., M.P.H.  
Winifred E. Kistler, M.L.S.  
Ming-Yu Li, Ph.D., M.L.S.  
Bryan Mayeda, D.V.M.  
R. H. McCapes, D.V.M.  
Marjan Merala, M.S., Ldo. Vet.  
Lloyd J. Neurauter, D.V.M., M.P.H.  
Arnold S. Rosenwald, D.V.M., Ph.D.  
John C. Sawyer, D.V.M., M.P.V.M.  
Charles R. Schroeder, D.V.M.  
Patton L. Smith, D.V.M., M.P.V.M.  
Herald G. Wixom, D.V.M.  
James H. Wommack, D.V.M.  
George K. York, Ph.D.

**Upper Division Courses****101. Perspectives in Veterinary Medicine. (2) I.**

Lecture—2 hours. Consideration of the present-day scope of veterinary medicine and of the role of the veterinary profession in modern society.

Mr. Schwabe

**102. Biomedical Information Retrieval. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: enrollment in the School of Veterinary Medicine or consent of instructor. The use of bibliographic tools in the biomedical sciences; the use and availability of demographic data; the application of manual and machine systems for storage and retrieval of data; and consideration of computerized systems in literature retrieval and clinical data processing.

Mrs. Kistler, Messrs. Li, Merala, Franti

**103A. Medical Statistics. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Use of statistics in clinical, laboratory and population medicine; graphical and tabular presentation; biomedical statistical laboratory to accompany introductory course in statistics. Mr. Franti, Mr. Wiggins

**103B. Medical Statistics. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103A or consent of instructor. Regression, correlation, analysis of variance in biomedical sciences; time-dependent variation and trends; bioassay; introduction to mathematical epidemiology; non-parametric methods.

Mr. Franti, Mr. Wiggins

**103C. Medical Statistics. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103B or consent of instructor. Continuation of course 103B; additional topics in bioassay; life tables and cohort studies; clinical trials; problems in sampling and surveys.

Mr. Franti, Mr. Wiggins

**111. Animal Hygiene. (3) III.**

Lecture—3 hours. Prerequisite: Biological Sciences I or consent of instructor. The causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

Mr. Adler

**140. Principles of Epidemiology. (2) II.**

Lecture—1 hour; case study—2 hours. Prerequisite: sophomore standing in the School of Veterinary Medicine or consent of instructor. Introduction to medical ecology with special consideration given to modes of disease transmission and to interrelationships between those host, agent, and environmental factors which are responsible for the distributional patterns of diseases in space and time.

Mr. Schwabe

**150. Food-borne Infections and Intoxications. (4) II.**

Lecture—4 hours. Prerequisite: Bacteriology 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 those agents; prevention of food-borne diseases. Messrs. Genigeorgis, Riemann, York

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses**

**201. Diseases of Laboratory Animals. (3) II.**

Lecture—3 hours. Prerequisite: senior standing in veterinary medicine or consent of instructor. A study of infectious and noninfectious diseases of laboratory animals, including diagnostic procedures and treatment. Mr. Adler

**205. Physiological and Ecological Bases of Parasitism. (3) III.**

Lecture—two 1½-hour lectures per week. Prerequisite: general parasitology and introductory biochemistry or consent of instructor. The physiological adaptations of protozoa and helminths for parasitism with consideration given to those host factors which influence the establishment of host-parasite associations. Offered in even-numbered years. Mr. Harlow

**208. Avian Medicine. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or consent of instructor. Etiology, pathology, diagnosis, epidemiology, prevention and control of diseases of poultry, including those important to public health. Demonstration and discussion of selected diseases: necropsy, diagnosis, and prevention.

Messrs. Raggi (in charge), Adler, Bankowski, Yamamoto

**210. Advanced Epidemiology. (5) I.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: a doctoral degree (or equivalent) in veterinary medicine, human medicine, or dental medicine, and consent of instructor. Methods for the study of diseases in populations both of lower animals and of man, with critical discussions of illustrative case examples of "classical" and contemporary epidemiological research.

Mr. Riemann, Mr. Schwabe

**212. Epidemiology of the Zoonoses. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 210 or consent of instructor. The epidemiological features of infections and infestations shared by man and other animals with particular attention to those perpetuated in nature by wildlife and those which are of greater public health and economic significance.

**214. Comparative Epidemiology of Noninfectious Diseases. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210 or consent of instructor. Study of the environmental and host factors which are associated with the occurrence of diseases of noninfectious or unknown etiology. Emphasis will be placed on the comparison of the epidemiologic features of these diseases in man and lower animals.

**216. Mass Screening for Diseases in Populations. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210 or consent of instructor;



Veterinary Microbiology 270 recommended. Consideration of immunodiagnostic, biochemical, and other techniques for mass screening of human and animal populations for abnormalities and disease; evaluation of their usefulness to study incidence and/or prevalence of such conditions and for application in programs of prevention and control. Mr. Yamamoto, Mr. Adler

#### 218. Disease Control and Eradication. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 216 or consent of instructor. Studies of various approaches used to control diseases in lower animals and man. Discussions will be concerned with past successes and failures and emphasis placed on future prospects and limitations of these methods. Mr. Bankowski

#### 240. Public Health. (3) III.

Lecture—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or consent of instructor. Introduction to public health and to the responsibilities of the veterinarian; consideration of the roles of lower animals in the causation and perpetuation of human diseases; consideration of occupational health hazards associated with the practice of veterinary medicine.

#### 250. Veterinary Food Hygiene. (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: Junior standing in the School of Veterinary Medicine or consent of instructor. Discussion of public health importance of diseases

transmitted to man through meat, poultry, and milk; the means and likelihood of preventing their transmission; and the role and responsibility of the veterinary practitioner in preventing human illness from this cause.

Messrs. Sadler, Riemann, Genigeorgis

#### 252. Principles and Practice of Meat and Milk Hygiene. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in the veterinary curriculum or consent of instructor. Principles and practice of inspection and sanitary control of meat of mammalian origin and of milk.

Mr. Sadler, Mr. Genigeorgis

#### 254. Public Health Aspects of Meat and Meat Products Technology. (2) III.

Lecture—2 hours. Prerequisite: consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

Mr. Riemann, Mr. Genigeorgis

#### 290. Seminar in Epidemiology and Preventive Medicine. (1) I, II, III.

Seminar—2 hours. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

#### 298. Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

#### 299. Research. (1-9) I, II, III.

The Staff (Chairman in charge)

## FOOD SCIENCE AND TECHNOLOGY

*Major Advisers.*—See *Class Schedule* listing.

*Major Program and Graduate Study.*—See pages 82 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Lower Division Courses

#### 1. Introduction to Food Science. (3) I, III.

Lecture—3 hours. Open to nonmajors. Development and maintenance of an adequate food supply; food quality and its measurement; scientific and technological aspects of converting raw animal and plant products into a large variety of processed and preserved foods; maintenance and improvement of the acceptability and nutritional value of foods.

Messrs. Amerine, Stewart, Schweigert

#### 49. Processing Plant Studies. (1) I.

Prerequisite: course 1. Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

Mr. Leonard

#### 98. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Schweigert in charge)

#### 99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Mr. Schweigert in charge)

### Upper Division Courses

#### 101. Biochemistry and Food Science. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B. Topics on enzymes, proteins, lipids and vitamins. Biochemical principles related to food composition, preservation and processing.

Mr. Tappel

#### 102. Malting and Brewing Technology. (3) I.

Lecture—3 hours; field trips and pilot-scale brewing by arrangement. Prerequisite: Biochemistry 101A. The technology of the malting, brewing, and fermentation processes is integrated with the chemistry, biochemistry, and microbiology that determines industrial practices and product quality.

Mr. Lewis

#### 103. Physical and Chemical Methods for Food Analysis. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B; Chemistry 5;

Chemistry 8B (may be taken concurrently). Theory and application of physical and chemical methods for analyzing foods.

Mr. Whitaker, Mr. Bernhard

**104. Food Microbiology. (3) II.**

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 8B; or equivalent courses. Taxonomy, physiology, ecology, and control of beneficial microorganisms important in the manufacture and ripening of foods, undesirable microorganisms that produce defects and spoil foods, and harmful microorganisms associated with food-borne infections and intoxications.

Mr. Collins

**104L. Food Microbiology Laboratory. (2) II.**

Laboratory—6 hours. Prerequisite: Bacteriology 105AL or equivalent; course 104 (should be taken concurrently). Laboratory exercises illustrate selected subject matter discussed in course 104. Microbiological techniques used in studying the characteristics of beneficial, harmful, and undesirable microorganisms associated with foods. Messrs. Crisan, Collins, Vaughn

**105. Microbiological Analysis of Foods. (3) III.**

Lecture—1 hour; laboratory—5 hours. Prerequisite: courses 104, 104L. Cultural and morphological characteristics of specific groups of bacteria and fungi involved in production or deterioration of foods. Analyses of microbiological quality of foods and food products.

Mr. Crisan, Mr. Vaughn

**106. Industrial Fermentations. (3) I.**

Lecture—3 hours. Prerequisite: Bacteriology 2. Microorganisms and their activity in relation to industrial processes such as baking, brewing, and the production of industrial solvents, vitamins, enzymes, drugs, and other chemicals. For laboratory experience in this field, students may register in course 106L.

Messrs. Lewis, Phaff, Kunkee

**106L. Food and Industrial Microbiology Laboratory. (3) (Summer).**

Laboratory—90 hours total. Prerequisite: a course in industrial fermentation. Microorganisms and their activities in relation to industrial processes such as baking; brewing; production of industrial alcohol, yeasts, solvents, vitamins, enzymes, antibiotics, and other drugs.

Mr. Lewis

**107A. Analysis of Variance as Applied to Sensory Evaluation Problems. (1) II.**

Lecture, discussion and laboratory—2 hours. Prerequisite: Mathematics 13 or its equivalent. Intensive review of hypothesis testing and the analysis of variance.

Mrs. Pangborn

**107B. Principles of Sensory Evaluation of Foods. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 107A or the ability to use

analysis of variance. Nature of sensory response with emphasis on taste and smell as related to foods; design and methodology of small panel and consumer panel testing; and application of appropriate mathematical procedures.

Mr. Amerine, Mrs. Pangborn

**108A. Food Plant Sanitation. (2) I.**

Lecture—2 hours. Prerequisite: Chemistry 1A. Principles of water conditioning and water treatment, chemical sanitizing agents, metallic corrosion, fundamental concepts in the disposal of wastes, and discussion of other factors relating to food plant sanitation.

Mr. Jennings

**108B. Food Plant Sanitation. (2) II.**

Lecture—2 hours. Prerequisite: Chemistry 8B. Principles of hard-surface detergency; detergent classification and formulations, soil and substrate considerations, energy relationships in detergency, and theories and mechanisms of detergency.

Mr. Jennings

**110A. Physical Principles in Food Processing. (4) I.**

Lecture—3 hours; discussion—2 hours. Prerequisite: Physics 2A and 2B or equivalent; calculus recommended. Not open for credit to students enrolled in College of Engineering. Applications of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer, and problem solving.

Mr. Merson

**110B. Heat Transfer in Food Processing. (2) II.**

Lecture—2 hours. Prerequisite: course 110A or equivalent. Conduction, convection, radiation, principles of refrigeration, heat exchangers.

Mr. Harper

**111. Introduction to Food Processing. (4) I.**

Lecture—3 hours; discussion-demonstration—2 hours. Prerequisite: Bacteriology 2, Chemistry 8B, and Physics 2B, or equivalent. Food processing from farm to package. Characteristics of raw materials, fresh produce handling, overview of food processing and processing unit operations, chemical additives. Demonstration and field trips.

Mr. Miller

**113. Structure of Food Materials. (3) I.**

Lecture—3 hours. Anatomical features and structural properties of foods; histochemical tests of food tissues; rheological characteristics; food texture.

Mr. Sterling

**119. Principles of Dairy Processing. (3) III.**

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Technical principles related to the commercial processing of milk and its products including ice cream, butter and cheese; theory and practical applications.

Mr. Nickerson, Mr. Dunkley

**120. Muscle as Food. (2) III.**

Lecture—2 hours; demonstrations (occasional). Prerequisite: Biochemistry 101B and



Bacteriology 2 or equivalent. The biochemical, physiological, microbiological, psychophysical and engineering principles underlying the conversion of muscle to meat, man's most expensive food. Includes processing, preservation, brining, smoking and curing of meat, poultry, marine foods, and sausages.

Mr. Peterson and staff

### 121. Birds and Their Eggs as Food. (3) I.

Lecture—3 hours; demonstrations. Prerequisite: consent of instructor; Biochemistry 101B recommended. Avian products as food considered from the physical, chemical and nutritional aspects. Factors affecting processing, preservation and quality.

Mr. Peterson, Mr. Brant

### 125. Metals and Metal Complexes in Foods. (4) II.

Lecture—4 hours. Prerequisite: Biochemistry 101B; Chemistry 107B. Structure, reactions, and physical properties of metal complexes, particularly those of importance to food science. The biochemistry of metal ions in foods.

Mr. Gruenwedel

### 130. Chemistry of Milk and Dairy Products. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101A. The chemistry of milk constituents; physical and chemical properties of milk; and the changes that occur during the processing and storage of dairy products, with emphasis on quality.

Mr. Nickerson, Mr. Smith

### 131. Packaging Processed Foods. (3) III.

Lecture—3 hours. Prerequisite: course 1; open to nonmajors. Technical aspects of packaging processed foods. Definitions and functions of packages for food. Packaging materials and properties. Public health problems associated with packaging. Food-packaging interactions for major commodities and their control. Design criteria, construction technology and performance testing of food packages.

Mr. Stewart

### 190. Recent Advances in Food Technology. (1) I.

Lecture—1 hour. Prerequisite: two courses in Food Science and Technology. Assigned topics, reports, and discussions concerning recent advances in food technology.

Mr. Schweigert

### 198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Schweigert in charge)

### 199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Schweigert in charge)

#### Graduate Courses

### 210. Proteins: Functional Activities and Interactions. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101B. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in

plant and animal materials and products.

Mr. Feeney

### 211. Chemistry of the Food Lipids. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101A. Chemical constitution, molecular structure, and stereo chemistry of the fats, phospholipids, and related compounds. Methods of isolation, characterization, and synthesis. Relation of molecular structure to physical properties.

Mr. Smith

### 213. Macromolecular Gels. (2) I.

Lecture—2 hours. Prerequisite: Biochemistry 101A. Structural interrelationship of water with typical biological polymers in gels; aerogels and xerogels; gel properties and methods of study. Offered in odd-numbered years.

Mr. Sterling

### 220. The Natural Coloring Matters. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: 3 units of biochemistry or plant biochemistry; 3 units of upper division organic chemistry. Chemistry of natural pigments and related compounds; spectrophotometric and chromatographic techniques; special emphasis on pigments in relation to foods.

### 235. Mycology of Food and Food Products. (2) III.

Lecture—2 hours. Prerequisite: courses 104, 104L, or their equivalents; concurrent enrollment in course 235L recommended. Fungi involved in the production, destruction and quality of food. Fungi as food; deterioration and spoilage; toxins; fungal food fermentations.

Mr. Crisan

### 235L. Mycology of Food and Food Products

#### Laboratory. (2) III.

Lecture—1 hour; laboratory—2 hours; term paper preparation. Prerequisite: course 104, 104L, or their equivalents; concurrent enrollment in course 235. Techniques for isolating and identifying important fungi; morphology, physiology, and ecology of representative groups of food related fungi.

Mr. Crisan

### 250A-250B. Isolation and Characterization of Trace Volatiles. (2) I-II.

Lecture—2 hours. Prerequisite: consent of instructor. Preparation of volatile concentrates suitable for gas chromatographic separations; influence of the design and type of chromatograph on the efficiency of separation; techniques of trapping and reinjecting chromatographic fractions; and spectrometric characterization of the separated compounds.

Mr. Jennings

### 250C. Advanced Characterization and Quantitation of Trace Volatiles. (2) III.

Lecture—2 hours. Prerequisite: knowledge equivalent to that contained in course 250A-250B and introductory computer programming. Theory and application of mass and nmr spectroscopy in the characterization of trace volatiles, quantitative aspects of gas chromatography, data

treatment and analysis by computer processing.  
Mr. Russell, Mr. Jennings

**251A-251B. Isolation and Identification of Trace Volatiles. (1) I-II.**

Laboratory—3 hours. Prerequisite: course 250A-250B must be taken concurrently. Preparation of volatile concentrates for gas chromatographic separations; construction of gas chromatographic columns and determination of their efficiencies; trapping techniques; infrared and mass spectrometric characterization of isolated compounds.  
Mr. Jennings

**251C. Advanced Characterization and Quantitation of Trace Volatiles—Laboratory. (1) III.**

Laboratory—3 hours. Prerequisite: course 250C must be taken concurrently. Laboratory exercises involving gas chromatographic purification, mass and nmr spectroscopy on isolated samples, quantitative treatment of GC data, and computerized data processing.  
Mr. Russell, Mr. Jennings

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)  
Mr. Mazelis

**FOODS**

*Major Advisers.*—See *Class Schedule* listing under *Consumer Food Science*.

*Major Program and Graduate Study.*—See pages 75 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**20. Food Habits and Culture. (3) I.**

Lecture—3 hours. Prerequisite: sophomore standing or above. Cultural, geographical, socioeconomical, religious, and psychological influences on development and maintenance of food habits. Attention is given to past and present subcultural groups in the United States and other countries, with emphasis on the role of food within the total pattern of living of the social units.  
Mrs. Pangborn

**47. Food Product Development Field Study. (1) III.**

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. (Passed/Not Passed grading only.)  
Mr. Schutz

**98. Directed Group Study for Lower Division Students. (1-5) I, II, III.**

The Staff (Miss Morris in charge)

**291. Current Research Literature. (1) I, II, III.**

Seminar—1 hour. Prerequisite: graduate standing. Critical reading, evaluation, and presentation of papers from the literature as well as results of own research with emphasis on those dealing with all aspects of proteins, enzymes and nucleic acids.

The Staff (Mr. Schweigert in charge)

**298. Group Study. (1-5) I, II, III.**

Directed study on food chemistry, food microbiology, food processing or sensory evaluation.

The Staff (Mr. Schweigert in charge)

**299. Research. (1-12) I, II, III.**

Prerequisite: graduate standing.

The Staff (Mr. Schweigert in charge)

**Related Courses:** see Consumer Science, Foods, Nutrition, Viticulture and Enology; Biochemistry 123; Engineering 110; Environmental Toxicology 180; Epidemiology and Preventive Medicine 150; Plant Science 112, 112L.

**99. Special Study for Undergraduate Students.**

(1-5) I, II, III.

The Staff (Miss Morris in charge)

**Upper Division Courses**

**100A. Principles of Food Composition and Preparation. (3) I.**

Lecture—3 hours. Prerequisite: Chemistry 8B; one course in physics; Bacteriology 2 (may be taken concurrently). Science, sensory aspects and aesthetics of food preparation with emphasis on the chemical and physical properties of food products. Characteristics and functions of colloids, carbohydrates, lipids, and proteins in food combinations.  
Mr. Russell

**100B. Principles of Food Composition and Preparation. (3) II.**

Lecture—3 hours. Prerequisite: course 100A. Chemical, physical, microbiological, and sensory aspects relating to food. Edible plant tissues, protein foods, pigments, food preservation, packaging and marketing, food regulatory agencies, science and aesthetics of food combinations, food habits, world food problems.  
Mr. Russell

**101A. Principles of Food Composition and Preparation Laboratory. (1) I.**

Laboratory—3 hours. Prerequisite: course 100A, should be taken concurrently. Studies of the chemical, physical and sensory properties of

foods. Characteristics and functions of basic constituents and of food systems—solutions, colloidal dispersions, gel structures, emulsions and foams. Mrs. Bruhn

**101B. Principles of Food Composition and Preparation Laboratory. (2) II.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 100B, should be taken concurrently. Studies of the chemical, physical, microbiological and sensory aspects relating to foods. Plant, meat and flour systems, science and aesthetics of food combinations. Mrs. Bruhn

**134. Concepts of Food Acceptance. (3) I.**

Lecture—3 hours. Recommended: introductory course in psychology and foods or food science. Contribution of physical and psychological factors to food acceptance. Role of flavor, appearance, texture; effects of monotony, food classes, combinations, background characteristics, and environment. Problems and methods of changing food habits. Mr. Schutz

**135. Principles of Product Development. (3) II.**

Lecture—3 hours. Recommended: one course in introductory foods or food science. Presents basic concepts of product research and development. Organization, activities, new product development, project management. Role of food

regulations, consumerism, marketing, advertising, consumer research. Mr. Schutz

**197. Introduction to Research in Foods. (4) III.**

Lecture—1 hour; laboratory—9 hours. Prerequisite: majors of senior standing. Senior thesis on independent problems.

Mr. Russell in charge

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Miss Morris in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Miss Morris in charge)

**Graduate Courses**

**290. Seminar. (1) III.**

Seminar—1 hour.

The Staff (Miss Morris in charge)

**298. Group Study. (1-5) I, II, III.**

The Staff (Miss Morris in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Miss Morris in charge)

**Related Courses:** see Consumer Science, Food Science and Technology, Institution Management, Nutrition, Viticulture and Enology 3.

## FOREIGN LITERATURE IN TRANSLATION

The following courses are open to students throughout the campus. The readings are in English. Refer to departmental listing for descriptions of courses.

### Classics

\*139B. Greek Literature in Translation.

\*141. Greek and Roman Comedy.

### Comparative Literature

40A-H. Introduction to Comparative Literature.

49. Freshman Seminar.

140A-F. Themes and Structures in Literature.

141. Theories of Literature and the Techniques of Literary Criticism.

\*163. Studies in the Nineteenth-Century Novel.

\*165. Intercultural Literary Colloquium: The Tragic Vision in Western Literature.

\*166. Intercultural Literary Colloquium: The Modern Novel and the Agony of Humanism.

\*167. Intercultural Literary Colloquium: Studies in Fantastic Reality.

192A-E. Intercultural Literary Colloquium: Modern Literary Movements and Styles.

193A-D. Intercultural Literary Colloquium: The Avant Garde.

### Dramatic Art

20. Introduction to Dramatic Art.

158A, 158B. World Drama.

159. Contemporary Drama.

### English

170A. The Epic.

170B. European Influences on the English and American Novel.

171. English Bible as Literature.

\*185. Intercultural Literary Colloquium.

### French

\*39A. French Literature in English Translation: to the End of the Eighteenth Century.

\* Not to be given, 1972-73.

- \*39B. French Literature in English Translation: to the Nineteenth Century.
- 39C. French Literature in English Translation: the Contemporary Period.
- 141. Gide and Proust.
- \*142. French Novel from Malraux to the Nouveau Roman.
- 150. Masterpieces of French Literature.
- \*151. The French Novel.

### German

- 15. The Development of German Literature.
- 110. Masterpieces of German Prose from Goethe to Kafka.
- 111. Masterpieces of German Drama from Lessing to Brecht.
- 112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke.
- 114. Goethe's Faust.
- 115. German Literature of the Twentieth Century up to the Second World War.
- 116. German Literature of the Twentieth Century since the Second World War.
- 117. Kafka and Dada.
- 118. Brecht.
- 185. Intercultural Literary Colloquium.

### Italian

- 139A. Italian Literature in English: Early Italian Literature and Dante Alighieri.

### FRENCH

\*<sup>4</sup>Max Bach, Ph.D., *Chairman of the Department*  
 Ruth B. York, Ph.D., *Acting Chairman of the Department*  
 Department Office, 515 Sproul Hall

#### Professors:

- \*<sup>4</sup>Max Bach, Ph.D.
- Marshall Lindsay, Ph.D.
- Nicole A. D. Marzac, Docteur ès Lettres

#### Assistant Professors:

- Edward M. Bloomberg, Ph.D.
- Gerald Herman, Ph.D.
- Jurate Izokaitis, Ph.D.



#### Associate Professor:

- Jean Marc Blanchard, Agrégé de Lettres  
*(Visiting)*

- 139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance.
- 139C. Italian Literature in English: Modern Italian Literature.

### Oriental Languages

- \*35A-35B. Great Books of Eastern Asia.
- 132A-132B. History of Japanese Literature.

### Russian

- 30. Great Russian Writers.
- 40. Survey of Russian Literature to 1800.
- 41. Survey of Russian Literature: Nineteenth Century.
- 42. Survey of Russian Literature: Twentieth Century.
- 121. The Nineteenth-Century Russian Novel.
- 123. The Twentieth-Century Russian Novel.
- 128. Modern Russian Poets.
- 140. Dostoevsky.
- 141. Tolstoy.
- 185. Intercultural Literary Colloquium.

### Spanish

- 34. Mexico in its Literature.
- 35. Survey of Mexican Culture.
- 50A. Hispanic Literary Heritage.
- 50B. Hispanic Literary Heritage.
- 150. Masterpieces of Spanish Literature.

#### Assistant Professors:

- Larry N. Hillman, M.A. (*Acting*)
- Manfred Kusch, M.A. (*Acting*)

#### Lecturer:

- Margo R. Kaufman, M.A.
- Ruth B. York, Ph.D.

#### The Major Program

Lower Division Courses.—Required: French 1, 2, 3, 4, and 6 or their equivalents; French 30A, 30B. Recommended: courses 109A, 109B, and 109C; one year of college Latin or the equivalent.

Upper Division Courses.—Required: at least 36 units including one quarter of course 110,

<sup>0</sup> Not to be given, 1972-73.

<sup>3</sup> Absent on leave, winter quarter 1973.

<sup>4</sup> Absent on leave, spring quarter 1973.

one of the following: 130, 131, 132, and a separate course in each of the following periods: sixteenth century, seventeenth century, eighteenth century, nineteenth century. Recommended: Classics 40, 41.

Courses 107A, 107B, 160 and either course 104 or 105 are required for the General Secondary Teaching Credential in French.

*Honors and Honors Programs* (see page 148). The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

*Graduate Study.*—The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of French and Italian.

*Teaching Minor.*—A minimum of 30 units in French including courses 30A, 30B, 104, 105, and 107A–107B. Recommended: courses 109A, 109B, 109C.

#### Lower Division Courses

A course may not ordinarily be taken for credit if it is a prerequisite to a course already completed. Students offering high school language preparation as a prerequisite must take a placement test.

*Course Placement.*—Students with two years of high school French normally take French 2, those with three years take French 3 and those with four years take French 4.

#### 1. Elementary French. (6) I, II, III.

Discussion—5 hours; laboratory—two ½-hour sessions. The Staff

#### \*1G. French for Graduate Students. (No Credit) III.

Recitation—3 hours. A course designed to prepare students for the graduate reading examination. Mr. Herman

#### \*1R. Elementary French—Reading. (4) I.

Lecture—3 hours; laboratory—1 hour. Elementary French with emphasis on reading. The Staff

#### 2. Elementary French. (6) I, II, III.

Discussion—5 hours; laboratory—two ½-hour sessions. Prerequisite: course 1 or equivalent. A continuation of course 1. The Staff

#### \*2R. Elementary French—Reading. (4) II.

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 1R or equivalent. Elementary French with emphasis on reading. The Staff

#### 3. Intermediate French. (6) I, II, III.

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2 or equivalent. A continuation of course 2. The Staff

#### 3R. Elementary French—Reading. (4) I.

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 2R or equivalent. Elementary French with emphasis on reading. Miss York

#### 4. Intermediate French. (5) I, II, III.

Discussion—5 hours. Prerequisite: course 3. The Staff

#### 4R. Intermediate French—Reading. (4) I, II.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 3R or equivalent. This variant of course 4 places greater emphasis on reading than the regular course. The Staff

#### \*5R. Intermediate French—Reading. (4) II.

Laboratory—2 hours; recitation—4 hours. Prerequisite: course 4R or equivalent. This variant of course 5 places greater emphasis on reading than the regular course. The Staff

#### 6. Reading and Conversation. (4) I, II, III.

Recitation—4 hours. Prerequisite: course 5 or equivalent. Class discussion; reading of selected works; oral reports; analysis of texts. The Staff

#### 8A. French Conversation. (2) I, II, III.

Lecture—2 hours. Prerequisite: course 3. A course designed to offer practice in speaking French. The Staff

#### 8B. French Conversation. (2) I, II, III.

Lecture—2 hours. Prerequisite: course 8A or 4, or the equivalent. A course designed to offer practice in speaking French. Continuation of course 8A. The Staff

#### 8C. French Conversation. (2) I, II, III.

Lecture—2 hours. Prerequisite: course 8B or 6, or the equivalent. Continuation of course 8B. A course designed to offer practice in speaking French. The Staff

#### 30A. Grammar, Composition, and Conversation.

(4) I, II, III.

Lecture—3 hours. Prerequisite: course 6. The Staff

#### 30B. Grammar, Composition, and Conversation.

(4) I, II, III.

Lecture—3 hours. Prerequisite: course 30A. The Staff

#### \*39A. French Literature in English Translation: to the End of the Eighteenth Century. (4) I.

Lecture—3 hours. An introduction to French literature for non-French majors. Knowledge of French not required. Miss Zants

#### \*39B. French Literature in English Translation: the Nineteenth Century. (4) II.

Lecture—3 hours. An introduction to French literature for non-French majors. Knowledge of French not required.

\* Not to be given, 1972–73.

**39C. French Literature in English Translation: the Contemporary Period. (4) I.**

Lecture—3 hours. An introduction to French literature for non-French majors. Knowledge of French not required. Miss Izokaitis

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

The Staff (Chairman in charge)

**Upper Division Courses****104. Advanced Grammar and Composition. (4) I.**

Lecture—3 hours; essays and compositions. Prerequisite: course 30B. Mr. Bach

**105. Advanced Grammar and Composition. (4) II.**

Lecture—3 hours; essays and compositions. Prerequisite: course 104. Mr. Bach

**107A. Survey of French Culture and Institutions. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. From the origins of French civilization through the Renaissance. Mrs. Kaufman

**107B. Survey of French Culture and Institutions. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. From the seventeenth century to the present. Mrs. Kaufman

**\*109A. Survey of French Literature: Middle Ages and Renaissance. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from major works; discussion of literary history and theory.

**\*109B. Survey of French Literature from 1600 to 1800. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from major works; discussion of literary history and theory.

**109C. Survey of French Literature from 1800 to the Present. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from major works; discussion of literary history and criticism. Miss York

**110. Advanced Composition and Translation. (2) III.**

Lecture—2 hours. Prerequisite: course 30B. This course may be repeated for credit.

The Staff

**\*115A. Medieval Literature: Epic and Romance. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. *La Chanson de Roland*, *Tristan et Iseut*, and selected works of Chrétien de Troyes. Readings to be in modern French. Mr. Herman

**115B. Lyric, Satiric, and Didactic Poetry. (4) III.**

Lecture—3 hours. Prerequisite: course 6. Selected readings from the trouvères, fabliaux, Roman de Renart, and Roman de la Rose. Texts to be read in modern French. Mr. Herman

**116A. Literature of the Sixteenth Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. A study of the lyric poetry of the sixteenth century from Marot to d'Aubigné, with emphasis on the Pléiade. Mrs. Marzac

**116B. Literature of the Sixteenth Century. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6. Rabelais and Montaigne. A critical study of the works in relationship to the period. Mrs. Marzac

**117A. Theater of the Seventeenth Century. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Mr. Bloomberg

**117B. Moralists of the Seventeenth Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. Mr. Bloomberg

**\*117C. Poetry and the Novel in the Seventeenth Century. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Miss Izokaitis

**\*118A. Les Philosophes. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6. Readings from Montesquieu, Voltaire, Diderot, Rousseau and the Encyclopédie.

**118B. The Novel in the Eighteenth Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. Novels of Lesage, Prévost, Diderot, Rousseau, Laclous, Sade. Mr. Kusch

**118C. The Theater in the Eighteenth Century. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6. Plays of Marivaux and Beaumarchais. Mr. Kusch

**\*119A. The Nineteenth Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6. Romanticism in the drama and novel. Mr. Bach

**\*119B. The Nineteenth Century. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Realism and naturalism: Balzac, Flaubert, Maupassant, Zola.

**119C. The Nineteenth Century. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6. Symbolism: the poetry and poetics of Baudelaire, Mallarmé, Verlaine, Rimbaud, Corbière, Laforgue, and Lautréamont. Mr. Lindsay

**120A. Twentieth Century Drama. (4) I.**

Lecture—3 hours. Prerequisite: course 6. Representative plays from Jarry to Giraudoux. Miss York

\* Not to be given, 1972-73.

**120B. Twentieth Century Drama. (4) II.**

Lecture—3 hours. Prerequisite: course 6. Representative plays from Anouilh to Ionesco. Miss York

**\*130. Critical Reading of Poetry. (4) I.**

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of works representing main types of French poetry. Study of poetic conventions and versification.

Mr. Lindsay

**131. Critical Reading of Fiction. (4) II.**

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of short stories and novels representing the main types of French fiction, with emphasis on narrative structure and techniques.

Mr. Kusch

**\*132. Critical Reading of Drama. (4) III.**

Lecture—3 hours. Prerequisite: course 6 or its equivalent. Analysis and evaluation of plays representing main types of French drama, with emphasis on dramatic structure and techniques.

Miss York

**\*138A. French Poetry from the Pre-Romantics to Baudelaire. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or equivalent. Offered in even-numbered years.

Miss Izokaitis

**\*138B. French Poetry from Baudelaire to the Surrealists. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or equivalent. Offered in even-numbered years.

Miss Izokaitis

**\*140. Study of a Major Writer. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. May be repeated for credit with consent of instructor.

Miss York

**141. Gide and Proust. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 for those reading in French. Lectures and discussion in English; reading in French or English.

Mr. Lindsay

**\*142. French Novel from Malraux to the Nouveau Roman. (4) II.**

Lecture—3 hours; term paper. Reading in French and English.

Mr. Lindsay

**\*145. Reading of Philosophical Texts. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6. Style and content of representative texts from the Renaissance to the present.

Mr. Bloomberg

**150. Masterpieces of French Literature. (4) I.**

Lecture—3 hours; term paper. Prerequisite: English 1. Reading, lectures, and discussion in English. May not be counted as part of the

\* Not to be given, 1972-73.

major in French. Offered in even-numbered years.

Mr. Lindsay

**\*151. The French Novel. (4) I.**

Lecture—3 hours; term paper. Reading, lectures, and discussion in English. May not be counted as part of major in French.

Mr. Lindsay

**160. Structure of the French Language. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. Linguistic analysis of modern French.

Mr. Hillman

**192A-E. Intercultural Literary Colloquium. Modern Literary Movements and Styles. (4) I.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Studies in popular taste, messianic vision, and elitist polarities. Content will alternate among the following segments: A. Romanticism; B. Symbolist Poetry and Poetics; C. Naturalism and Expressionism; D. Utopianism and Authoritarian Structures; E. Quests of Mystery and Science Fiction. May be repeated for credit in different subject area. (Same course as Comparative Literature, German, and Russian 192A-E.)

Miss Izokaitis, Mr. Menges, Mr. Patterson

**193A-D. Intercultural Literary Colloquium. The Avant Garde. (4) II.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Literary innovation and rebellion in Western culture since World War I. Content will alternate among the following segments: A. Dada and Surrealism; B. The Absurdist Tradition; C. The "New Novel"; D. Proletarian and Epic Theater. May be repeated for credit in different subject area. (Same course as Comparative Literature and Dramatic Art 193A-D.)

Messrs. Bossart, Kusch, Snyder

**194H. Special Study for Honors Students.**

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses****\*200. Seminar in French Linguistics. (4) III.**

Seminar—3 hours. Prerequisite: graduate standing and consent of instructor. Study of substrata influences, dialect geography, homonymic conflict, jargons and argots, French contributions to linguistic theory.

Mr. Keith

**201A. History of the French Language. (4) I.**

Seminar—3 hours.

Mr. Hillman



**\*201B. History of the French Language. (4) II.**

Seminar—3 hours. Prerequisite: course 201A. Mr. Hillman

**202. Medieval French Literature. (4) III.**

Seminar—3 hours. May be repeated for credit with consent of instructor. Mr. Herman

**\*203. Reading of Old French Texts. (4) III.**

Seminar—3 hours. Prerequisite: course 201A–201B or equivalent. Mr. Hillman

**204. Sixteenth-Century French Literature.**

(4) II.

Seminar—3 hours. May be repeated for credit with consent of instructor. Mr. Blanchard

**206. Seventeenth-Century French Literature.**

(4) II, III.

Seminar—3 hours. May be repeated for credit with consent of instructor.

Miss Izokaitis

**208. Eighteenth-Century French Literature.**

(4) I.

Seminar—3 hours. May be repeated for credit with consent of instructor. Mr. Blanchard

**215. Nineteenth-Century French Literature.**

(4) III.

Seminar—3 hours. May be repeated for credit with consent of instructor. Miss Izokaitis

**220. Twentieth-Century French Literature.**

(4) I, II, III.

Seminar—3 hours. May be repeated for credit with consent of instructor.

\_\_\_\_\_, Mr. Lindsay, Miss York

**\*225. Problems in French Criticism. (4–4) II–III.**

Seminar—3–3 hours. Selected topics in criticism for intensive investigation. May be repeated for credit with consent of instructor.

**GENETICS**

*Major Advisers.*—See *Class Schedule* listing. *Major Program and Graduate Study.*—See pages 87 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Division of Biological Sciences, 150 Mrak Hall.

*Note:*—Applied genetics courses follow this listing (see page 309).

**Lower Division Course****10. Heredity and Evolution. (4) I, II.**

Lecture—3 hours; discussion—1 hour. The general principles of the laws of heredity and evolution for students not specializing in biology. No credit to students who have had or are taking upper division genetics courses.

\_\_\_\_\_, I. Mr. Stebbins, II. Mr. Gottlieb

\* Not to be given, 1972–73.

(Deferred grading only, pending completion of the sequence.) Mr. Lindsay

**\*230. Old Provençal. (4) III.**

Seminar—3 hours. Prerequisite: courses 201A, 201B or equivalent. An introduction to Old Provençal phonology and morphology, with reading and interpretation of texts. Mr. Hillman

**\*235. Explication de Textes. (4) III.**

Seminar—3 hours. Prerequisite: graduate standing in French. Theory of the *explication de textes* method and exercises according to this method. Mr. Bloomberg

**238. Problems in French Composition and Syntax.**

(4) I.

Seminar—3 hours. Prerequisite: graduate standing. Problems and techniques of English-French translation: morphological, syntactical, and stylistic. Mrs. Marzac

**297. Individual Research. (1–5) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff

**298. Group Study. (1–4) I, II, III.**

Seminar—1–3 hours. May be repeated for credit with consent of instructor.

The Staff (Chairman in charge)

**299. Research. (2–5) I, II, III.**

The Staff (Chairman in charge)

**299D. Individual Study. (1–6) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**Professional Course****300. Teaching of a Modern Foreign Language.**

(3) III.

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language. Mrs. Kaufman

**Upper Division Courses****100A. Principles of Genetics. (3) I, II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in biology, botany, microbiology, or zoology; not open for credit to students who have received credit for course 115. Introduction to genetics with some consideration of its applications in agriculture and biology. I. Mr. Boyd; II. Mrs. Fisher

**100B. Principles of Genetics. (3) II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Mathematics 13 or equivalent recommended. Continuation of course 100A. II. Mr. Qualset; III. Mrs. Lowry

**100L. Principles of Genetics Laboratory. (1) II, III.**

Laboratory—3 hours. Prerequisite: course



100A. Laboratory work in basic genetics to supplement courses 100A, 100B, and 115.

Mr. Green

**101. Cytogenetics. (3) III.**

Lecture—3 hours. Prerequisite: course 100B or 115. Gross and fine structure of chromosomes and associated cell organelles; chromosome reproduction; behavior of chromosomes as related to genetics and evolution in polyploids, aneuploids, and structural heterozygotes.

Mr. Snow, Mr. Rick

**101L. Cytogenetics Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: course 101 (may be taken concurrently). Laboratory study of chromosome structure and behavior.

Mr. Snow, Mr. Rick

**102. Molecular and Biochemical Genetics. (3) I.**

Lecture—3 hours. Prerequisite: course 100A, Biochemistry 101B. Study of gene structure, mutation and the biochemical basis of gene function.

Mr. Edlin

**103. Organic Evolution. (3) III.**

Lecture—3 hours. Prerequisite: course 100B or 115. Evolutionary processes in higher organisms.

Mr. Stebbins

**104. Developmental Genetics. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A or 115; Biochemistry 101B; Zoology 100 recommended. Modern concepts of the development and differentiation of vertebrates and other higher organisms. Emphasis is placed on genetic and biochemical approaches to the study of control mechanisms operative at the various levels of gene action.

Mr. Boyd, Mrs. Abbott

**105. Population Genetics. (3) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: course 100B or 115; Mathematics 13, 16B recommended. An introductory course in the analysis and interpretation of quantitative genetic systems.

Mr. Allard

**115. Human Genetics. (5) I.**

Lecture—4 hours; discussion—1 hour. Prerequisite: introductory course in zoology, botany, or biology; Mathematics 13, or equivalent; upper division standing; not open for credit to students who have received credit in courses 100A–100B. Introduction to genetics with special emphasis on man. This course will fulfill the needs of preprofessional students and those in other areas of human biology.

Mr. Green

**197T. Tutoring in Genetics. (1–5) I, II, III.**

Prerequisite: upper division standing with major in genetics and consent of Department Chairman. Conducting of discussion groups affiliated with one of the department's regular courses.

The Staff (Mr. Allard in charge)

**198. Group Study. (1–5) I, II, III.**

Prerequisite: consent of instructor. Directed group study of special topics in genetics.

The Staff (Mr. Allard in charge)

**199. Special Study for Advanced Undergraduates.**

(1–5) I, II, III.

Prerequisite: consent of instructor based on adequate preparation of the student in allied fields.

The Staff (Mr. Allard in charge)

**Graduate Courses**

**203. Advanced Organic Evolution. (3) III.**

Lecture—2 hours; discussion—2 hours. Prerequisite: courses 103 and 105 or consent of instructor. Analysis of the process of speciation in plants and animals.

Mr. Gottlieb

**205. Advanced Population Genetics. (3) II.**

Lecture—3 hours. Prerequisite: course 105, Mathematics 130A or 131A. Analysis of the genetic structure and evolution of populations. Offered in even-numbered years.

Mr. Hansche

**206. Current Topics in Genetics. (3) I, II, III.**

Lecture—2 hours; laboratory or discussion—2 hours. Prerequisite: course 100B or 115, consent of instructor. Selected topics of current interest in advanced genetics. May be repeated for credit.

**291. Seminar in History of Genetics. (2) II.**

Seminar—2 hours. Prerequisite: course 100B or 115. The development of modern genetic theories beginning with Mendel. (Satisfactory/Unsatisfactory grading only.)

Mr. Laidlaw

**292. Seminar in Gene Structure and Action. (1–3) I.**

Seminar—1–3 hours. Prerequisite: course 102 or 206. Topics of current interest related to the structure of genes mutation, and the mechanism of gene action. Offered in even-numbered years. (Satisfactory/Unsatisfactory grading only.)

Mr. Kado

**293. Seminar in Cytogenetics and Evolution.**

(1–3) II.

Seminar—1–3 hours. Prerequisite: course 291 (may be taken concurrently). Topics of current interest related to chromosomal changes, mutation and other genetic changes in natural populations, and the application of genetics to study of organic evolution. (Satisfactory/Unsatisfactory grading only.)

Mr. Wolfe

**294. Seminar in Breeding Systems. (1–3) III.**

Seminar—1–3 hours. Prerequisite: course 291. Topics of current interest relating genetics to problems of animal and plant breeding. (Satisfactory/Unsatisfactory grading only.)

Mr. Ayala

**298. Group Study. (1–5) I, II, III.**

Prerequisite: consent of instructor. Directed

group study of special topics in genetics. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Allard in charge)

**299. Research. (1-12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Allard in charge)

**APPLIED GENETICS**

**107. Animal Breeding and Genetics. (3) I.**

Lecture—3 hours. Prerequisite: course 100B; Mathematics 13. Qualitative and quantitative inheritance in relation to animal breeding; review of selection and breeding experiments with reference to livestock and poultry improvement.

Mr. Bradford, Mr. Laben

**107A Mammalian Genetics Laboratory. (1) I.**

Laboratory—3 hours. Prerequisite: course 100B or 115; Mathematics 13 recommended. Experiments in qualitative and quantitative genetics using the laboratory mouse. Segregation; linkage; evaluation of effects of inbreeding, selection and maternal influence on different kinds of traits.

Mr. Bradford

**107B. Animal Breeding Laboratory. (2) II.**

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 107. Laboratory exercises in quantitative genetics using computer generated herd records. Selection progeny testing, and inbreeding experiments with statistical analyses using collected data. Evaluation of environmental effects.

Mr. Laben

**107C. Discussion of Animal Breeding Experiments and Methods. (1) III.**

Discussion—1 hour. Prerequisite: course 107. Review of literature and discussion relating to animal breeding experiments and programs. Emphasis on cattle, sheep and swine.

Mr. Rollins

**107D. Discussion of Poultry Breeding Experiments and Methods. (1) II.**

Discussion—1 hour. Prerequisite: course 107. A discussion of genetic experiments and breeding plans specifically related to poultry.

Mr. Abplanalp

**108. Methods in Quantitative Animal Breeding. (3) II.**

Lecture—3 hours. Prerequisite: course 107. Principles, methods and procedures in quantitative animal breeding; heritability, intra- and inter-population selection methods, including selection index, family, pedigree and progeny selection; genetic correlation; relationship and inbreeding.

Mr. Rollins

**131. Genetics of Animal Adaptation. (4) II.**

Lecture—3 hours. Prerequisite: course 100B (may be taken concurrently). Genetic principles applied to natural populations; species as plastic elements subject to genetic change through environmental influences and interaction with other species; the role of adaptation in population ecology and development. (Same course as Wildlife and Fisheries Biology 131.)

Mr. Gall

**207. Quantitative Genetics and Animal Breeding. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 105B; Mathematics 16A recommended. The genetic theory of selection, population structure, and induced variation, and its implications in the design of animal breeding experiments.

Mr. Abplanalp

**299. Research in Animal Genetics. (1-12) I, II, III.**

The Staff (Mr. Bradford in charge)

**Related Courses:** see Agronomy and Range Science 221, 222, 223; Plant Pathology 215, Plant Science 113; Vegetable Crops 220.

**GEOGRAPHY**

Howard F. Gregor, Ph.D., *Chairman of the Department*

Department Office, 280 Academic Office Building III

**Professors:**

Howard F. Gregor, Ph.D.

Herbert B. Schultz, Ph.D. (*Geography and Agricultural Engineering*)

Frederick J. Simoons, Ph.D.

Kenneth Thompson, Ph.D.

**Associate Professors:**

Stephen C. Jett, Ph.D.

David S. McArthur, Ph.D.

◇ ◇ ◇

**Assistant Professors:**

Michael Bonine, M.A. (*Acting*)

William E. Derrenbacher, M.A. (*Acting*)

**Lecturer:**

Karl M. Kriesel, Ph.D.

**Departmental Major Advisers.**—Mr. Bonine, Mr. Kriesel.

**Graduate Adviser:** Mr. Jett.

**The Major Program**

Lower Division Courses.—Required: Geography 1, 2, 3, 5; Anthropology 2.

Upper Division Courses.—Required: 36 upper division units in geography. Each program should normally include Geography 105 and 151.

Students who wish to prepare for further training or employment in the field of Urban

and Regional Planning may do so by completing certain additional courses, while fulfilling the requirements for the major, in consultation with the departmental adviser.

*Teaching Major.*—Requirements for the teaching major are the same as for the undergraduate major for degree, with the addition of Geography 300.

*Teaching Minor.*—A minimum of 30 quarter units in Geography, including course 300.

*Subject Representative:* Mr. Bonine.

*Graduate Study.*—The department offers programs of graduate study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.

#### Lower Division Courses

### 1. Physical Geography. (4) I, III.

Lecture—4 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

Mr. McArthur

### 2. Man in the Habitat: An Introduction to Cultural Geography. (4) I, II, III.

Lecture—4 hours. Major systems of habitat use: their characteristics, origins, spread, ecology, and environmental impact. Principal themes in cultural geography. Emphasis on the non-industrial world.

Messrs. Derrenbacher, Jett, Simoons

### 3. Climate and Weather. (3) II.

Lecture—3 hours. Composition and structure of atmosphere, weather elements, pressure, wind, temperature, moisture, fog, and clouds; weather maps; regional climates and world climate classification; instruments for obtaining climatological data; installation and maintenance of weather stations; evaluation of recordings.

Mr. Schultz

### 4. Introduction to Maps. (3) I.

Lecture—3 hours. History and principles of cartography; great map-makers; national surveys; modern trends in mapping.

Mr. Bonine

### 5. Man and Resource Development: An Introduction to Economic Geography. (4) II.

Lecture—4 hours. The principal ways in which man has developed natural and human resources to meet his needs, and their spatial and morphological expression in the economic landscape.

Mr. Bonine, Mr. Gregor

### 7. Problems in Regional Ecology. (4) III.

Lecture—4 hours. Selected historical and contemporary ecological problems from various parts of the world. Emphasis on interaction between cultural and physical environments. Regions selected from areas of faculty specialization.

Mr. Derrenbacher

### 11. Cultural Geography of Black America. (4) II.

Lecture—4 hours. Geographic origins, dispersals, and adaptations of blacks in the New World.

### 98. Directed Group Study. (1-5) I, II, III.

The Staff (Chairman in charge)

### 99. Independent Study. (1-5) I, II, III.

The Staff (Chairman in charge)

#### Upper Division Courses

### 102. Field Course in Physical Geography. (4) III.

Lecture and field trip—one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the natural landscape.

Mr. Derrenbacher

### \*103. Field Course in Human Geography. (4) III.

Lecture and field trip—one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the cultural landscape.

### 104. Field Course in Urban Geography. (4) III.

Lecture—1 hour; four 2-day field trips. Field analysis of selected urban problems in northern 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.

Mr. Kriesel

### 105. Cartography. (4) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 4 or consent of instructor. Theory and construction of map projections; interpretation of maps; compilation and generalization of base-map data; symbolization and processing of map data; cartographic designing and lettering techniques; map reproduction.

Mr. Bonine

### 106. Interpretation of Aerial Photographs. (4) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 1 or consent of instructor. Analysis of landscape from aerial photographs: land forms; vegetation; land use; settlements; transport and communications. Preparation of contour and planimetric maps, and construction of aerial photo mosaics.

### 107. Advanced Cartography. (4) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 105 and 106. Advanced cartographic representation of field and aerial photographic data.

Mr. Bonine

### 108. Analysis of Landforms. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Ori-

\* Not to be given, 1972-73.

gin of land forms. Review of varied interpretations of processes involved, with emphasis on recent views. Mr. McArthur

**\*110. Statistical Methods in Geographical Research. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 13 or equivalent. Principles of statistical reasoning illustrated with examples from the field of geography. A critical review of current applications of statistical methods in geographical research. Mr. McArthur

**111. Alluvial Morphology. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 108 or consent of instructor. The origin and genesis of alluvial landforms, especially those of Quaternary age. Analysis of gradational processes giving rise to alluvial landforms, including tectonism, eustasy, and climatic change. Techniques of pale-landscape identification: soil stratigraphy, paleohydrology, and radiometric dating. Offered in odd-numbered years. Mr. McArthur

**112. Coastal Morphology. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 108 or consent of instructor. Advanced treatment of coastal landforms and the processes that produce them. Offered in even-numbered years. Mr. McArthur

**119. Arid Lands. (4) II.**

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Physical characteristics and human utilization of rainfall-deficient regions. Mr. Jett

**121. North America. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Natural and economic regions of the United States and Canada. Mr. Gregor

**122A. Middle America. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy from Mexico to Panama and in the Caribbean.

**122B. South America. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy in the South American countries.

**123A. Western Europe. (4) II.**

Lecture—3 hours; term paper. Prerequisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social and political problems of the countries of Western Europe. Mr. Thompson

**\*123B. Eastern Europe. (4) II.**

Lecture—3 hours; discussion—1 hour. Pre-

requisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social and political problems of the countries of Eastern Europe.

**124. The Soviet Union. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical landscapes and cultural regions of the U.S.S.R. Mr. Kriesel

**125A. North Africa and the Near East. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of the Arab World and its neighbors. Mr. Bonine

**125B. Sub-Saharan Africa. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara. Mr. Simoons

**\*126. Southern Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Southern Asia. Mr. Simoons

**131. California. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Regions of California: landforms, climate, and other physical characteristics; agricultural, mineral, and other resources; and patterns of settlement, population, transportation, and economy. Mr. Derrenbacher, Mr. Gregor

**\*141A. Economic Geography. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Factors in economic regionalism. Analysis of major agricultural regions of the earth. Mr. Gregor

**\*141B. Economic Geography. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Factors in economic regionalism. Analysis of major industrial regions of the earth.

**143. Political Geography. (4) III.**

Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political organization. Mr. Thompson

**151. History of Geographic Thought. (4) I.**

Lecture—3 hours; term paper. Prerequisite: three upper division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject. Mr. Kriesel

**\*152. Geographical Discovery and Exploration. (4) I.**

Lecture—3 hours; term paper. Expansion of

\* Not to be given, 1972-73.

western world's geographical horizons from ancient through modern times. Mr. Thompson

**\*154. Settlement Geography. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Settlement features of the rural landscape: origins, morphology, function, and distribution.

Mr. Bonine

**155. Urban Geography. (4) I.**

Lecture—3 hours; term paper. The geography of urban land use: the study of the economic, physical, political, and social forces responsible for the origin and development of urban and metropolitan-area land use patterns; theories of urban growth and structure. Emphasis is on American cities. Offered in odd-numbered years.

Mr. Kriesel

**156. The Urban Region. (4) I.**

Lecture—3 hours; term paper. Urban-regional and inter-urban relationships: the urban economic base; the Central Place Theory; the functional classification of American cities and the spatial distribution of the functional classes. Offered in even-numbered years. Mr. Kriesel

**161. Conservation of Resources and Environment. (4) III.**

Lecture—4 hours. Principles of natural-resource and environmental-quality conservation. Land use conflicts between forestry, agricultural, mining, municipal, and recreational interests. Roles of industry, government, and society in creating and resolving resource and environmental problems.

Mr. Jett

**\*162. Geography of Water Resources. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Geographical survey of water on the land; needs and opportunities for water-resource development and conservation. Historical solutions to water needs of specific areas, and geographical problems associated with current and future water requirements.

Mr. McArthur

**170. Cultural Ecology. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2; or Anthropology 2. Theories of environment-man relations. Ecologic relations of gatherers, fishermen, hunters, swidden cultivators, peasants; their impact on environment; their domestic plants and animals.

Mr. Jett

**171. Cultural Geography. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Consideration of the principal approaches to cultural geography in modern times, including environmental determinism and possibilism, regional geography, cultural history, cultural ecology, and environmental perception.

Mr. Simoons

**172. Geography of Domesticated Animals. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 2, Anthropology 2, or consent of instructor. Theories of animal domestication; spread of domesticated animals in Old and New Worlds; contrasting roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies. Mr. Simoons

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Chairman in charge)

**Graduate Courses**

**201. Sources and General Literature of Geography. (4) I, II, III.**

Discussion—3 hours. Prerequisite: graduate status in geography. Designed for students preparing for higher degrees in geography. May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography.

The Staff

**\*250. Theory and Method in Geography. (4) III.**

Lecture—2 hours; discussion—1 hour.

Mr. Kriesel

**\*256. Regional Economic Organization. (4) III.**

Seminar—3 hours. Analysis of theories of spatial organization and examination of their applicability to selected examples of regional economic development.

**\*290. Seminar: Selected Regions. (4) III.**

Seminar—3 hours. Region to be announced annually.

The Staff

**291. Seminar in Cultural Geography. (4) I.**

Seminar—3 hours.

Mr. Jett

**292. Seminar in Landform Analysis. (4) I.**

Seminar—3 hours.

Mr. McArthur

**\*293. Seminar in Political Geography. (4) I.**

Seminar—3 hours.

Mr. Kriesel

**294. Seminar in Climatology. (4) II.**

Seminar—3 hours.

Mr. Schultz

**295. Seminar in Urban Geography. (4) II.**

Seminar—3 hours.

Mr. Kriesel

**\*296. Seminar in Agricultural Geography. (4) I.**

Seminar—3 hours.

Mr. Gregor

**\*297. Seminar in Industrial Geography. (4) II.**

Seminar—3 hours.

**298. Group Study. (2-5) I, II, III.**

Prerequisite: consent of instructor. The Staff

\* Not to be given, 1972-73.

299. Research. (2-9) I, II, III.

The Staff (Chairman in charge)

Professional Course

300. Problems in Teaching Geography. (2) III.

**GEOLOGY**

<sup>1</sup>Eldridge M. Moores, Ph.D., *Chairman of the Department*

Jere H. Lipps, Ph.D., *Acting Chairman*

Department Office, 175 Physics-Geology

*Professors:*

- Daniel I. Axelrod, Ph.D.
- Cordell Durrell, Ph.D.
- Charles G. Higgins, Ph.D.
- Ian D. MacGregor, Ph.D.
- James W. Valentine, Ph.D.

*Associate Professors:*

- Jere H. Lipps, Ph.D.
- <sup>1</sup>Eldridge M. Moores, Ph.D.

*Assistant Professors:*

- Gerald C. Bond, Ph.D.
- Richard Cowen, Ph.D.
- Harry W. Green, II, Ph.D.
- Robert J. Twiss, Ph.D.



*Lecturer:*

Robert A. Matthews, A.B.

*Departmental Major Advisers.*—B.S. Degree: Mr. Cowen, Mr. Durrell. A.B. Degree: Mr. Higgins.

*The Major Programs*

Students interested in becoming professional geologists and continuing their geological studies at the graduate level should elect the program leading to the Bachelor of Science degree. Students desiring a less intensive program in geology as part of their general education or as preparation for nonprofessional careers in geology should elect the program leading to the Bachelor of Arts degree. High school students should note that the preparation for either degree is simplified if their high school programs include chemistry and four years of mathematics.

*Bachelor of Science Major Program*

Lower Division Courses.—Biology 1; Chemistry 1A-1B-1C or preferably 4A-4B-4C; Geology 60-60L; Mathematics 11, 21A-21B-21C; Physics 4A-4B. In addition, for emphasis in physical geology, Mathematics 22A or 22B or 22C and Physics 4C; for emphasis in paleobiology, Mathematics 15 and Zoology 2.

Upper Division Courses.—Geology 102, 105-105L, 106-106L, 107-107L, 118, and 190 re-

<sup>1</sup>Absent on leave, 1972-73.

Lecture—2 hours. Prerequisite: course 1 or 2. Establishing, organizing, and conducting courses in geography and regional study. Designed primarily for prospective elementary and secondary school teachers of the social sciences.

Mr. Thompson

peated at least once. Additional courses in cognate sciences, mathematics, and geology required for specialization within physical geology or paleobiology must be selected in consultation with the major adviser.

*Bachelor of Arts Major Program*

Lower Division Courses.—Biological Sciences 1; Chemistry 1A-1B or 4A-4B; Geology 60-60L; Physics 2A, 3A, 2B, 3B. Recommended: Chemistry 1C or 4C; Mathematics 13, 15, 16A, 16B.

Upper Division Courses.—Geology 102, 105-105L, 106-106L, 107-107L, and other upper division courses in geology and related fields to total not less than 36 units selected in accordance with a plan approved by the major adviser.

*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.

*Teaching Major.*—Requirements for the teaching major are the same as for undergraduate major for degree (A.B. or B.S.).

*Teaching Minor.*—Thirty units (quarter units) including Geology 60, 105, 106, and 107 to be selected with the advice of the subject representative. Eighteen of the 30 units must be at the upper division or graduate level.

*Subject Representative:* Mr. Higgins

*Lower Division Courses*

**1. Evolution of the Earth. (3) I.**

Lecture—3 hours. Prerequisite: high school science. Origin and physical development of the Earth through geologic time, and the processes and materials that formed it.

Mr. Lipps

**1L. History of the Earth Laboratory. (1) I.**

Laboratory—3 hours. Prerequisite: course 1 (concurrently). The materials (rocks and minerals), structures (faults and folds), and processes (sea floor spreading and continental drift) that formed the Earth, illustrated by specimens, maps, experiments, and field trips.

Mr. Lipps

**2. Landforms (3) II.**

Prerequisite: course 1. Physical geology and

geomorphology: the Earth as a planet; processes which affect its erosional and depositional landforms. Mr. Higgins

### 21. Landforms Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 2 (concurrently). Introduction to landforms and geologic features as depicted on topographic and geologic maps, structure sections, and aerial photographs. Mr. Higgins

### 3. History of Life. (3) III.

Lecture—3 hours. Recommended: course 1. The history of life during the three 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. Mr. Cowen

### 3L. History of Life Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 3 (concurrently); course 25 recommended. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution. Mr. Cowen

### 16. The Physical Earth and Man. (3) II.

Lecture—2½ hours; discussion—½ hour. The problem of non-renewable natural resources. Their role in technology and society; their availability, rates of depletion, and the probable impact on society of their exhaustion. Mr. Durrell

### 17. Earthquakes and Other Earth Hazards. (2) III.

Lecture—2 hours; field trip—1 day. The impact of earthquakes and other geologic hazards on Man, his structures and his environment. Discussion of the causes, prediction, and solution of geologic problems in rural and urban settings. Mr. Matthews

### 20. Geology of California. (2) III.

Lecture—2 hours; demonstration—1 hour. Recommended: course 25. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. Mr. Durrell

### 25. Geologic Excursions. (2) I.

Lecture—1 hour; in the field—six to eight Saturdays, 8–5. Prerequisite: course 1. Study areas of geologic interest in the Sierra Nevada (gold-bearing gravels, glacial terrane, volcanic rocks) and Coast Ranges (old sea floor, folded sedimentary rocks, San Andreas fault) and appraisal of man's impact on his natural environment. Mr. Matthews

### 60. Materials of the Earth. (3) III.

Lecture—3 hours. Recommended: elementary chemistry. Introduction to common minerals and

rocks, their composition, structure, classification, and conditions of origin. Mr. Green

### 60L. Materials of the Earth Laboratory. (2) III.

Laboratory—6 hours; two one-day field trips. Prerequisite: course 60 (preferably taken concurrently). Demonstration of common rocks and minerals and the examination, description, and interpretation of igneous, metamorphic, and sedimentary rocks. Mr. Green

#### Upper Division Courses

### 102. Field Geology. (4) III.

Laboratory—3 hours; Saturday field work—8 hours. Prerequisite: courses 60, 60L, 105, 105L, 106, 106L; or consent of instructor. Laboratory study of topographic and geologic maps. Field geologic study of selected areas. Preparation of field reports for application to geologic, engineering, agricultural, and environmental uses. The Staff

### 105. Structure of the Earth. (3) I.

Lecture—3 hours. Prerequisite: course 60 or 1. Types and significance of deformation of earth materials; interpretation of folds, faults, and other rock structures; introduction to regional structural geology, plate tectonics, continental drift, and structure of the earth's interior. Mr. Twiss

### 105L. Structure of the Earth: Laboratory. (2) I.

Laboratory—6 hours; two one-day field trips. Prerequisite: course 105 (may be taken concurrently), or consent of instructor. Analysis of selected problems of structural geology in the laboratory and in the field. Introduction to geologic maps, cross-sections, and graphic solutions to structural problems. Field study of selected areas exhibiting diverse structural features. Mr. Twiss

### 106. Ancient Environments. (3) II.

Lecture—3 hours. Prerequisite: course 1 or 60. Study of modern and ancient environments; processes and geologic records of mountains, plains, coasts, shallow seas, and deep oceans. Ecology and fossil record as a key to past environments; introduction to stratigraphic principles and methods. Mr. Lipps

### 106L. Ancient Environments Laboratory. (2) II.

Laboratory—6 hours; two or three one-day field trips. Prerequisite: course 106 (concurrently). Introduction to stratigraphic procedures, identification of environmentally diagnostic rocks and fossils, problems of making geologic maps, recognition of ancient environments in the field. Mr. Lipps

### 107. Principles of Paleobiology. (3) III.

Lecture—3 hours. Prerequisite: Biological Sciences 1. The evolution and ecological structure of the biosphere from the origin of life to the present, with special emphasis on the oceanic



environment during the last 600 million years.

Mr. Valentine

#### 107L. Principles of Paleobiology Laboratory. (2) III.

Laboratory—6 hours; two all-day field trips. Prerequisite: Biological Sciences I; course 107 (concurrently). Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory.

Mr. Valentine

#### 111A. Paleobiology of Invertebrata. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates.

Mr. Cowen

#### 111B. Paleobiology of Protista. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of single-celled organisms.

Mr. Lipps

#### 112. The Oceans. (3) I.

Lecture—3 hours. Prerequisite: one course in physical or biological science. The history and origin of ocean basins, sea water, and circulation patterns, and their effect on the development of life. The modern marine environment, including marine geology, physical, chemical, and biological oceanography, marine resources, and pollution.

Mr. Valentine

#### 113. The Solar System. (3) II.

Lecture—3 hours. Prerequisite: one course in physical science. The evolution of stars and their bearing on the origin of elements. Origin and early history of the solar system and of the terrestrial planets and their satellites.

Mr. MacGregor

#### 115. Geochemistry. (3) III.

Lecture—3 hours. Prerequisite: Chemistry 1A (may be taken concurrently). Application of principles of solution, physical, structural, colloidal, and isotopic chemistry to geologic problems. Formation of carbonate rocks and other chemical sediments, rock weathering, and clay mineral formation. Magmatic, metamorphic, and hydrothermal processes and radiometric dating techniques.

#### 117. Physics of the Earth. (3) II.

Lecture—3 hours. Prerequisite: course 105, Mathematics 21C, Physics 4B; Mathematics 22B and Physics 4C recommended. An introduction to the study of deep earth structure and processes: seismology, heat flow, geomagnetism, paleomagnetism, and gravity.

Mr. Twiss

#### 118. Summer Field Geology. (8) (Summer).

Six weeks in field. Prerequisite: course 102. Preparation of a geologic map and report on a selected field area.

The Staff

#### 124. Optical Mineralogy. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 60, 60L. Optical properties of minerals and applications to the study of rocks in the petrographic microscope.

Mr. Durrell

#### 125. Igneous Petrology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 60, 60L, 124; or consent of instructor. Origin and characteristics of igneous rocks and processes of the earth, moon, and terrestrial planets. Laboratory study of representative rock suites in hand specimen and thin section.

Mr. MacGregor

#### 126. Sedimentation and Sedimentary Petrology. (4) II.

Lecture—2 hours; laboratory—6 hours; two 1-day field trips. Prerequisite: courses 60, 60L, 124. Survey of sedimentary rocks, including weathering processes, mechanics of sediment transport and deposition, and diagenesis and lithification. Identification of sediments and textures in hand specimen and thin section. Environmental significance of sedimentary suites.

#### 128. Metamorphic Petrology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 60, 60L, 124; or consent of instructor. Origin and characteristics of metamorphic rocks and processes. Laboratory study of representative rock suites in hand specimen and thin section.

Mr. Twiss

#### 130. Non-renewable Natural Resources. (3) I.

Lecture—3 hours. Prerequisite: course 1 or 16. Origin, occurrence, and distribution of non-renewable resources, including metallic, non-metallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects.

Mr. Matthews

#### 134. Environmental Geology and Land Use Planning. (3) II.

Lecture—3 hours. Geologic aspects of land use and development planning. Problems concerning waste disposal, land stability, earthquake prediction. Analytic techniques, presentation of reports, and legal aspects of selected case studies.

Mr. Matthews

#### 140. Paleobotany. (5) III.

Lecture—2 hours; laboratory—6 hours; two all-day field trips and one three-day field trip. Prerequisite: senior standing. Guiding principles underlying an analysis of successive floral assemblages in Cenozoic and Cretaceous rocks. Development of modern vegetation, with emphasis on centers of origin and radiation, rates of evolution, and community evolution. (Same course as Botany 140.)

Mr. Axelrod



**142. Evolution of Plant Ecosystems. (4) I.**

Lecture—2 hours; discussion—1 hour; field trips. Prerequisite: course 140 or Botany 141. Development of mixed mesophytic forest, conifer-hardwood forest, taiga, rain forest, deserts, and "mediterranean" ecosystems. (Same course as Botany 142.) Mr. Axelrod

**152. Photogeology. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: stereoscopic vision and one course in geology; courses 105 and 102 (taken concurrently) recommended. Study of geologic structures, rock types, and regional geologic history by analysis of their images on aerial photographs. Mr. Higgins

**153. Studies in Geomorphology. (3) I.**

Lecture—3 hours. Prerequisite: course 2. Recommended: course 2L and Geography 108. Methods of analysis of geomorphic problems. Mr. Higgins

**160. Global Tectonics. (3) II.**

Lecture—3 hours. Prerequisite: course 105 or consent of instructor. Major tectonic features of the earth. Causes, processes, and consequences of plate motions through geologic time; plate tectonic model of orogenesis. Mr. Green

**162. Stress and Deformation. (4) III.**

Lecture—3 hours; discussion—2 hours. Prerequisite: Mathematics 21C and Physics 4B; Mathematics 22A, 22C, and Physics 4C recommended. Introduction to tensor analysis: tensor notation transformations, representation quadric, Mohr-circle construction; stress; strain; strain-rates, elasticity. Solution of general, three-dimensional problems with geological application. Mr. Green

**190. Seminar in Geology. (1) I, II, III.**

Lecture-discussion—2 hours; term paper. Seminar on current topics in geology. (Passed/Not Passed grading only.) The Staff

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: senior standing in geology or consent of instructor.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-4) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses****201A. Ecological Theory. (3) I.**

Lecture—2 hours; discussion—1 hour. Prerequisite: a course in ecology. The course will focus on the ecologic community as a unit. The major generalizations concerning the structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic

environment and its fluctuations. (Same course as Botany, Ecology and Zoology 201A.)

Ecology Group Staff

**201B. Analysis of A Selected Ecosystem. (3) II.**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists from several fields. May be repeated for credit. (Same course as Botany, Ecology and Zoology 201B.)

Ecology Group Staff

**201C. The Changing Biosphere. (3) III.**

Lecture—2 hours; assigned problem. Prerequisite: courses 201A, 201B, or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes on living systems, changes in species diversity, effects of human population increase, and related topics. (Same course as Botany, Ecology and Zoology 201C.)

Ecology Group Staff

**213. Geomorphology. (3) I.**

Seminar—two 1½ hour sessions per week. Prerequisite: course 153 or Geography 108. Selected geomorphic studies of surficial processes and the evolution of landforms.

Mr. Higgins

**\*216. Tectonics. (3) I.**

Seminar—3 hours. Prerequisite: course 105. Tectonic features of the Earth; structural histories of selected deformed belts in relation to theories of orogenesis. Offered in odd-numbered years.

Mr. Moores

**218. Advanced Structural Analysis. (3) I.**

Lecture—2 hours; seminar—1 hour. Prerequisite: course 105. Analysis of stress and strain. Theoretical and experimental investigations of rock deformation. Principles of fracture, folding, and flow of rocks and their application to field occurrences. Offered in even-numbered years.

Mr. Green

**236. Physical Geology of California. (2) I, II, III.**

Seminar—2 hours.

Mr. Durrell

**\*254. Phase Equilibria. (3) I.**

Seminar—3 hours. Prerequisite: Chemistry 1C; Mathematics 22A; physical chemistry recommended. Physicochemical aspects of the phase relations in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks. Offered in odd-numbered years.

Mr. MacGregor

\* Not to be given, 1972-73.

**\*255. Genesis of Metamorphic Rocks. (3) II.**

Seminar—3 hours. Prerequisite: course 124; courses 125, 254 recommended. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in even-numbered years.

**\*257. Sedimentary Petrology: Terrigenous Rocks. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 126. Origin of land-derived non-carbonate clastic rocks. Textural and compositional analyses in thin section. Offered in odd-numbered years.

**\*258. Sedimentary Petrology: Carbonate Rocks. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 126. Origin of biological, biochemical, and chemical sedimentary carbonate rocks. Textural and compositional analyses in thin section. Offered in even-numbered years.

**260. Paleontology. (3) III.**

Seminar—3 hours. Prerequisite: course 111A or 111B, or graduate standing in a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting.

Messrs. Axelrod, Cowen, Lipps, Valentine

**\*261. Paleocoenology. (3) I.**

Lecture—2 hours; seminar—1 hour. Prerequisite: course 107; Mathematics 15. Recommended:

Mathematics 13. Theoretical and operational analyses of the structure and evolution of ancient and modern biotic associations, chiefly marine. Offered in odd-numbered years.  
Mr. Valentine

**262. Paleosystematics. (3) II.**

Lecture—1 hour; seminar—2 hours. Prerequisite: course 107, Mathematics 15. Recommended: Genetics 100B, Mathematics 13. Principles and methods of taxonomy of fossil organisms. Offered in even-numbered years.  
Mr. Valentine

**263. Functional Morphology of Fossil Invertebrates. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 111A or Zoology 112. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate phyla.  
Mr. Cowen

**280. Igneous Petrology. (3) I.**

Seminar—2 hours; laboratory—3 hours. Prerequisite: course 124. Integrated laboratory, field study, and seminar on igneous processes and products. Offered in even-numbered years.  
Mr. MacGregor

**290. Seminar in Geology. (1) I, II, III.**

Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (Satisfactory/Unsatisfactory grading only.)  
The Staff

**298. Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1-6) I, II, III.**

The Staff (Chairman in charge)

**GERMAN**

Clifford A. Bernd, Ph.D., *Chairman of the Department*  
Department Office, 416 Sproul Hall

**Professors:**

Clifford A. Bernd, Ph.D.

Wolfgang W. Moelleken, Ph.D.

**Associate Professors:**

Wolfgang F. Bender, Ph.D.

<sup>3</sup>Roland W. Hoedmann, Ph.D.

H. Guenther Nerjes, Ph.D.

**Assistant Professors:**

Wilbur A. Benware, Ph.D.

John F. Fetzer, Ph.D.

Karl R. Menges, Ph.D.

Fritz Sammern-Frankenegg, Ph.D.

◇ ◇ ◇

**Lecturer:**

<sup>4</sup>William M. Estabrook, Ph.D.

<sup>0</sup> Not to be given, 1972-73.

<sup>3</sup> Absent on leave, winter quarter 1973.

<sup>4</sup> Absent on leave, spring quarter 1973.

*Departmental Major Adviser.*—Mr. Estabrook.

*Graduate Advisers.*—Mr. Nerjes, Mr. Fetzer, Mr. Moelleken.

**The Major Program**

Lower Division Courses.—German 1, 2, 3, 6A-6B or 7.

Upper Division Courses.—36 units in upper division courses, including German 101, 102, 103; 119A and 119B. Majors can take not more than two courses in translation for credit.

*Honors and Honors Program* (see page 148). — The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

*The Master of Arts Degree*

The Department offers programs of study

leading to the M.A. degree. A minimum of 36 units is required. In addition, candidates for the M.A. will be expected to acquire a reading knowledge of French. Further information may be obtained by writing to the Graduate Adviser.

#### *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 Graduate Adviser.

*Teaching Major.*—Requirements are the same as for the departmental major.

*Teaching Minor.*—A minimum of 30 units in German, including 101, 102, 103.

*Subject Representative:* Mr. Estabrook.

#### Lower Division Courses

*Course Placement.*—Students with two years of high school German normally continue in German 2; those with three years, German 3; those with four years, German 6A, 6B, or 7.

#### 1. Elementary German. (6) I, II, III.

Discussion—5 hours; laboratory—two ¼ hour sessions. Mr. Estabrook

#### 2. Elementary German. (6) I, II, III.

Discussion—5 hours; laboratory—two ¼ hour sessions. Prerequisite: course 1. Mr. Estabrook

#### 2X. Intensive Elementary German. (12) II.

Discussion—10 hours; laboratory—2 hours. Prerequisite: course 1. A special double-credit course, combining courses 2 and 3. Designed to confer greater oral-aural proficiency than the normal sequence and to permit selected students to satisfy the college language requirement at an earlier date. Prepares student for courses 6A, 6B, 7. Mr. Benware

#### 3. Intermediate German. (6) I, II, III.

Discussion—5 hours; laboratory—two ¼ hour sessions. Prerequisite: course 2. Class discussions of events and life in Germany—present and past. Reading of modern short stories with inductive review of grammar. Mr. Estabrook

#### 6A. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 3. (Course 6A may be taken concurrently with 6B and/or 7.) Intensive conversational practice based on the everyday vocabulary of reading assignments in German newspapers and contemporary literature. The Staff

#### 6B. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 3. (Course 6B may be taken concurrently with 6A and/or 7.) Intensive conversational practice and discussions based on selected literary texts; oral interpretation of dramatic roles in representative dramas and one-act plays. The Staff

#### 7. Advanced German. (4) I, II, III.

Recitation—3 hours. Prerequisite: course 3. (Course 7 may be taken concurrently with 6A and/or 6B.) Review of grammatical and stylistic principles by means of written exercises; expanding of comprehension vocabulary through rapid and extensive readings of modern prose, dramatic and verse texts. The Staff

#### 10. Basic Reading German. (6) II.

Lecture—3 hours; discussion—2 hours; laboratory. Prerequisite: sophomore standing. Intensive course for non-majors to furnish students with sufficient grasp of reading grammar and vocabulary to permit comprehension of intermediate-level texts of general cultural value. Intended as common core of techniques supplemented by specialization in courses 11H, 11N, 11S. The Staff

#### 11H. Reading German for the Arts and Humanities.

##### (6) III.

Lecture—3 hours; discussion—2 hours; laboratory. Prerequisite: course 10 or equivalent. Continuation of course 10, with specialized focus for upper-division and graduate students in arts and humanities. Reading selections will be appropriately representative. The Staff

#### 11N. Reading German for the Natural Sciences.

##### (6) III.

Lecture—3 hours; discussion—2 hours; laboratory. Prerequisite: course 10 or equivalent. Continuation of course 10, with specialized focus for upper-division and graduate students in the natural sciences. Reading selections will be appropriately representative. The Staff

#### 11S. Reading German for Social Sciences. (6) III.

Lecture—3 hours; discussion—2 hours; laboratory. Prerequisite: course 10 or equivalent. Continuation of course 10, with specialized focus for upper-division and graduate students in the social sciences. Reading selections will be appropriately representative. The Staff

#### 15. The Development of German Literature. (4) I, II, III.

Lecture—3 hours. Characteristic themes, problems, and genres in the mainstream of German literature, from medieval epics and love poetry to the modern period. Study of masterworks in English translation demonstrating problem continuity and relevance to contemporary values within the total intellectual framework. The Staff

#### 49. Freshman Seminar. (2) II.

Discussion—2 hours. Prerequisite: knowledge of German not required. Inquiry into the intellectual roots of problems confronting today's students, particularly as illustrated in translation by such modern German literary figures as Nietzsche, Kafka, Hesse, Brecht, and Günter Grass. Enrollment limited to 15 freshmen. (Passed/Not Passed grading only.) The Staff

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Chairman in Charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

The Staff (Chairman in Charge)

Upper Division Courses

**101. Composition and Conversation. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 7 or courses 6A-6B, or their equivalents. The Staff

**102. Composition and Conversation. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Intermediate essay-writing; analysis of literary and journalistic styles; extension of active writing and speaking vocabulary. The Staff

**103. Advanced Composition. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 102 or consent of instructor. Advanced prose style and original composition. The Staff

**104. German Grammar and Stylistics. (4) II.**

Lecture—3 hours. Prerequisite: course 103 or consent of instructor. The grammar and stylistics of modern written usage. Mr. Moelleken

**105. History of the German Language. (4) I.**

Lecture—3 hours. Prerequisite: course 102. Survey of the linguistic development from the Germanic and Old High German sound shifts; Middle High diphthongization and monophthongization, Ablaut and Umlaut phenomena; "Kanzleisprache" and Luther; origins of modern comparative philology with the Grimms; elementary phonetics. Mr. Benware

**106. Linguistic Structure of German. (4) I.**

Lecture—3 hours. A linguistic analysis of modern standard German including phonetics, phonemics, morphology and syntax. Mr. Benware

**108. Contrastive Structures of English and German. (4) II.**

Lecture—3 hours; assigned problem sets. A contrastive study of the linguistic structures of English and German. Mr. Benware

**109A. The Development of German Culture. (4) II.**

Lecture—3 hours; term paper. Prerequisite: courses 6A and 6B or course 7, or their equivalents. The evolution of ideas, science, and the arts as dimensions of German society and national thought. Mr. Fetzer

**109B. The Development of German Culture. (4) III.**

Lecture—3 hours; term paper. Prerequisite: courses 6A and 6B or course 7, or their equivalents. Continuation of course 109A. The evolution of ideas, science, and the arts as dimensions of German society and national thought. Mr. Fetzer

**110. Masterpieces of German Prose from Goethe to Kafka. (4) I.**

Lecture—3 hours. Study in translation of works which have helped shape the European tradition in the novel and short story or were crucial in the development of German literature. Knowledge of German not required; may not be counted as part of the major in German. Mr. Fetzer

**111. Masterpieces of German Drama from Lessing to Brecht. (4) II.**

Lecture—3 hours. Study in translation of works which have helped shape the European drama or were crucial in the development of German literature. Knowledge of German not required; may not be counted as part of the major in German.

**112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke. (4) III.**

Lecture—3 hours. Study in translation of the German Lyric genius from medieval love poetry through the classicism of Goethe and Hölderlin to the mysticism of Rilke. Knowledge of German not required; may not be counted as part of the major in German. Mr. Menges

**113. Hermann Hesse. (4) III.**Lecture—3 hours; additional readings and written reports. Knowledge of German not required. A study of the main ideas and issues of the principal novels, with emphasis on man's dualism and his search for self-knowledge and self-fulfillment. Discussion of such works as *Siddhartha*, *Steppenwolf*, *Narcissus*, and *Goldmund*, et al. Mr. Nerjes**114. Goethe's Faust. (4) II.**Lecture—3 hours. A detailed analysis and aesthetic critique in English of both "Parts," together with the first-draft *Urfaust*. Knowledge of German not required; German majors fulfill readings in German. Mr. Nerjes**115. German Literature of the Twentieth Century Up to the Second World War. (4) I.**

Lecture—3 hours. Knowledge of German not required. The sublimation of tradition and the exploration of new forms from Nietzsche's death until the Second World War, including readings in translation from Hofmannsthal, Hesse, Rilke, Kafka and Thomas Mann. Mr. Hoermann

**116. German Literature of the Twentieth Century Since the Second World War. (4) II.**

Lecture—3 hours. Knowledge of German not required. The period of reawakening since 1945, the search for identity and meaning within the European community East and West, and the German political-moral dilemma as reflected in translated works by Brecht, Frisch, Dürrenmatt, Grass, and other "Gruppe 47" writers. Mr. Hoermann

**117. Kafka and Dada. (4) II.**

Lecture—3 hours. Knowledge of German not required. Two contemporaneous confrontations with Nietzsche's legacy of cultural nihilism: Kafka's paradoxical dissection, and Dada's paradoxical sublimation of the twentieth-century's continuing encounter with the absurd in literature and art.

Mr. Hoermann

**118. Brecht. (4) II.**

Lecture—3 hours. Knowledge of German not required. A study of Brecht's Epic Theater and his doctrine of aesthetic alienation.

Mr. Hoermann

**119A. Survey of Literary Periods Through Classicism. (4) I.**

Lecture—3 hours. Prerequisite: courses 6A and 6B or course 7, or their equivalents. An integrated view of the philosophical, historical, and stylistic components in the development of the German literary tradition up to German Romanticism.

Mr. Fetzer

**119B. Survey of Literary Periods from Romanticism to the Present. (4) II.**

Lecture—3 hours. Prerequisite: course 119A. Romanticism to the present. Continuation of course 119A.

Mr. Fetzer

**120. The Medieval Period in German Literature. (4) III.**

Lecture—3 hours; written reports. Prerequisite: course 119A or equivalent. The literary-philosophical profile of the "Mittelhochdeutsche Blütezeit" in terms of the significant courtly and folk epics and the "Minnesang." Readings in modern German translation.

Mr. Moelleken

**121. The Renaissance and Reformation Period in German Literature. (4) II.**

Lecture—3 hours; written reports. Prerequisite: course 119A or equivalent. The distinctive thought and literary values of the period from Der-Ackermann-aus-Böhmen through the "Meistergesang" and "Fastnachtspiel" of Hans Sachs.

Mr. Bender

**122. The Baroque Period. (4) I.**

Lecture—3 hours; written reports. Prerequisite: course 119A or equivalent. The stylistic and philosophical predicament of the Thirty-Years War era as documented in the works of Opitz and the Silesian Schools to Grimmelshausen and Gryphius.

Mr. Bender

**123. Enlightenment, Sentimentality and Rococo in German Literature. (4) I.**

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. From the rationalism of Gottsched to the humanism of Lessing, from the hymnodic verse of Klopstock, the anacreontic of Gellert, the rococo of Wie-

land to the beginnings of "Sturm und Drang" with Herder.

Mr. Nerjes

**125A. Goethe. (4) I.**

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. Goethe's development from his anacreontic period to the Italian Journey, with particular emphasis on *Werther*, *Götz* and his early lyrics.

Mr. Nerjes

**125B. Goethe. (4) II.**

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. From the Italian Journey to his death. Study and discussion of the master works of his later period.

Mr. Nerjes

**126A. Young Schiller. (4) II.**

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. A study of the poetry and dramas of his "Sturm und Drang" period to the beginning of the classical era: from *Die Räuber* to *Don Carlos*.

Mr. Nerjes

**126B. Classical Schiller. (4) III.**

Lecture—3 hours; written reports. Prerequisite: course 119A (may be taken concurrently) or equivalent, or consent of instructor. Schiller's historical dramas in conjunction with his critical essays and "Ideendichtung."

Mr. Nerjes

**127. Romanticism. (4) III.**

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. The Napoleonic era from the Jena school of the Schlegels and Novalis, through the Arnim-Brentano group in Heidelberg, to the Berlin circle including Tieck, Eichendorff, and Hoffmann.

Mr. Fetzer

**128. Early Nineteenth-Century German Realism. (4) II.**

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. An examination of the work of such important literary figures as Kleist, Hebbel, Büchner and Grillparzer.

Mr. Bernd

**129. Naturalism to Neo-Classicism in German Literature. (4) I.**

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. From Hauptmann and the social protest of north-German naturalism, through the Viennese psychological impressionism of Schnitzler and the neo-romanticism of Hofmannsthal and Hesse, to Rilke and the collective mysticism of the "George-Kreis."

Mr. Nerjes

**130. The Modern Period from Expressionism to the Present. (4) III.**

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. The moral and existential quandary from Nietzsche, Wedekind, and the wartime generation of dramatists, through the poetry of Trakl, Loerke, and Benn; novelistic mastery in Thomas Mann and Kafka, and the new theater of Brecht, Frisch, and Dürrenmatt. Mr. Menges

**132. The German "Novelle." (4) II.**

Lecture—3 hours; written reports. Prerequisite: course 119B (may be taken concurrently) or equivalent, or consent of instructor. An inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka. Mr. Nerjes

**134. German Poetry. (4) III.**

Lecture—3 hours; language laboratory. Prerequisite: courses 101, 102; or consent of instructor. Analysis and study of representative lyric modes as deduced from the master specimens of verse throughout German literature. Mr. Menges

**185. Intercultural Literary Colloquium. (4) II.**

Lecture—2 hours; discussion—1 hour; term paper; readings in English or German. Prerequisite: consent of instructor. Interdepartmental inquiry into such European and American themes as the anti-hero, guilt and judgment, escape, and utopia. Specific topics to be chosen by instructors. Limited enrollment. (To be given jointly with English 185 and Russian 185.) Mr. Hoermann

**190. Proseminar in a Major Writer. (4) I, II, III.**

Lecture—3 hours; term paper. Prerequisite: courses 119A and 119B or their equivalent, and consent of instructor. Introduction to techniques of independent research and seminar reporting and rebuttal. May be repeated for credit with consent of instructor. The Staff

**191A–D. Intercultural Literary Colloquium: Reality in Transition. (4) III.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, and writers of comparable scope or depth. Content will alternate among the following segments: A. Essential Reality; B. Existential Reality; C. Political Reality; D. Fantastic Reality. May be repeated for credit in different subject area. (Same course as Comparative Literature, English, and Italian 191A–D.) Messrs. Fetzer, Marelli, Silvey

**192A–E. Intercultural Literary Colloquium: Modern Literary Movements and Styles. (4) I.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Studies in popular taste, messianic vision, and elitist polarities. Content will alternate among the following segments: A. Romanticism; B. Symbolist Poetry and Poetics; C. Naturalism and Expressionism; D. Utopianism and Authoritarian Structures; E. Quests of Mystery and Science Fiction. May be repeated for credit in different subject area. (Same course as Comparative Literature, French, and Russian 192A–E.) Miss Izokaitis, Mr. Menges, Mr. Patterson

**194H. Special Study for Honors Students.**

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper. The Staff

**197T. Tutoring in German. (2–4) III.**

Seminar—1–2 hours; laboratory—1–2 hours. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to 6 units. Mr. Hoermann

**198. Directed Group Study. (1–5) I, II, III.**

(Passed/Not Passed grading only.)

The Staff (Mr. Bernd in charge)

**199. Special Study for Advanced Undergraduates.**

(1–5) I, II, III.

The Staff (Mr. Bernd in charge)

**Graduate Courses****200. Gothic. (4) I.**

Seminar—3 hours. Phonology, grammar and reading of Gothic texts. Special topics including the relationship of Gothic to Indo-European and to the other Germanic languages. Knowledge of Modern German not required. Mr. Benware

**201. Old High German. (4) II.**

Seminar—3 hours. A study of the beginnings of German as a written language through the reading of selected texts from the eighth through the eleventh centuries. A linguistic analysis of the dialects. Mr. Benware

**202. Middle High German. (4) III.**

Seminar—3 hours. Outline of grammar; selections from Middle High German epic and lyric poetry. Mr. Moelleken

**203. Old Saxon. (4) III.**

Seminar—3 hours. A study of the linguistic structure and the literary significance of the language of the Old Saxon *Heland*. Knowledge of Modern German not required. Mr. Moelleken

**205. History of the German Language. (4) I.**

Seminar—3 hours. The development of the German language with emphasis on the early periods, from Indo-European to Middle High German.  
Mr. Benware

**210. Techniques of Literary Scholarship. (4) I.**

Seminar—3 hours. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.  
Mr. Fetzer

**211. The Rise of German Literary Criticism. (4) I.**

Seminar—3 hours. The history of criticism in Germany, with some attention to classical sources. The course proceeds chronologically until the modern period, then by a study of special topics broadens to a consideration of recent approaches to German literature.  
Mr. Bernd

**240. Forms of German Verse. (4) II.**

Seminar—3 hours. 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.  
Mr. Sammern-Frankenegg

**241. The German Drama. (4) III.**

Seminar—3 hours. The major forms of German drama from the origins to the middle of the twentieth century. May be repeated for credit with consent of instructor.  
Mr. Nerjes

**242. The German "Novelle." (4) III.**

Seminar—3 hours. The major German *Novellen*, with particular emphasis on the flowering of this genre in the nineteenth century. May be repeated for credit with consent of instructor.  
Mr. Bernd

**249. Medieval Epic Literature. (4) II.**

Seminar—3 hours. Prerequisite: courses 202 and 285, or consent of instructor. A critical analysis of selected epic poetry of the "Staufzeit," such as *Parzival*, *Tristan und Isolde*, and the *Nibelungenlied*. All texts are read in Middle High German.  
Mr. Moelleken

**250. Medieval Lyric Literature. (4) III.**

Seminar—3 hours. Prerequisite: courses 202 and 285, or consent of instructor. A critical study of the great lyric poets of medieval Germany, such as Walther von der Vogelweide, Heinrich von Morungen, and Reinmar von Hagenau. All texts read in Middle High German.  
Mr. Moelleken

**251. Studies in the Works of Andreas Gryphius. (4) II.**

Seminar—3 hours. A study of Gryphius' literary legacy, his lyrics, his tragedies and his comedies, with the purpose of showing his place

in the world of seventeenth-century thought, artistic, religious and humanistic.  
Mr. Bender

**252. The Writings of Lessing. (4) I.**

Seminar—3 hours. A study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama.  
Mr. Bender

**253. Goethe. (4) II.**

Seminar—3 hours. A study of the origins of Goethe's thought in German pietism, and his principal artistic autobiographical, scientific and philosophical works.  
Mr. Nerjes

**254. Schiller. (4) I.**

Seminar—3 hours. 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.  
Mr. Nerjes

**257. Heinrich von Kleist. (4) III.**

Seminar—3 hours. Kleist's important dramatic and prosaic works; special attention will be given to the peculiar hermeneutic problems in modern German, French and Anglo-American Kleist criticism.  
Mr. Bernd

**258. The Novels of Thomas Mann. (4) II.**

Seminar—3 hours. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany.  
Mr. Menges

**259. Studies in Kafka. (4) I.**

Seminar—3 hours. Study of Kafka's nuclear fables.  
Mr. Hoermann

**260. The Poetry of Rilke. (4) I.**

Seminar—3 hours. A study of the principal motifs, myths, images and problems in the poetry of Rainer Maria Rilke.  
Mr. Sammern-Frankenegg

**\*261. Brecht and the Epic Theater. (4) III.**

Seminar—3 hours. A reading of all works with emphasis on the ideas which impelled the development of new literary forms and concepts.  
Mr. Hoermann

**285. Middle High German Literature. (4) II.**

Seminar—3 hours. An extensive reading of Middle High German texts with emphasis upon belletristic and cultural values; also examines linguistic problems. May be repeated for credit with consent of instructor.  
Mr. Moelleken

**288. The Renaissance and Reformation in German Literature. (4) I.**

Seminar—3 hours. The parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor.  
Mr. Bender



**289. German Literature of the Baroque. (4) III.**

Seminar—3 hours. The "Elegantiadeal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.

Mr. Bender

**290. The Enlightenment in German Literature.**

(4) II.

Seminar—3 hours. The revolt against the excesses of the "Elegantiadeal," and the evolution of a new literature based on reason and wit. May be repeated for credit with consent of instructor.

Mr. Nerjes

**291. Rococo in German Literature. (4) II.**

Seminar—3 hours. The essential novels of Christoph Martin Wieland and those contemporaries of his whose literary style mirrors the euphony that is characteristic of Mozart's music. May be repeated for credit with consent of instructor.

Mr. Nerjes

**292. Sentimentality and "Sturm und Drang" in German Literature. (4) III.**

Seminar—3 hours. The German liberal authors of the eighteenth century, such as Johann Georg Hamann and Johann Gottfried Herder, who lived in complete disagreement with the rationalistic tenets of their age. May be repeated for credit with consent of instructor.

Mr. Nerjes

**293. The Classical Age of German Literature. (4) I.**

Seminar—3 hours. An inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor.

Mr. Nerjes

**294. The Romantic Period in German Literature. (4) III.**

Seminar—3 hours. 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.

Mr. Fetzer

**295. Poetic Realism in German Literature. (4) I.**

Seminar—3 hours. 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.

Mr. Bernd

**296. Twentieth Century German Literature. (4) II.**

Seminar—3 hours. 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.

Mr. Menges

**298. Group Study. (1-5) I, II, III.**

The Staff (Mr. Bernd in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Bernd in charge)

**Professional Course**

**390. The Teaching of German. (3) I.**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants.

Mr. Estabrook

**GREEK—See Classics**

**HEBREW—See Oriental Languages**

**HISTORY**

Walter L. Woodfill, Ph.D., *Chairman of the Department*  
Department Office, 176 Voorhies Hall

*Professors:*

- William M. Bowsky, Ph.D.
- <sup>1</sup>David Brody, Ph.D.
- Daniel Calhoun, Ph.D.
- Paul Goodman, Ph.D.
- <sup>2</sup>W. Turrentine Jackson, Ph.D.
- David L. Jacobson, Ph.D.
- Kwang-Ching Liu, Ph.D.
- Jung-Pang Lo, Ph.D.
- C. Bickford O'Brien, Ph.D.
- Rollie E. Poppino, Ph.D.
- <sup>3</sup>Richard N. Schwab, Ph.D.
- James H. Shideler, Ph.D.
- <sup>4</sup>Wilson Smith, Ph.D.

- Donald C. Swain, Ph.D.
- F. Roy Willis, Ph.D.
- Walter L. Woodfill, Ph.D.

*Associate Professors:*

- Daniel Brower, Ph.D.
- Manfred P. Fleischer, Ph.D.
- José R. Juarez, Ph.D.
- C. Roland Marchand, Ph.D.
- Morgan B. Sherwood, Ph.D.
- Stylios Spyridakis, Ph.D.

<sup>1</sup> Absent on leave, 1972-73.

<sup>2</sup> Absent on leave, fall quarter 1972.

<sup>3</sup> Absent on leave, winter quarter 1973.

<sup>4</sup> Absent on leave, spring quarter 1973.



**Assistant Professors:**

Arnold J. Bauer, Ph.D.  
 Peter K. Cline, Ph.D.  
 James A. Fisher, Ph.D.  
 William W. Hagen, M.A.  
 Eugene Lunn, Ph.D.  
 Ted W. Margadant, Ph.D.  
 Richard J. Miller, Ph.D.

**Departmental Advisers.**—Mr. Bauer, Mr. Cline, Mr. Fleischer, Mr. Hagen, Mr. Jacobson, Mr. Lunn, Mr. Marchand, Mr. Margadant, Mr. Miller, Mr. Schwab, Mr. Sherwood, Mr. Spyridakis.

**Graduate Advisers.**—Mr. Bowsky, Mr. Brower, Mr. Calhoun, Mr. Goodman, Mr. Liu, Mr. Poppino, Mr. Shideler, Mr. Willis.

**Introductory Courses.**—Courses 3, 4A, 4B, 4C, 9A, 9B, 17A, 17B, 21A, 21B, 22, 27A, 27B, 51, 61, 76, 85, and 90 are open to all students.

**The American History and Institutions requirement** may be satisfied by any one of the following courses: History 17A, 17B, 21A, 21B, 27A, 27B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 183A, 183B. Upper division courses may be taken with consent of instructor. (See also page 33.)

**The Major Program**

**Lower Division Courses.**—Required: Students majoring in history must complete five lower division history courses, including two courses in each of two of the following categories:

- a) history of Western Civilization,
- b) history of Asian Civilization,
- c) history of the United States.

It is recommended that history majors take all three of the courses in the history of Western Civilization. It is also recommended that students, in consultation with their advisers, take one or two courses (normally a two-quarter sequence of courses) in one of the following fields: classics, cultural anthropology, cultural geography, principles of economics, English literature, literature of the United States, philosophy, political science, psychology, sociology, or statistics. Foreign language study is recommended for all history majors, and especially for those who intend to undertake graduate study in history.

**Upper Division Courses.**—Required: Students majoring in history must complete at least 36 upper division units in history, including:

- a) a minimum of 3 courses (including a two-quarter sequence of courses) in a field of concentration (for "field" see below);
- b) a minimum of two courses each in two other fields of history. (The fields referred to are Ancient History, Medieval Europe, Modern Europe, Great Britain, Russia, East Asia, Latin America and the United States.)

**Honors and Honors Program** (see page 148).  
 —A student may become eligible for graduation

with high honors or highest honors in history by completing the Department's honors program. The program consists of the following work (along with normal major requirements): History 101 usually taken during the junior year; at least one undergraduate proseminar (History 102 or equivalent); an honors essay, to be written in 6 to 10 units of History 199, and completed during the two quarters before the beginning of the student's last quarter as an undergraduate. Any history major who has a departmental grade-point average of 3.2 in a total of at least 20 units of history may enter the program by registering in the departmental office. Those with special interests or qualifications may apply through their advisers.

**Graduate Study.**—The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.

**Teaching Major.**—Requirements are the same as for the departmental major plus course 300.

**Teaching Minor.**—Thirty-two units of history, including 4A–4B–4C, 17A–17B, and 12 units of upper division course work. The 12 units of upper division work should include a two-quarter sequence.

**Subject Representative:** Mr. Jacobson

**Lower Division Courses****3. Cities: A Survey of Western Civilization. (4) II.**

Lecture—3 hours; discussion—1 hour. A survey of western civilization focusing on ten cities, each at the height of its creativity: Athens, Rome, Constantinople, Paris, Florence, Amsterdam, Vienna, London, Moscow, and New York. Slides, music, and literature including political theory. Reading in original sources. Mr. Willis

**4A. History of Western Civilization. (4) I, III.**

Lecture—3 hours; discussion—1 hour. The growth of western civilization from ancient times through the middle ages. The Staff

**4B. History of Western Civilization. (4) I, II.**

Lecture—3 hours; discussion—1 hour. The development of western civilization from the Renaissance through 1815. The Staff

**4C. History of Western Civilization. (4) II, III.**

Lecture—3 hours; discussion—1 hour. The development of western civilization in the nineteenth and twentieth centuries. The Staff

**9A. History of Asian Civilizations. (4) I.**

Lecture—3 hours; discussion—1 hour. The history of the major civilizations of Asia (Chinese, Japanese, Hindu, and Islamic) to the end of the eighteenth century. Emphasis will be put on the general features of the society and government, the economy, religion, philosophy, and the arts. Mr. Miller

**9B. History of Asian Civilizations. (4) II.**

Lecture—3 hours; discussion—1 hour. Introduction to the great changes in the major Asian countries in the past two centuries. Emphasis will be placed on the impact of the West, the search for a new culture, and the background of contemporary social and political problems.

Mr. Miller

**17A. History of the United States. (4) I.**

Lecture—3 hours; discussion—1 hour. The growth of the American people from colonial times through the Civil War.

The Staff

**17B. History of the United States. (4) II, III.**

Lecture—3 hours; discussion—1 hour. The American people from Reconstruction to the present.

The Staff

**21A. Race and Nationality in American History.**

(4) II.

Lecture — 3 hours; discussion — 1 hour. Sources of American nationality and its relationship to ethnical, racial, and religious minorities, 1607–1865. Experiences of groups including American Indians, Orientals, Blacks, Catholics, Jews, Irish and Germans. Tensions between majorities and minorities in the American past.

Mr. Goodman

**21B. Race and Nationality in American History.**

(4) III.

Lecture — 3 hours; discussion — 1 hour. Sources of American nationality and its relationship to ethnical, racial, and religious minorities, 1865 to present. Experiences of groups including American Indians, Orientals, Blacks, Catholics, Jews, Irish and Germans. Tensions between majorities and minorities in the American past.

Mr. Goodman

**\*22. Violence and Law in America. (4) III.**

Lecture—2 hours; discussion—2 hours. Movements of protest or social control from the revolutionary period to the present.

Mr. Calhoun

**27A. Afro-American History. (4) I.**

Lecture—3 hours; discussion—1 hour. The history of black people in the United States from the African background to Reconstruction.

The Staff

**27B. Afro-American History. (4) II.**

Lecture—3 hours; discussion—1 hour. The history of black people in the United States from Reconstruction to the present.

The Staff

**49. Freshman Seminar. (2) I, II, III.**

Seminar—2 hours. Prerequisite: consent of instructor. Reports, discussion and elementary research in the several fields of history designed for the beginning student.

The Staff

**51. Imperialism in British Popular Culture. (4) III.**

Seminar—4 hours; term paper. Investigation of the popular culture which broadly involved

people in the British imperial cause and inspired them to support it. Reading and discussion of relevant, chiefly contemporary, printed materials. No final examination. Limited enrollment.

Mr. Cline

**61. Discovery and Settlement of Spanish America.**

(4) III.

Seminar—4 hours. Some knowledge of Spanish recommended. Examination of the laws, customs, and activities of pre-Colombian and colonial Spanish-American society through reading and discussion of contemporary letters, reports, and other sources in transcription or translation. Each student to keep a journal of his studies. No final examination. Limited enrollment.

Mr. Poppino

**76. The Great Depression. (4) I.**

Discussion—4 hours; term paper. The social impact of the great depression of the 1930s upon the ideas, values and conditions of various segments of American society. Emphasis will be placed on development of skills in research methods, writing style and interpretive analysis. Limited enrollment.

Mr. Marchand

**85. Nature, Man and the Machine in America. (4) III.**

Seminar—4 hours; term paper. Prerequisite: consent of instructor. History of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. Limited enrollment. (Passed/Not Passed grading only.)

Mr. Sherwood, Mr. Swain

**90. Modernization of China and Japan. (4) III.**

Discussion—4 hours; term paper. Prerequisite: consent of instructor; courses 9A or 9B recommended. Reading and discussion on salient aspects of the modern history of China and Japan. Designed for freshmen and sophomores. Background of the contemporary scene is stressed. No final examination. Limited enrollment.

Mr. Liu, Mr. Miller

**98. Directed Group Study. (1–5) I, II, III.**

The Staff (Chairman in charge)

**99. Special Study for Undergraduates. (1–5) I, II, III.**

The Staff (Chairman in charge)

**Upper Division Courses****101. Introduction to Historical Thought and Writing.**

(5) II.

Lecture-discussion—4 hours; term paper. Prerequisite: consent of instructor. The study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation and style in historical writing.

Mr. Margadant

**102. Undergraduate Proseminar in History.**

(5) I, II, III.

Seminar—3 hours; term paper. Prerequisite:

\* Not to be given, 1972–73.

consent of instructor. Designed primarily for history majors. Intensive reading, discussion, research and writing in selected topics in the various fields of history: A. Ancient; B. Medieval; C. Renaissance and Reformation; D. Modern Europe to 1815; E. Europe since 1815; F. Russia; G. China to 1600; H. China since 1600; I. Britain; J. Latin America since 1810; K. American History to 1787; L. United States, 1787-1896; M. United States since 1896; N. Japan. May be repeated for credit. Limited enrollment. The Staff

**111A. Ancient History. (4) I.**

Lecture—3 hours. History of the ancient empires of the Near East and of the Greek city-states to the fifth century B.C. Mr. Spyridakis

**111B. Ancient History. (4) II.**

Lecture—3 hours. History of Greece, the Hellenistic kingdoms, and Rome from the fifth century B.C. to the Punic Wars. Mr. Spyridakis

**111C. Ancient History. (4) III.**

Lecture—3 hours. History of Rome and its empire from the Punic Wars to Constantine. Mr. Spyridakis

**\*121A. Medieval History. (5) I.**

Lecture-discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century. Mr. Bowsky

**121B. Medieval History. (5) II.**

Lecture-discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century. Mr. Bowsky

**121C. Medieval History. (5) III.**

Lecture-discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance. Mr. Bowsky

**131A. Early Modern European History. (4) I.**

Lecture—3 hours. Recommended: courses 4A, 4B. Western European history from about 1350 to about 1500. Mr. Fleischer

**131B. Early Modern European History. (4) II.**

Lecture—3 hours. Recommended: courses 4A, 4B, 131A. Western European history from about 1500 to about 1650. Mr. Fleischer

**131C. Early Modern European History. (4) III.**

Lecture—3 hours. Recommended: courses 4A, 4B, 131B. Western European history from about 1650 to about 1789. Mr. Fleischer

**133. The Age of Ideas. (4) I.**

Lecture—3 hours. The Enlightenment and its background in the seventeenth century. Mr. Schwab

**134A. The Age of Revolution. (4) III.**

Lecture—3 hours. Ideas and institutions dur-

\* Not to be given, 1972-73.

ing the French Revolution and the Napoleonic era. Mr. Schwab

**\*134B. The Age of Revolution. (4) III.**

Lecture—3 hours. Ideas and revolution after 1815. Mr. Schwab

**\*135. History of Science from the Sixteenth to Eighteenth Centuries. (4) III.**

Lecture—3 hours; term paper. Developments in the physical and biological sciences during the sixteenth to eighteenth centuries. Emphasis will be on analysis, synthesis, and interpretation rather than on a chronological narration of events.

**137A. Russian History: Kievan and Muscovite Russia. (4) II.**

Lecture—3 hours. Russian civilization from earliest times to the reign of Peter the Great. Mr. O'Brien

**137B. Russian History: The Empire to 1856. (4) III.**

Lecture—3 hours. Russian civilization from the Age of Peter the Great through the Crimean War. Mr. O'Brien

**137C. Russian History: The Empire, 1856-1917. (4) I.**

Lecture—3 hours. Russian civilization from the Crimean War to the Revolution of 1917. Mr. Brower

**137D. Russian History: Soviet Russia. (4) III.**

Lecture—3 hours. Russia from the Revolution of 1917 to the Age of Stalin. Mr. Brower

**\*141. France since 1815. (4) I.**

Lecture—3 hours; term paper. Mr. Margadant, Mr. Willis

**\*142. History of Italy since the French Revolution. (4) III.**

Lecture—3 hours. Prerequisite: courses 4A, 4B, 4C.

**\*143A. History of Eastern Europe. (4) I.**

Lecture—3 hours; term paper. Recommended: course 4C. History, mid-eighteenth century to mid-nineteenth century, of the subject nationalities of the Habsburg and Russian Empires (Czechs, Slovaks, Poles, Hungarians, Baltic peoples) with focus on their socioeconomic development and struggles for cultural and political independence. Mr. Hagen

**143B. History of Eastern Europe. (4) I.**

Lecture—3 hours; term paper. Recommended: courses 4C, 143A. Geographical focus as in course 143A. Concentration, mid-nineteenth century to the present, on (1) the socioeconomic problems of rural society, industrialization and middle-class development and (2) the political problems of imperialism, nation-state formation and social revolution. Mr. Hagen

**\*144A. History of Germany to 1815. (4) II.**

Lecture—3 hours. Prerequisite: courses 4A and 4B. A history of the Germanies through the Congress of Vienna. Mr. Hagen

**144B. History of Germany since 1815. (4) II.**

Lecture—3 hours. Prerequisite: courses 4C and 144A. The German national unification, the age of Bismarck and William II, and the wars and revolutions of the twentieth century. Mr. Hagen

**145A. Europe in the Nineteenth Century. (4) I.**

Lecture—3 hours. A survey of the history of Europe from 1815 to 1870. Mr. Margadant

**145B. Europe in the Nineteenth Century. (4) II.**

Lecture—3 hours. A survey of the history of Europe from 1870 to 1918. Mr. Margadant

**\*146A. Europe in the Twentieth Century. (4) I.**

Lecture—3 hours; term paper. A survey of the history of Europe from 1919 to 1939. Mr. Willis

**\*146B. Europe in the Twentieth Century. (4) III.**

Lecture—3 hours; term paper. A survey of the history of Europe since 1939. Mr. Willis

**147A. European Intellectual History in the Nineteenth Century. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 4C. A study of major currents of European thought in the nineteenth century viewed within the context of important social and political developments. Emphasis will be placed upon the emergence of the socialist and aesthetic critiques of nineteenth-century industrial civilization. Mr. Lunn

**147B. European Intellectual History in the Twentieth Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: courses 4C and 147A. European thought since 1890 viewed within the context of major social and political developments. Topics will include: the development of modern sociological and psychological thought; divergent forms of twentieth-century Marxism; the politics of literary intellectuals; French Existentialism. Mr. Lunn

**148. European Culture in an Age of Social Upheaval, 1914–1950. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 146A or consent of instructor. The impact of World War I, The Russian Revolution, German Nazism, and Italian Fascism upon literature, art, and cinema. Materials will include selected novels and films as well as historical works. Mr. Lunn

**151A. History of England. (4) I.**

Lecture—3 hours. Recommended: course 4A.

A survey of English history to the latter part of the fifteenth century. Mr. Woodfill

**151B. History of England. (4) II.**

Lecture—3 hours. Recommended: courses 4A, 4B, and 151A. A survey of English history from the latter part of the fifteenth century to the latter part of the eighteenth century. Mr. Woodfill

**151C. History of England. (4) III.**

Lecture—3 hours. Recommended: courses 4B, 4C, 151A, and 151B. A survey of English history from the latter part of the eighteenth century to the present. Mr. Cline

**\*152A. English Constitutional History. (4) II.**

Lecture—2 hours; discussion—2 hours. Recommended: course 151A. From Anglo-Saxon times to the reign of Edward IV. Mr. Woodfill

**\*152B. English Constitutional History. (4) III.**

Lecture—2 hours; discussion—2 hours. Recommended: courses 151B or 154, 151C, and 152A. From the reign of Edward IV to the present. Mr. Woodfill

**154. Tudor and Stuart England. (5) III.**

Seminar—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. Mr. Woodfill

**156. Social and Economic History of Britain since 1760. (4) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: course 151C or consent of instructor. Integration of the history of industrial, commercial and agricultural development with the nature and course of change in demography, social organization and urbanization from preindustrial to postindustrial Britain. Mr. Cline

**\*158A. The British Empire in the Nineteenth Century. (4) II.**

Lecture—3 hours. Prerequisite: course 4C; courses 151B, 151C recommended. The development of Britain's overseas empire, and the evolution of colonial policies, to the Boer War.

**\*158B. The British Empire in the Twentieth Century. (4) III.**

Lecture—3 hours. Prerequisite: course 4C. Recommended: courses 151B, 151C. The evolution and decline of the British Empire from the Boer War to the 1950s.

**\*160. History of the West Indies, 1492–1850. (4) III.**

Seminar—3 hours; reports and research pa-

\* Not to be given, 1972–73.

pers. Prerequisite: consent of instructor. Study of selected topics on European expansion in the West Indies, with special emphasis on social and economic developments. (Passed/Not Passed grading only.) Mr. Jacobson

**161A. Latin American History. (4) I.**

Lecture—3 hours. Colonial history of Latin America. Mr. Bauer

**161B. Latin American History. (4) II.**

Lecture—3 hours. The national period of Latin American history. Mr. Bauer

**162. History of the Andean Region. (4) III.**

Lecture-discussion—3 hours; term paper. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present. Mr. Bauer

**\*163A. History of Brazil. (4) I.**

Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in odd-numbered years. Mr. Poppino

**\*163B. History of Brazil. (4) II.**

Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in even-numbered years. Mr. Poppino

**\*164. History of Argentina. (4) III.**

Lecture—3 hours. Prerequisite: courses 161A and 161B or consent of instructor. The history of Argentina from about 1800 to the present, stressing the contributions of the colonial heritage and nineteenth-century political, economic, and social developments to the rise of Argentine nationalism. Offered in even-numbered years. Mr. Bauer

**165. Latin American Social Revolutions. (4) III.**

Lecture—3 hours; written reports. Major social upheavals since 1900 in Mexico, Argentina, Brazil, Bolivia, and Cuba, examined as to similarities and differences in causes, course, and consequences. Mr. Poppino

**166A. History of Mexico to 1848. (4) I.**

Lecture—3 hours; term paper. The political, economic and social development of pre-Colombian, colonial and national Mexico to 1848. Offered in odd-numbered years. Mr. Juárez

**166B. History of Mexico Since 1848. (4) I.**

Lecture—3 hours; term paper. The history of Mexico from 1848 to the present. Offered in even-numbered years. Mr. Juárez

**168. History of Inter-American Relations. (4) II.**

Lecture—3 hours; written reports. Diplomatic

\* Not to be given, 1972-73.

history of Latin America since independence, intra-Latin American relations, relations with the United States, participation in international organizations, and communism in Latin America. Mr. Poppino

**\*169A. Mexican-American History. (4) I.**

Lecture-discussion—3 hours; term paper. The origins and evolution of the Spanish-speaking population of the Southwest to 1848, with emphasis on native American cultures, Spanish conquest and settlement of Mexico, frontier conditions, missionary efforts, economical, cultural, and social developments in the Spanish Borderlands. Mr. Juárez

**169B. Mexican-American History. (4) II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 169A or consent of instructor. The Spanish-speaking peoples of the American Southwest from 1848 to 1910, with emphasis on the impact of occupation and rule by Anglo-Americans, the Spanish heritage, the clash of cultures, and the role of Mexican-Americans in the mining, pastoral, and agricultural economies. Mr. Juárez

**169C. Mexican-American History. (4) III.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 169B or consent of instructor. The Spanish-speaking peoples in the American Southwest since 1910, with emphasis upon the heavy immigration from Mexico following the Mexican Revolution, the "Mexican problem," the bracero program, and the role of Spanish-speaking citizens in the society of the American Southwest. Mr. Juárez

**170A. Colonial America. (4) I.**

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. Mr. Jacobson

**170B. The American Revolution. (4) I.**

Lecture—3 hours. An 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. Mr. Jacobson, Mr. Goodman

**\*170C. The Early National Period, 1789-1815.**

(4) III.

Lecture—3 hours. The political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences. Mr. Goodman

**171A. The Jacksonian Era. (4) I.**

Lecture—3 hours. The political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850. Mr. Calhoun

**171B. American Civil War. (4) II.**

Lecture—3 hours. Major developments in American history from 1848 to 1865: slavery and antislavery, immigration, sectional conflict, emergence of the Republican party, the Civil War.  
Mr. Calhoun

**\*171C. The Emergence of Modern America. (4) I.**

Lecture—3 hours. From Reconstruction to the twentieth century, including political and intellectual change, the advent of big business, the rise of organized labor, ethnic adjustments, urbanization, and movements of social unrest.  
Mr. Brody

**174A. Recent History of the United States. (4) I.**

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from 1900 to 1930s.  
Mr. Shideler, Mr. Swain

**174B. Recent History of the United States. (4) II.**

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from the 1930s to the present.  
Mr. Brody, Mr. Swain

**174C. Selected Themes in Twentieth Century American History. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 174A or 174B, or consent of instructor. Selected topical themes of the period from the 1890s to the present. Emphasis will be on analysis, synthesis and interpretive overview rather than a chronological narrative of events.  
Messrs. Brody, Shideler, Swain

**\*175A. Intellectual History of the United States. (4) II.**

Lecture—3 hours. Prerequisite: course 17A or its equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American social thought from colonial times to the 1860s. Emphasis upon Puritanism, the American Enlightenment, Transcendentalism, Jacksonian democracy, in the context of ideas about the nature of man and his freedom and the idea of progress.  
Mr. Smith

**\*175B. Intellectual History of the United States. (4) III.**

Lecture—3 hours. Prerequisite: courses 17A and 17B; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American social thought from the 1860s to the present. Emphasis upon the social relevance of philosophical and religious idealism, naturalism, and pragmatism.  
Mr. Smith

**176A. Social and Cultural History of the United States. (5) I.**

Lecture—4 hours; term paper. A study of

social and cultural forces in American society from colonial times through the Civil War with emphasis on social structure, religious movements, labor systems, racial and national groups, social reform movements and changes in social values.  
Mr. Marchand

**176B. Social and Cultural History of the United States. (5) III.**

Lecture—4 hours; term paper. A study of social and cultural forces in American society since the Civil War and with emphasis on social structure, religious movements, labor systems, racial and national groups, social reform movements, problems of urbanization, and changes in social values.  
Mr. Marchand

**177. Black History Since 1900. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 17A, 17B, 27A, 27B strongly recommended. Examination of the political, economic, social, and intellectual history of black people in the United States from 1900 to the present.  
Mr. Fisher

**\*178A. Great Issues in United States History: Ideas and Interpretations. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development to 1865.  
Mr. Jackson

**\*178B. Great Issues in United States History: Ideas and Interpretations. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development since 1865.  
Mr. Jackson

**\*179A. Economic Growth of the United States. (4) II.**

Lecture—3 hours. Development of the American economy from colonial agriculture and mercantilism to the emergence of industrial capitalism.

**\*179B. Economic Growth of the United States. (4) III.**

Lecture—3 hours. The changing nature of industrial capitalism and its effects on agriculture, labor, business, and government in the late nineteenth and twentieth centuries.  
Mr. Brody

**183A. The Frontier Experience: Trans-Mississippi West. (4) II.**

Lecture—3 hours; discussion—1 hour. The

\* Not to be given, 1972-73.

fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War.  
Mr. Jackson

**183B. The Frontier Experience: Trans-Mississippi West. (4) III.**

Lecture—3 hours; discussion—1 hour. 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.  
Mr. Jackson

**185A. History of Science and Technology in America. (4) II.**

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions to 1890.  
Mr. Sherwood, Mr. Swain

**185B. History of Science and Technology in America. (4) III.**

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions since 1890.  
Mr. Sherwood, Mr. Swain

**187. Issues in American Educational History. (4) III.**

Lecture—3 hours; discussion—1 hour. An exploration of the patterns by which educational institutions have developed, with emphasis on the ways in which Americans have used the transmission of culture between generations as a focus for general social criticism. Offered in odd-numbered years.  
Mr. Calhoun

**188A. History of Agriculture in the United States. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural development to 1900 with emphasis on social and economic institutions. Mr. Shideler

**188B. History of Agriculture in the United States. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural changes from 1900 to the present with emphasis on the background and evolution of government policy.  
Mr. Shideler

**189A. History of California. (4) II.**

Lecture—3 hours; discussion—1 hour. History of California to 1865.  
Mr. Jackson

**189B. History of California. (4) III.**

Lecture—3 hours; discussion—1 hour. History of California since 1865.  
Mr. Jackson

\* Not to be given, 1972–73.

**191A. Early Imperial China. (4) I.**

Lecture—3 hours; discussion—1 hour. Chinese history to 960 with emphasis on the basic ideas and institutions which have molded the culture and society of China.  
Mr. Lo

**191B. Late Imperial China. (4) II.**

Lecture—3 hours; discussion—1 hour. China, 960 to 1800, with attention to the growth of autocracy, economic and intellectual development, and problems of foreign relations. Offered in even-numbered years.  
Mr. Lo

**\*191C. Modern China. (4) III.**

Lecture—3 hours; discussion—1 hour. The revolutionary transformation of China from the nineteenth century to the present.  
Mr. Lo

**192A. Modern China and the West. (4) I.**

Lecture—3 hours. A survey of China's relations with the West since 1800, with emphasis on the impact of imperialism, the profound effects of Western technology and ideas, and the changes in the Chinese worldview and foreign policy.  
Mr. Liu

**192B. Modern China and the West. (4) II.**

Lecture—1 hour; discussion—2 hours. Prerequisite: course 192A or consent of instructor. Intensive study of topics in the history of China's relations with the West.  
Mr. Liu

**\*193. China's Relations with Southeast Asia. (4) I.**

Lecture—3 hours; discussion—1 hour. China's historical relations with Southeast Asia—military, political, cultural, and economic. Offered in odd-numbered years.  
Mr. Lo

**\*194A. History of Japan, I. (4) I.**

Lecture—3 hours. A survey of Japanese history to the end of the Tokugawa period.  
Mr. Miller

**\*194B. History of Japan, II. (4) II.**

Lecture—3 hours. Prerequisite: course 194A or consent of instructor. A survey of Japanese history from the late Tokugawa period to the present.  
Mr. Miller

**197T. Tutoring in History. (2) I, II, III.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: enrolled as a history major with senior standing and consent of Department Chairman. 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. (Passed/Not Passed grading only.)  
The Staff (Mr. Woodfill in charge)

**198. Directed Group Study. (1–5) I, II, III.**

Prerequisite: consent of instructor; upper division standing.  
The Staff (Chairman in charge)



**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

Prerequisite: consent of instructor.  
The Staff (Chairman in charge)**Graduate Courses****201. Sources and General Literature of History.**

(4) I, II, III.

Seminar—3 hours. Designed primarily for students preparing for higher degrees in history. A. Ancient; B. Medieval; C. Renaissance and Reformation; D. Modern Europe to 1815; E. Europe since 1815; F. Russia; G. China to 1600; H. China since 1600; I. Britain; J. Latin America since 1810; K. American history to 1787; L. United States, 1787-1896; M. United States since 1896; N. Japan. The Staff

**\*202. Social Science in Historical Practices. (4) III.**

Seminar—4 hours. Explores sociological and economical ideas that have actually been used by working historians, especially in United States history, and develops ways to evaluate and plan such efforts. Mr. Calhoun

**\*211. Ancient History. (4) II.**

Seminar—3 hours. Prerequisite: courses 111A, 111B, 111C. A seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization. Mr. Spyridakis

**221. Medieval History. (4) I.**

Seminar—3 hours. Recommended: courses 121A, 121B. Topics in the history of medieval Europe. Mr. Bowsky

**\*237. Russian History. (4) I.**

Seminar—3 hours. Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1856. Mr. O'Brien

**\*242. History of the Enlightenment. (4) III.**

Seminar—3 hours. Prerequisite: a reading knowledge of French. Intellectual and social history of Europe during the Enlightenment. May be repeated for credit. Mr. Schwab

**246. Europe in the Twentieth Century. (4) II.**

Seminar—3 hours. Political history of Europe since 1919, with particular emphasis on the post-1939 period. Mr. Willis

**251. English History. (4) I, II, III.**

Seminar—3 hours. Recommended: courses 151A, 151B, and 151C; 152A and 152B; 154. Mr. Woodfill

**\*261. Latin American History. (4) I, II, III.**

Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese. Mr. Bauer, Mr. Poppino

**\*270. Early American History. (4) III.**

Seminar—3 hours. Mr. Jacobson

**\*271. History of the United States, 1760-1815.**

(4) II.

Seminar—3 hours. Mr. Goodman

**272. History of the United States, 1815-1848.**

(4) II.

Seminar—3 hours. Mr. Calhoun

**\*273. History of the United States, 1848-1900.**

(4) I, II.

Seminar—3 hours. \_\_\_\_\_

**\*274. Recent History of the United States. (4) I.**

Seminar—3 hours. Topics in twentieth century American history. Mr. Swain

**275. American Social and Intellectual History.**

(4) I.

Seminar—3 hours. Prerequisite: courses 175A, 175B or their equivalent; or consent of instructor. Studies in the recent historiography of, or research in, American social and intellectual history. May be repeated for credit. Mr. Smith

**\*276. Social History of Science and Technology in America. (4) I.**

Seminar—3 hours. Prerequisite: graduate standing. Studies in the historiography of, and research in, the history of science and technology in America from colonial times to the present. Mr. Sherwood

**\*279. History of the United States: the Twentieth Century. (4) I.**

Seminar—3 hours. Emphasis on social and economic developments. Mr. Brody

**\*283. History of the United States: The Frontier. (4) I.**

Seminar—3 hours. Mr. Jackson

**\*288. History of the United States. (4) II, III.**

Seminar—3 hours. Prerequisite: graduate standing. Emphasis on agricultural history and closely related topics such as exports, transportation and politics. Mr. Shideler

**291A-291B. Chinese History. (4-4) I-II.**

Seminar—3 hours. Prerequisite: consent of instructor. Research on topics to be chosen by the student for the purpose of writing article-length papers. Mr. Liu, Mr. Lo

**\*291C. Chinese History. (4) III.**

Seminar—3 hours. Prerequisite: reading knowledge of Chinese. Readings in Chinese historical materials. Training in the techniques of using Chinese reference works will be provided. Mr. Lo

\* Not to be given, 1971-72.



- 298. Group Study. (1-5) I, II, III.**  
The Staff (Chairman in charge)
- 299. Research. (1-9) I, II, III.**  
The Staff (Chairman in charge)
- 299D. Individual Study. (1-6) I, II, III.**  
(Satisfactory/Unsatisfactory grading only.)  
The Staff (Chairman in charge)

## HOME ECONOMICS EDUCATION

*Major Advisers.*—See *Class Schedule* listing.

*Major Program and Graduate Study.*—See pages 87 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Professional Courses

**300. Teaching Home Economics in Secondary Schools. (3) II.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a teaching major or minor in home economics. Instructional procedures and materials used in teaching home economics in secondary schools. This course should be completed before student teaching and is accepted as a part of the professional education requirements for the teaching credential. Mrs. Adams

## HOME MANAGEMENT

*Related Undergraduate Major.*—See page 87.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Upper Division Courses

**140. Home Management. (4) III.**

Lecture—4 hours. Prerequisite: Psychology

## HUMAN DEVELOPMENT

*Related Undergraduate Major.*—See pages 71 and 74.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Lower Division Courses

**12. Human Sexuality and Sexual Behavior. (2) I.**

Lecture—2 hours. Structure and function of genital system; sexual response; fertility; birth control; pregnancy and childbirth; homosexuality; cross-cultural, social and psychological

### Professional Course

**300. The Teaching of History in the Secondary School and the Junior College. (3) III.**

Lecture—3 hours. Prerequisite: junior or senior standing with a teaching major or minor in social studies. Methods for the presentation of history at the secondary and junior college level.

**320A. Introduction to Teaching. (1) I.**

Lecture—1 hour. Observations and participation in some form of public school work.

Mrs. Adams

**320C. Supervised Teaching. (12) I, II, III.**

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in home economics.

Mrs. Adams

**320E. Curriculum and Instruction Procedures.**

(3) I, II, III.

Discussion—3 hours. Prerequisite: all students enrolled in 320E must enroll in 320C concurrently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching.

Mrs. Adams

**1A. Management principles in relation to family resources, goals, and values.**

Mrs. Bruhn

**140L. Laboratory in Home Management. (3) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 140 and senior or graduate standing. Integrated experiences in the various phases of home management.

Mrs. Bruhn

considerations; sex education; courtship and marriage; communication; attitudes and values; lovemaking. (Passed/Not passed grading only.)

Mr. Hildebrand

**33. Introduction to Supervised Observation.**

(2) I, II, III.

Lecture—1 hour; discussion—1 hour. Observation of individuals in a variety of settings; emphasis on observational techniques and the discrimination of individual differences.

The Staff (Mrs. Welker in charge)

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Thompson in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**  
The Staff (Mr. Thompson in charge)

**Upper Division Courses**

**131. Infancy and Early Childhood. (4) I, II, III.**

Lecture—4 hours. Prerequisite: introductory psychology and biology. An analysis of the biological, social and cultural influences in the psychological growth and development of children; emphasis on the functions served by the parent-offspring relationship; observations.

Mr. Lynn, Mr. Harper

**133. Case Study of a Young Child. (3) I, II, III.**

Discussion—1 hour; laboratory—6 hours; meetings with preschool teachers—3 hours. Prerequisite: consent of instructor; courses 33 and 131 recommended. Intensive case study of an individual child aged 2 to 5, use of observational techniques, cumulative records and test results.

Mrs. Welker

**133L. Laboratory in Early Childhood Education.**

(3) I, II, III.

Discussion—2 hours; laboratory—5 hours. Prerequisite: course 133 and consent of instructor. Supervised participation in programs administered by the Early Childhood Education Center, field placements at suitable educational institutions. Interaction with groups of young children, observation in schools, evaluation and testing of theories of preschool education and child development. May be repeated for credit.

Mrs. Welker

**136. Middle Childhood and Adolescence. (4) I, II, III.**

Lecture—4 hours. Prerequisite: course 131; Psychology 1C; introductory biology. Analysis of the interplay of biological and social-cultural factors in the emotional cognitive and social development from middle childhood through adolescence.

Mr. Harper, Mr. Horowitz

**136L. Laboratory in Child Development. (2) II, III.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: courses 133 or 136 or Psychology 112. Laboratory work with school-age children and adolescents including supervised tutorial work with children with special needs. May be repeated for credit.

The Staff

**137. Contemporary American Family. (4) II III.**

Lecture—4 hours. Sociological and psychological factors influencing marriage and the family in present-day society.

II. Mr. Hawkes; III. ———

**139. Diagnostic Techniques with Children.**

(4) I, II, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 131 and 136, or Psychology 112. Evaluation of intelligence, personality, and special abilities of children. Class demonstration of individual tests for infants, preschool,

and school-age children. Concepts of environment. Relevant research findings.

Miss Bryant, Ms. Werner

**140. Emotionally Disturbed Children. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 131 and 136, or Psychology 112. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children.

Mrs. Bachtold

**141. Physically Handicapped and Mentally Retarded Children. (3) I, II, III.**

Lecture—3 hours. Prerequisite: courses 131 and 136 or Psychology 112. Etiology and diagnosis of sensory handicaps, brain damage, and mental retardation in children; education of these children.

Miss Bryant, Ms. Werner

**142. Gifted Children. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 136 or Psychology 112 or consent of instructor. Review of research on intellectually gifted; planning appropriate classroom experiences; role of parents and teachers in encouraging creative thinking.

Mr. Horowitz, Mrs. Bachtold

**143. The Adult. (3) III.**

Lecture—3 hours. Prerequisite: courses 131 and 136, or psychology 112. Developmental stages of early, middle, and late adulthood; the mature personality.

Mr. Horowitz

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Thompson in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

**Graduate Courses**

**210. Child Development and Behavior. (3) I.**

Lecture—discussion—3 hours. An analysis of the historical, theoretical and empirical issues in child development.

The Staff

**211. Physiological Correlates of Behavioral Development. (3) III.**

Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals.

Mr. Harper

**213. Cross-Cultural Study of Children. (3) I.**

Seminar—3 hours. Prerequisite: graduate standing. Current theory and research concerned with ethnic and social class differences in children's development. Methods of cross-cultural research, patterns of child rearing, achievement motivation, cognitive and social development

among children in the developing countries and ethnic subcultures in the U.S.A. Ms. Werner

**231. Issues in Cognitive and Linguistic Development. (3) III.**

Seminar—3 hours. Prerequisite: Education 212 and consent of instructor. The study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development. Mr. Horowitz

**237. Parent-Child Interaction. (3) II.**

Seminar—3 hours. Prerequisite: course 210. Current theory and research. Emphasis on parental behavior in other animals and other cul-

tures, child-rearing practices, the child's perception of parents, the differential influence of each parent on the child's psychological well-being, sex-role development, and moral development. Mr. Lynn

**290. Seminar. (2) I, II, III.**

Discussion—2 hours. Discussion and analysis of research in human development. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Thompson in charge)

**298. Group Study. (1-5) I, II, III.**

The Staff (Mr. Thompson in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Thompson in charge)

## INSTITUTION MANAGEMENT

*Related Major Program.*—See pages 79 and 87.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**125. Quantity Food Production and Service. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Foods 100B. Quantity food preparation, purchasing, service, safety and sanitation as related to large quantity food production. Field trips, observations, and discussions with experts in above areas. Mrs. Sugars

**126. Quantity Food Production Laboratory and Production Planning. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 125. Quantity food production laboratory applying the principles presented in course 125. Menu planning, recipe standardization, portion control, yield studies and financial

management as related to food service management. Mrs. Sugars

**127. Food Service Organization and Management. (4) III.**

Lecture—4 hours. Prerequisite: Foods 100B. Administration of quantity food service units, general principles of organization and management, work simplification, personnel management, planning for layout and equipment. Miss Zeman

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: senior standing and consent of instructor. The Staff (Miss Zeman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: senior standing and consent of instructor. The Staff (Miss Zeman in charge)

*Related Courses:* see Foods and Nutrition.

## INTEGRATED STUDIES

Arthur E. McGuinness, Ph.D., *Chairman of the Group*  
Group Office, 314 Sproul Hall

**1A-1B-1C. Major Figures of the Seventeenth and Twentieth Centuries: Philosophy, Theology and the Sciences. (4-4-4) I-II-III.**

Lecture—4 hours. Prerequisite: courses 2A-2B-2C and 6 to be taken concurrently. An interdisciplinary study of the ideas and methods of Galileo, Newton, Descartes, Hobbes, Whitehead, Einstein and Neitzsche. Limited enrollment. The Staff (Mr. McGuinness in charge)

**2A-2B-2C. Major Figures of the Seventeenth and Twentieth Centuries: The Arts. (4-4-4) I-II-III.**

Lecture—4 hours. Prerequisite: courses 1A-1B-1C and 6 to be taken concurrently. An interdisciplinary study of the ideas and work of

Rembrandt, Donne, Monteverdi, Stravinsky, Picasso and Eliot.

The Staff (Mr. McGuinness in charge)

**3A-3B-3C. Tradition and Change in the Arts and Political Science. (4-4-4) I-II-III.**

Lecture—4 hours. Prerequisite: courses 1C and 2C; courses 4A-4B-4C and 8 may be taken concurrently; consent of instructor. An interdisciplinary study of psychology, drama, the novel, art and music.

The Staff (Mr. McGuinness in charge)

**4A-4B-4C. Tradition and Change in the Sciences, Philosophy and Psychology. (4-4-4) I-II-III.**

Lecture—4 hours. Prerequisite: courses 1C

and 2C; courses 3A-3B-3C and 8 to be taken concurrently; consent of instructor. An interdisciplinary study of biology, genetics, philosophy of science and psychology.

The Staff (Mr. McGuinness in charge)

**6. Seminar. (1) I, II, III.**

Discussion—1 hour. Prerequisite: courses 1 and 2 to be taken concurrently. Concentrates on the integration of knowledge in the arts and sciences with emphasis upon major figures studied

in courses 1 and 2. May be repeated for credit. (Passed/Not Passed grading only.)

The Staff (Mr. McGuinness in charge)

**8. Seminar. (1) I, II, III.**

Discussion—1 hour. Prerequisite: courses 3 and 4 to be taken concurrently. Concentrates on the integration of knowledge about tradition and change in the arts and sciences. May be repeated for credit. (Passed/Not Passed grading only.) The Staff (Mr. McGuinness in charge)

**INTERNAL MEDICINE—See Medicine**

**INTERNATIONAL AGRICULTURAL DEVELOPMENT**

*Major Advisers.*—See *Class Schedule* listing.

*Major Program and Graduate Study.*—See pages 88 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Course**

**10. Population, Food, and Life; Quality or Subsistence? (3) I.**

Lecture—3 hours. Food requirements versus self-realization as the limiting force in population growth; the interaction of changing human goals and new technology through successive stages in economic development; agriculture's contributions to development. Mr. Hansen

**Upper Division Courses**

**101. Crop Production under Tropical Conditions. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Botany 2. Climatic and soil adaptation; varieties and varietal improvement in annual and perennial crops; pests, diseases, and their control; fertilization and other management practices. Mr. Williams

**102. Livestock and Poultry Production in Developing Areas. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Ecological considerations of developing areas including feed resources, pests, diseases and their control; kinds of livestock, wild game, poultry and fish suited to these areas and their management; uses of animals and their by-products.

The Staff (Mr. Vohra in charge)

**190. Proseminar in International Agricultural Development. (3) III.**

Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Coordination of concepts, principles, and information drawn for technical agriculture and the social sciences presented in the context of economic development. Special emphasis on the problems of program design and implementation. Mr. Davis

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Akesson in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Mr. Hedges, Graduate Group Chairman in charge)

**Graduate Courses**

**280A-280B. Social, Technological, and Economic Factors; Strategies, Planning Procedures and Case Studies. (3-3) II-III.**

Seminar—3 hours. Prerequisite: consent of instructor. Problems and analysis in agricultural development; cultural, political, social, and economic organization; human factors in relation to resource use and technology; strategies and planning procedures in agricultural development; case studies of development programs in individual countries.

II. Mr. Hedges, Mr. Peterson

III. Mr. Hedges, Mr. Chancellor

**299. Research. (1-9) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Hedges, Graduate Group Chairman, in charge)

**INTERNATIONAL RELATIONS**

Randolph M. Siverson, Ph.D., *Chairman of the Committee*  
Committee Office, 351 Voorhies Hall

**Committee in Charge:**

Andrzej Brzeski, Ph.D. (*Economics*)

Howard F. Gregor, Ph.D. (*Geography*)

H. Guentder Nerjes, Ph.D. (*German*)

Rollie E. Poppino, Ph.D. (*History*)

Randolph M. Siverson, Ph.D. (*Political Science*)

*Major Adviser.*—See *Class Schedule*.

The major in international relations is devised to meet the needs of students interested in acquiring an understanding of the forces and influences conditioning present-day world politics and economics, as well as the main problems and policies of organized states in their relations with one another. Because these problems and policies must be dealt with and determined by governments, the major is built around courses dealing with intergovernmental diplomatic and economic relations. However, it cuts across departmental lines, for international relations are also shaped in relation to political, geographic, economic, and social conditions, and in the light of historical precedents.

*The Major Program*

*Language requirement:* approximately 26 quarter units in one modern foreign language. Equivalent course coverage by a placement test or transfer credit is accepted.

*Lower Division Courses.*—Required: Economics 1A-1B or 2A-2B-2C; History 4B, 4C, or 9A, 9B or 17A, 17B; Political Science 2 or 2D and 3 or 3D.

*Upper Division Courses.*—From the following four disciplines select 3 courses from each of two disciplines, and 2 courses from each of the remaining two; or select 3 courses from each of three disciplines, and at least one course in the remaining discipline:

- a) Economics 110B, 115A-115B, 116, 117,

121A-121B, 123, 125A-125B, 135A-135B-135C, 150, 151, 160, 161;

b) Political Science 112, 117A, 117B, 118A-118B-118C, 122, 123, 124, 125, 128, 129, 131, 132, 134, 137, 139, 140A-140B, 141, 142, 143, 144, 145, 146A-146B, 147A, 147B, 148A, 148B, 149, 170, 172, 174, 176, 185A-185B;

c) History 102, 137D, 141, 143A-143B, 144B, 146A, 146B, 147B, 151C, 161B, 162, 163B, 164, 165, 166B, 168, 169C, 174A, 174B, 191C, 192A-192B, 193, 194B;

d) Geography 119, 121, 122A, 122B, 123A, 123B, 124, 125A, 125B, 126, 141A, 141B, 143. Interdisciplinary seminar (listed under Political Science 192A-192B), 2 quarters of 4 units each, required in junior or senior year.

Optional relevant courses: Sociology 118, 125, 130, 141, 142, 143, 145, 155, 175; German 110, 111, 114, 115, 116; Russian 40, 41, 42, 125, 128; French 107A, 107B, 141, 142, 150; Italian 120A, 120B; Oriental Languages 132A-132B, 142; Spanish 101A-101B, 101C, 120A, 134, 150.

*Teaching Major.*—For the secondary credential: In addition to the departmental major, one (three or four unit) upper division course in history, economics, political science, or geography is required in order to acquire 16 upper division units in one discipline. This course is to be selected from the courses listed above.

For the elementary credential: The teaching major is the same as the departmental major.

*Subject Representative:* Mr. Lieber

## ITALIAN

Department Office, 515 Sproul Hall

*Assistant Professors:*

Jonathan L. Butler, Ph.D.

Alfonso De Petris, *Dottore in Lettere*.

Enrico Marelli, *Dottore in Lettere*.

*Departmental Major Adviser.*—Mr. Marelli.

*The Major Program*

*Lower Division Courses.*—Required: Italian 1, 2, 3, 4, 5, and 6 or their equivalents. Recommended: one year of college Latin or a Romance Language.

*Upper Division Courses.*—Required: at least 36 units of upper division courses of which two may be chosen from department-approved courses in related fields.

*Honors and Honors Program* (see page 148). The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

*Teaching Major.*—Requirements for the teaching major are the same as for the departmental major.

*Teaching Minor.*—A minimum of at least 30 units in Italian of which 12 are upper division units including Italian 101 and 102.

*Lower Division Courses*

A course may not ordinarily be taken for credit if it is a prerequisite to a course already completed. Students offering high school language preparation as a prerequisite must take a placement test.

**1. Elementary Italian. (4) I, II, III.**

Discussion—4 hours.

The Staff

**2. Elementary Italian. (4) I, II, III.**

Discussion—3 hours; laboratory—to be arranged. Prerequisite: course 1.

The Staff

**3. Elementary Italian. (4) I, II, III.**

Discussion—3 hours; laboratory—to be arranged. Prerequisite: course 2 or equivalent.

The Staff

**4. Intermediate Italian. (3) I, II, III.**

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 3 or equivalent.

The Staff

**5. Intermediate Italian. (3) II, III.**

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 4 or equivalent. Continuation of course 4. The Staff

**6. Reading and Conversation. (4) I, III.**

Recitation—4 hours. Prerequisite: course 5 or equivalent. Class discussion; reading of selected works; oral reports; analysis of texts. The Staff

**Upper Division Courses****101. Advanced Conversation, Composition, and Grammar. (4) I.**

Lecture—3 hours; weekly essays. Prerequisite: course 6 or consent of instructor.

Mr. De Petris

**102. Advanced Conversation, Composition, and Grammar. (4) II.**

Lecture—3 hours; weekly essays. Prerequisite: course 101 or consent of instructor. Offered in odd-numbered years. Mr. De Petris

**\*113A. Italian Literature before the Renaissance: from St. Francis to Petrarch. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A study of the origins of lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The development of an Italian standard of poetry, with emphasis on the Sicilian school of Poetry. The "Sweet New Style," and Petrarch. Mr. Butler

**\*113B. Italian Literature before the Renaissance: Dante's Divine Comedy and Boccaccio. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A study of the origins of non-lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The *Divine Comedy* and the development of a prose style with emphasis on Boccaccio's *Decameron*. Mr. Butler

**\*115A. Italian Literature of the Renaissance and the Baroque: from Humanism to Machiavelli. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A detailed examination of the development of the Renaissance ideal of man and the subsequent loss of faith in this ideal as evidenced in the work of Lorenzo de' Medici, Poliziano, Ariosto and Machiavelli. Mr. De Petris

**\*115B. Italian Literature of the Renaissance and the Baroque: from Cellini to Marino. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 115A. A continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus on Galileo's role in the formation of a modern literary standard. Mr. De Petris

**118. Italian Literature of the Eighteenth Century. (4) I.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. An examination of the struggle for the establishment of a modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretta, Parini, Alfieri and Vico. Offered in odd-numbered years.

Mr. Marelli

**\*119. Italian Literature of the Nineteenth Century. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. The various aspects of romanticism in Italy; Manzoni, Verga and *Verismo*. Offered in even-numbered years.

Mr. Marelli

**120A. Italian Literature of the Twentieth Century: The Novel. (4) II.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. A study into the development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese and Vittorini. Offered in odd-numbered years.

Mr. Marelli

**\*120B. Italian Literature of the Twentieth Century: Poetry and Drama. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 6 or consent of instructor. The main trends in Italian poetry with emphasis on hermeticism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama. Offered in even-numbered years.

Mr. Marelli

**139A. Italian Literature in English: Early Italian Literature and Dante Alighieri. (4) I.**

Lecture—3 hours; term paper. The origin of the Italian Lyric Tradition, with emphasis on authors of the Sicilian School, the Dolce Stil Novo, and Dante's *Vita Nuova* (offered in even-numbered years); the *Divina Commedia*. Offered in odd-numbered years. Mr. Butler

**139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance. (4) II.**

Lecture—3 hours; term paper. Petrarch and Boccaccio and their relations to the Middle Ages and the Renaissance (offered in even-numbered years); the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo and Tasso. Offered in odd-numbered years.

Mr. Marelli

**139C. Italian Literature in English: Modern Italian Literature. (4) III.**

Lecture—3 hours; term paper. The Romantic Movement in Italy in its relationship to European Romanticism with emphasis on Foscolo,

\* Not to be given, 1972-73.

Leopardi and Manzoni (offered in even-numbered years); twentieth-century Italian authors: differing emphasis according to the needs of the students. Offered in odd-numbered years.

Mr. Marelli

**191A-D. Intercultural Literary Colloquium: Reality in Transition. (4) III.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, and writers of comparable scope or depth. Content will alternate among the following segments: A. Essential Reality; B. Existential Real-

ity; C. Political Reality; D. Fantastic Reality. May be repeated for credit in different subject area. (Same course as Comparative Literature, English, and German 191A-D.)

Messrs. Fetzner, Marelli, Silvey

**194H. Special Study for Honors Students.**

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff (Mr. Bach in charge)

**199. Special Study for Advanced Undergraduates.**

(1-4) I, II, III.

Prerequisite: consent of instructor. Directed individual study for advanced undergraduate students.

The Staff (Mr. Bach in charge)

**JAPANESE—See Oriental Languages**

**LATIN—See Classics**

**LAW**

Daniel J. Dykstra, LL.B., S.J.D., *Dean of the School and Chairman of the Department*

Richard D. Lee, LL.B., *Assistant Dean of the School*

Department Office, 1011 Martin Luther King, Jr. Hall

**Professors:**

Homer G. Angelo, J.D., LL.M.  
Edward L. Barrett, Jr., J.D.  
Edgar Bodenheimer, J.U.D., LL.B.  
Daniel J. Dykstra, LL.B., S.J.D.  
Dov M. Grunschlag, LL.B.  
James E. Hogan, LL.B.  
Pierre R. Loiseaux, LL.B., LL.M.  
Edward H. Rabin, LL.B.  
Mortimer D. Schwartz, J.D., LL.M., M.S.  
(*Law Librarian*)  
John W. Whelan, LL.B.  
Donald H. Wollett, LL.B.

◇ ◇ ◇

**Professors:**

Gerald J. Adler, LL.B., LL.M. (*Acting*)  
John D. Ayer, J.D. (*Acting*)  
Edwin J. Bradley, LL.B. (*Visiting*)  
Charles Davenport, LL.B. (*Acting*)  
Harrison C. Dunning, LL.B. (*Acting*)  
Floyd F. Feeney, LL.B. (*Acting*)  
Daniel W. Fessler, J.D., LL.M. (*Acting*)  
Gary S. Goodpaster, J.D. (*Acting*)  
William W. Oliver, J.D. (*Visiting*)  
Kellis E. Parker, J.D. (*Acting*)  
Raymond I. Parnas, J.D., LL.M. (*Acting*)  
John W. Poulos, J.D. (*Acting*)  
Richard C. Wydick, LL.B. (*Acting*)

**Lecturers:**

Brigitte M. Bodenheimer, J.U.D., LL.B.  
Richard D. Lee, LL.B.  
Alfred J. Lewis, LL.B., A.M.L.S.  
(*Assistant Librarian*)

**Admission Requirements and Curriculum:**  
for details consult the *Announcement of the School of Law*.

**Professional Curriculum**

**First Year**

**200. Introduction to the American Legal Process.**

(3) I.

Lecture—3 hours. An introduction to American Legal Process through study of how courts resolve disputes in selected areas. Emphasis will be upon operation of the case law system, the lawmaking roles of the courts and the legislatures, and the acquisition of skills of a lawyer.

Mr. Grunschlag, Mr. Poulos

**201A-201B-201C. Property. (3-2-3) I-II-III.**

Lecture—3-2-3 hours. The basic legal doctrines governing the use and transfer of real estate. (Deferred grading only, pending completion of the sequence.)

Mr. Dunning, Mr. Rabin

**202A-202B. Contracts. (4-4) I-II.**

Lecture—4-4 hours. Examination of the sorts of promises that are enforced at law and the

<sup>1</sup>Absent on leave, 1972-73.



nature of protection given. Inquiry into the means by which traditional doctrine adjusts—or fails to adjust—to changing social demands. (Deferred grading only, pending completion of sequence.) Mr. Ayer, Mr. Fessler

**203A–203B. Pleading and Procedures in Civil Cases. (3–3) II–III.**

Lecture—3–3 hours. A study of the methodology by which a civil suit is initiated and carried through the courts (excluding, however, the rules and tactics relating to the proof of disputed facts, which are the subject matter of Evidence and Trial Practice, respectively). (Deferred grading only, pending completion of sequence.) Mr. Hogan, Mr. Grunschlag

**204A–204B. Torts. (4–4) I–II.**

Lecture—4–4 hours. A study of the legal concepts which apply to actions brought by litigants who seek relief for injury; thus, concern with intentional invasions of personality and property and with the unintentional invasion of these same interests. More specifically, analysis of civil actions based upon wrongs carrying labels such as: assault, battery, false imprisonment, negligence, defamation, invasion of privacy, misrepresentation and nuisance. (Deferred grading only, pending completion of sequence.) Mr. Adler, Mr. Dykstra

**205. Introduction to Public Law. (2) II.**

Lecture—2 hours. An introduction to the legal aspects of government including the legislative and executive processes, administration and regulation. Study of Federal and State materials. Consideration of statutory construction and interpretation. Mr. Whelan

**206. Criminal Law. (4) III.**

Lecture—4 hours. A study of the elements and policies of selected criminal offenses. Mr. Hogan, Mr. Poulos

**207A–207B–207C. Legal Research and Writing. (1–1–2) I–II–III.**

Seminar—1–1–2 hours. Small group instruction in the techniques of legal research and writing. (Deferred grading only, pending completion of sequence.) Mr. Lewis, Mr. Schwartz

**209. Current Legal Problems. (3) III.**

Lecture—3 hours. Opportunity to consider in small groups legal problems of current significance. Each section will focus on a separate problem area. Problems to be announced in advance by the instructor teaching the particular sections. Messrs. Ayer, Dunning, Parker, Wollett

**Second and Third Year Courses**

**213. Business Associations. (3) I.**

Lecture—3 hours. The business enterprise owned by relatively few persons. While some treatment is given the partnership and limited

partnership, the main emphasis is upon the close corporation. Materials are examined in a planning context and stress structuring of legally effective and efficient arrangements for the control, management and dissolution of the close corporation as well as arrangements governing profit sharing and transfer of ownership interests. Fiduciary concepts relevant to this kind of business organization taken up. Mr. Bradley

**214. Constitutional Law I. (3) II.**

Lecture—3 hours. An introductory analysis of the judicial process in constitutional cases; division of powers between the national government and the states. Mr. Barrett, Mr. Poulos

**215A–215B. Corporations. (3–3) II–III.**

Lecture—3–3 hours. Legal problems surrounding the dominant phenomenon of the industrial state, the public issue corporation. Attention given to the traditional statutory and judge-made legal principles as well as the rapidly expanding "federal corporation law." Among the areas studied are the governance of the corporation, its operation through a board of directors, committees, and officers, and the prerogatives of shareholders in the decision-making process; the increasing importance of the concept of corporate social responsibility; and the impact of federal regulation of the proxy system. (Deferred grading only, pending completion of sequence.) Mr. Bradley, Mr. Fessler

**216. Commercial Law I. (4) I, III.**

Lecture—4 hours. The basic course in Commercial Law. Emphasis on secured commercial transactions, particularly under Article 9 of the Uniform Commercial Code. Attention is also given to the developing law of consumer protection under retail installment sales acts, "truth in lending" acts, and the like. Some coverage of negotiable instruments. Enrollment in this course is helpful before, though not prerequisite to, enrollment in either Commercial Law II or Debtor and Creditor. Mr. Loiseaux

**217A–217B. Constitutional Law II. (3–2) II–III.**

Lecture—3–2 hours. Constitutional limitations on governmental power, civil rights and civil liberties. (Deferred grading only, pending completion of sequence.) Mr. Goodpaster, Mr. Poulos

**218. Criminal Law. (4) I, III.**

Lecture—4 hours. A study of the elements and policies of selected criminal offenses. I. Mr. Barrett; III. Mr. Goodpaster

**219A–219B. Evidence. (3–3) I–II.**

Lecture—3–3 hours. The rules regulating the admissibility of testimonial and documentary proof during the trial of civil and criminal cases, including the concept of relevancy, the hearsay rule, the examination and impeachment of witnesses, the opinion rule, constitu-



tional and statutory privileges, presumptions, and burden of proof. (Deferred grading only, pending completion of sequence.)

Mr. Hogan, Mr. Wydick

**220A-220B. Federal Taxation I. (3-3) I-II; II-III.**

Lecture—3-3 hours. A study of the statutory, judicial, and administrative material concerning federal income taxes. (Deferred grading only, pending completion of sequence.)

I-II. Mr. Davenport; II-III. Mr. Oliver

**221. Introduction to Estate Planning I. (3) II, III.**

Lecture—3 hours. The basic estate planning devices, with emphasis on wills and trusts.

Mr. Oliver

**223. Introduction to Estate Planning II. (3) III.**

Lecture—3 hours. Prerequisite: Introduction to Estate Planning I. The substantive law needed to prepare and administer modern estate plans. If class size permits, instruction in the drafting of complex dispositive instruments will be included.

Mr. Rabin

**225. Marital Property. (3) II.**

Lecture—3 hours. California community property law, property consequences of marriage dissolution, and marital property settlement agreements.

Mrs. Bodenheimer

**226. Criminal Law Administration I. (4) I.**

Lecture—4 hours. Constitutional and administrative problems raised by police investigative procedures.

Mr. Parnas

**227. Criminal Law Administration II. (2) I.**

Lecture—2 hours. Post-arrest through presentence phases of the criminal process with major emphasis on prosecutorial discretion and plea bargaining.

Mr. Parnas

**230. Family Law. (3) I.**

Lecture—3 hours. State regulation of marriage, legal position of husband and wife and of parent and child within the going family, family disorganization and its support and custody consequences, and adoptions. Mrs. Bodenheimer

**231. Legislation. (3) II.**

Lecture—3 hours. Organization and operation of the legislature under constitution and rules; relationship among the legislative, executive and judicial branches; statutory interpretation and drafting. Limited enrollment.

Mr. Whelan

**232. Private Land Development and Finance. (3) I.**

Lecture—3 hours. A study of selected problems in the acquisition, financing, and development of large-scale real estate developments.

Mr. Lee

**233. Philosophy of Responsibility and Punishment.**

(2) I.

Seminar—2 hours. Interdisciplinary approach

to some basic problems of penology, among them the following: 1) relation between freedom of will and criminal responsibility; 2) solutions of this problem proposed by modern schools of psychology, especially deterministic and existential psychology; 3) impact of these solutions upon the theory, justification, and limits of punishment.

Mr. Bodenheimer

**234. Agricultural Law. (3) II.**

Seminar—3 hours. Selected legal problems related to agricultural industries.

Mr. Dunning

**235. Administrative Law. (3) III.**

Lecture—3 hours. An examination of the powers and procedures of federal and state administrative agencies, with an emphasis on administrative and judicial roles in the performance of a major regulatory function.

Mr. Grunschlag

**236. Securities Regulation. (3) III.**

Lecture—3 hours. Prerequisite: Business Associations and Corporations. Primary purpose of course is to familiarize students with laws and regulations, federal and state, relating to the issuance of and trading in corporate securities. Includes materials pertaining to the scope of the term "securities," the registration of securities, intra-state and private offerings, broker-dealer regulations and civil liability under the Securities Act of 1933 and the Securities Exchange Act of 1934.

Mr. Bradley

**237. Commercial Law II. (3) III.**

Lecture—3 hours. Covers the law governing buyers and sellers, chiefly as embodied in the Uniform Commercial Code. Consumer protection through warranties will be studied as it develops. Commercial Law I helpful, but not required.

Mr. Loiseau

**238. Selected Problems in Comparative Law.**

(2) II.

Seminar—2 hours. Introduction to different legal systems and the comparative method in research and practice; examination of actual cases from foreign law practice; in depth study of files in recent cases from a civil law country, comparing substantive and procedural aspects with American law and practice.

Mr. Angelo

**242A-242B. Conflict of Laws. (3-2; 2-3) I-II; II-III.**

Lecture—3-2 or 2-3 hours. A study of cases involving transactions with multistate contacts, to be viewed from the angles of jurisdiction, effect of foreign judgments, and choice of applicable law. Special attention will be given to the judicial techniques used in solving conflicts problems. (Deferred grading only, pending completion of sequence.)

I-II. Mr. Bodenheimer; II-III. Mr. Adler

**243. Debtor and Creditor. (4) II.**

Lecture—3 hours. Recommended: Commer-

cial Law I. Focuses on the climax of litigation wherein creditors seek to separate debtors from their wealth. Students research the collection law of California or any other state of their choice. Class explores the evolving law of debtors' rights. Bankruptcy studied in its role as a sword and a shield. Mr. Loiseau

#### 244. Criminal Procedure. (3) I.

Lecture—3 hours. Selected problems in procedure in criminal cases. Mr. Goodpaster

#### 245. Estate Planning and Taxation. (4) III.

Lecture—4 hours. Prerequisite: Introduction to Estate Planning I and II. Federal estate and gift taxes; federal income taxation as it affects trusts, estates, and their beneficiaries.

Mr. Davenport

#### 246. Federal Jurisdiction. (4) I.

Lecture—4 hours. Prerequisite: Constitutional Law I. Congressional power over the jurisdiction of the federal courts; Supreme Court review of state court decisions; federal post-conviction review; the federal-question jurisdiction of the federal district courts; the choice-of-law applicable in federal litigation; the role of state courts in enforcing federal law. Mr. Grunschlag

#### 247. Federal Taxation II. (4) I.

Lecture—4 hours. Prerequisite: Federal Taxation I. Emphasis on income tax problems of corporations and their shareholders.

Mr. Davenport

#### 248. International Business Transactions. (4) II.

Lecture—4 hours. A basic introduction to legal rules and techniques in doing business with and in foreign countries. Foreign and U.S. law materials will be examined. Students will be presented with actual recent transactions which have arisen in the representation of U.S. interests in Europe, Africa, and Latin America, involving sales of goods (including agricultural products), establishing foreign corporations, taxation in more than one country, anti-trust, and regulation by international organizations such as the GATT, and the European Common Market.

Mr. Angelo

#### 249. Introduction to Transnational Legal Problems.

##### (4) I.

Lecture—4 hours. An analysis of the functions and shortcomings of law in international relations. Basic and emerging concepts and terminology in public international law and in the relations between national legal systems and efforts to establish regional (e.g. E.E.C., O.A.S.) and universal (U.N. and other organizations) legal systems will be examined. Students will undertake case studies of key problems in current efforts to regulate and limit the use of armed force and to peacefully settle transnational disputes.

Mr. Angelo

#### 250. Jurisprudence. (3) II.

Lecture—3 hours. A comprehensive view of the law from a philosophical, anthropological, psychological, and methodological standpoint. Problems connected with the taming of power and control of aggression will receive special attention. An anatomy of the values to be protected by the legal order will be attempted against the background of influential theories of natural law and justice. Impact of prevailing conceptions of justice, social ethics, and public policy upon the judicial decision-making process.

Mr. Bodenheimer

#### 251. Labor Relations and Social Problems I. (3) I.

Lecture—3 hours. The principle concern of this course is unions and collective bargaining. Emphasis will also be given to other legal developments which effect the work environment, e.g., Title VII of the Civil Rights Act of 1964 prohibiting discrimination in employment on the basis of race, religion, national origin, and sex.

Mr. Wollett

#### 252. Labor Relations and Social Problems II. (3) II.

Lecture—3 hours. The concern of this course is conflict resolution and the settlement of disputes, with emphasis on the negotiations process.

Mr. Wollett

#### 253. Products Liability. (2) III.

Seminar—2 hours. The civil action for harm to the consumer resulting from dangerous and defective products.

Mr. Adler

#### 254. Developmental Legal History. (2) III.

Lecture—2 hours. While some sixteenth and seventeenth century English materials will be used, this course will focus on certain major transformations in American legal doctrine during the period 1780–1880. The emergency of a conscious conception of law as an instrument of social change will be charted by examination of selected facets of the relationship between economic development and transformations in legal doctrine during the nineteenth century. Related topics include: changes in legal doctrine due to the emergence of competitive economic uses; the doctrine of ancient lights and other prescriptive infringements upon the absoluteness of rights in real property; and the early experience with transportation facilities, private investment, and the concept of public convenience and necessity.

Mr. Fessler

#### 255. Equity and Remedies I. (3) I.

Lecture—3 hours. The nature of equity jurisdiction and the principles of equity as developed in the law of specific performance of contracts, the law of equitable servitudes on land and chattels, the law of vendor and purchaser, and the law of injunctions. The course should enable the student to understand the operation of equitable remedies and equitable doctrines under modern conditions.

Mr. Parker

**256. Land Use Planning. (4) II.**

Seminar—4 hours. The legislative, judicial, and administrative methods used to facilitate the rational use of land. Legal topics considered within this context will include zoning, subdivision regulation, nuisance, eminent domain, city planning, and environmental law.

Mr. Rabin

**257. Law and Social Science. (2) II.**

Seminar—2 hours. A study of the methodology of social science and its application to law.

Mr. Poulos

**258. Legal Profession. (2) II.**

Seminar—2 hours. Selected problems on the professional responsibilities of the attorney. Some concern with the changing role of the attorney in delivering legal services through group legal services, public interest law firms, and the like, as well as a study of the ethical dilemmas facing the attorney as he seeks to serve the needs of his client, the legal system, and the profession.

Mr. Lee

**259. Problems in Modern Social Legislation. (2) I.**

Seminar—2 hours. An examination of selected problems in welfare and other recent legislation. An additional 2 units credit either as research or as clinical experience will be available to students with consent of instructor.

Mr. Feeny

**260. Equity and Remedies II. (3) II.**

Lecture—3 hours. The remedial and substantive law of restitution. Restitution is studied as a remedy for tort or equitable wrong, as a method for disgorging benefits conferred under agreements, and as a vehicle for remedying wrongs caused by mistake, misrepresentation, or due to illegal transactions. Problems involving quasi contracts, constructive trusts, equitable accounting and equitable liens are covered.

Mr. Parker

**261. Local Government—Managing the Urban Environment. (3) I.**

Lecture—3 hours. Seminar—3 hours. Problems in the organization and finance of urban areas.

Mr. Ayer

**262A–262B. Trade Regulation. (3–2) II–III.**

Lecture—3–2 hours. Examination of the economic and social policies of federal antitrust laws governing collaboration among competitors, restraints upon distribution of goods and services, monopolization, and mergers. (Deferred grading only, pending completion of sequence.)

Mr. Wydick

**263A. Trial Practice and Procedure. (1) I.**

Lecture—1 hour. Trial practice and applied procedure. (Deferred grading only, pending completion of 263A–263B sequence.)

Mr. Wydick

**263B. Trial Practice and Procedure. (2) I, II, III.**

Laboratory—2 hours. Prerequisite: course

263A. Trial practice and applied procedure. Mock trials will be conducted. (Deferred grading only, pending completion of 263A–263B sequence.)

Mr. Wydick

**263C. Trial Practice and Procedure. (2) II, III.**

Laboratory—2 hours. Prerequisite: course 263B. Trial practice and applied procedure. Mock trials will be conducted. (Optional portion of sequence and graded separately.)

Mr. Wydick

**264. Natural Resources Law. (3) II.**

Seminar—3 hours. Legal aspects of water resources management, with emphasis on property systems in water, the development of new supplies, the transfer of water rights, and special problems of groundwater management.

Mr. Dunning

**265. Government Contracts. (2) II.**

Lecture—2 hours. A study of the organization of the Federal Government with respect to acquisition and disposal of public property; expenditure of public funds; federal contracts as vehicles for carrying public policies into effect; making, administering, and terminating contracts; subcontracts; state power and federal contractors; remedies.

Mr. Whelan

**266. Law and Medicine. (3) I.**

Seminar—3 hours. Prerequisite: consent of instructor. A seminar approach involving class work, fieldtrips, and special projects to study medical education and practice, attorney-physician relations, human behavior development, community health care, and current problems. Limited enrollment.

Mr. Schwartz

**267A–267B. International Efforts to Preserve the Environment. (2–2) I–II.**

Seminar—2–2 hours. The course will deal with materials being used in preparation for the UN's Conference on the Human Environment to take place in Stockholm (June 1972), supplemented with basic readings about the role and shortcomings of law in international efforts to prevent pollution and the wasting of sources. (Deferred grading only, pending completion of sequence.)

Mr. Angelo

**269. Problems in International and Transnational Law. (3) III.**

Seminar—3 hours. Recommended: Prior international law study. Application of the international legal process to recent and current problems of international force, including war and other armed conflict; world order, including alternatives to the use of force; utilization of non-national resources, including the oceans and seabeds; and human rights in international law, including race relations and enforcement of individual rights.

Mr. Adler

**270. Selected Problems in Jurisprudence, Legal Sociology, and Legal History. (2) III.**

Seminar—2 hours. Prerequisite: course in

Jurisprudence strongly recommended but not required. Individual research performed in collaboration with the instructor.

Mr. Bodenheimer

**271. Selected Problems in Tax Policy. (2) II.**

Seminar—2 hours. A study of selected problems of public policy in relation to the tax laws.

Mr. Davenport

**272. Readings Concerning the Political, Economic, and Legal Aspects of Business. (2) II.**

Seminar—2 hours. An introductory course for second-year students planning to concentrate in the law governing business activities. Readings will be selected from major works in economics, political science, philosophy, business and law, and will be designed to examine the social and economic impact of business activity. It will seek to emphasize the nonlegal aspects of the business lawyer's role and intellectual equipment.

**273. The Law and the Police. (3) III.**

Seminar—3 hours. A study of all aspects of legal control of police practice and behavior. In addition to constitutional problems such as arrest, search and seizure, line-ups and confessions, attention will be given to state legislation, municipal codes, basic authorizing statutes, administrative practices, and informal controls. (An additional 2 units credit either as research or as clinical experience is available to students with consent of instructor.) Limited enrollment.

Mr. Feeney

**274. Unfair Trade Practice. (3) III.**

Lecture—3 hours. Business torts, including interferences with contractual relations, commercial disparagements, and appropriation of values created by another (trade secrets, trademarks, copyrights); the privilege to compete as a defense.

Mr. Wydick

**275. The Correctional Process. (2) II.**

Seminar—2 hours. Sentencing, probation; incarceration, and parole.

Mr. Parnas

**276. Juvenile Justice Process. (3) III.**

Seminar—3 hours. A study of the administration of the laws dealing with juvenile offenders. Major emphasis on the role of "defense" counsel at each phase of the process.

Mr. Parnas

**277. Public Administration. (2) III.**

Seminar—2 hours. A study of the administration of law by the principal executive departments; the function of the nonlitigant lawyer in public administration; interdepartment relationships. Guest lecturers will be featured.

Mr. Whelan

**278. Public Employee Bargaining. (3) III.**

Seminar—3 hours; written report. Focus on development and operation of structured collective bargaining by public employees at the federal, state, and local levels.

Mr. Wollett

**279A-279B. Clinical Program in Manpower Planning. (2-2) I-II.**

Laboratory—2-2 hours. Clinical course dealing with problems which arise in developing and using the capacities of human beings as actual or potential members of the labor force. The emphasis is on creating jobs and educating, training, and upgrading disadvantaged persons and bringing them into the world of work in a meaningful and productive way. Clinical arrangements have been made with the State Department of Human Resources Development which will involve the following: a 10-week period in the Legal Section offices in Sacramento (one day a week) to be spent in HRD Service Centers in Sacramento or in the Bay Area counseling clients. Two-hour seminar once every two weeks for the purpose of sharing experiences. Enrollment limited. (Deferred grading only, pending completion of sequence.)

Mr. Wollett

**280A-280B-280C. Legal Problems of the Disadvantaged. (1-1-1) I-II-III.**

Seminar—1-1-1 hours. Legal problems of the poor are selected for intensive study through readings, class discussions and field research. During 1971-72, course will focus on problems of hunger and health. The federal food programs and public health programs will be surveyed. Problems related to inequities in the supermarkets and food quality controls will also be considered.

Mr. Parker

**283. African Legal Systems. (2) I.**

Seminar—2 hours. An introduction to the development of legal systems in anglophonic Africa. Emphasis on the historical development of these systems under colonial rule, their response to particular problems such as the maintenance of law and order, resource allocation and the maintenance of legality and the directions in which they may develop as part of independent states. Offered in even-numbered years.

Mr. Dunning

**284. Consumer Protection. (2) III.**

Seminar—3 hours. Prerequisite: one basic course in commercial or consumer law, or consent of instructor. Selected problems in the developing law of consumer protection.

Mr. Ayer

**285. Problems of Administrative Regulation and the Environment. (2) II.**

Seminar—2 hours. Focus on the operations of one major administrative agency which makes decisions affecting the environment.

**286. Economics of Legal Issues. (2) II.**

Seminar—2 hours. Introduction to price theory and application to selected central issues at Law: education, housing, pollution, control, criminal administration.

Mr. Ayer, Mr. V. P. Goldberg

**287. Native American Law I. (2) III.**

Seminar—2 hours. The allocation of legislative and judicial power between reservation, state, and federal governments in areas such as crimes, property utilization, taxation, and family relations. Also, the executive power of the federal government over Native Americans.

**288. Native American Law II. (2) II.**

Seminar—2 hours. Native Americans' rights to state and federal benefits (voting, education, welfare, health, etc.). Property rights (land, water, natural resources, inheritance, federal management of trust property, economic development). Relocation of Native Americans to urban areas and the termination of the special relationship between the Federal Government and Native Americans.

**289. Law and Poverty. (3) II.**

Seminar—3 hours. A selective study of the processes, institutions, laws and practices which produce, maintain, exacerbate, regulate or otherwise affect the conditions of being poor, together with an examination of the role of law and the lawyer in ending poverty, its sustaining conditions and effects.

Mr. Goodpaster

**290. Selected Problems in Criminal Justice****Administration. (2) II.**

Seminar—2 hours. Selected current reform efforts in criminal justice administration. Emphasis on the pre-trial process. Specific topics include bail reform, preventive detention, alternatives to arrest, and noncriminal methods for handling juveniles. (Additional 2 units credit, either as research or as clinical experience, available to students with consent of instructor.)

Mr. Feeney

**291A-291B. Selected Problems in Constitutional****Litigation. (1-2) II-III.**

Seminar—1-2 hours. Slavery, the civil rights movement, and the war on poverty have had a significant impact on constitutional law as well as on the problems involved in precipitating courts to act when the legal issues have broad social and economic ramifications. Throughout

these developments, fundamental substantive and procedural concepts in constitutional law have evolved. The purpose of this course will be to focus on these changes in constitutional law, the role of the courts in protecting individual rights, the role of the profession and of paraprofessionals in constitutional litigation. (Deferred grading only, pending completion of sequence.)

Mr. Parker

**294. Clinical Program in the Legislative Process.****(3-6) II, III.**

Laboratory—3-6 hours. Prerequisite: consent of instructor. A clinical program involving work in legislative offices.

Mr. Whelan

**295A-295B-295C. Instruction in Legal Research and Writing. (2-2-2) I-II-III.**

Laboratory—2-2-2 hours. Each participant in this course will be responsible for planning and carrying out a program of instruction in legal research and writing for eight or nine first-year students. Enrollment limited to 20 students and subject to approval of the professor in charge. (Deferred grading only, pending completion of sequence.)

Mr. Schwartz

**296. Clinical Program in the Administration of Criminal Justice. (6-12) I, II.**

Laboratory—6-12 hours. Half-(6 units) to full-(12 units) time experience in a District Attorney's or Public Defender's Office, together with a weekly 3-hour seminar. Enrollment limited.

Mr. Parnas

**297. Clinical Programs. (1-10) I, II, III.**

Students may receive a maximum of 10 hours credit. For more details and regulations see page 12 of the *Announcement of the School of Law*.

Mr. Lee

**298. Group Study. (1-5) I, II, III.**

For details and regulations, see section on "Student-Initiated Studies," in the *Announcement of the School of Law*, p. 12. The Staff

**299. Research. (1-5) I, II, III.**

For details and regulations, see section on "Student-Initiated Studies," in the *Announcement of the School of Law*, p. 12. The Staff

**LIBERAL ARTS**

Gerald P. Mohrmann, Ph.D., *Chairman of the Committee*

Committee Office, 201 North Hall

**Committee in Charge:**

Peter K. Cline, Ph.D. (*History*)

Richard Cowen, Ph.D. (*Geology*)

Harvey Himelfarb, M.A. (*Art*)

Gerald P. Mohrmann, Ph.D. (*Rhetoric*)

*Major Adviser.*—See *Class Schedule* listing.

The Liberal Arts major which leads to a

Bachelor of Arts degree, is intended for students who have strong interdisciplinary or cross-disciplinary interests and who wish to be introduced systematically to a number of intellectual disciplines and styles. The major consists of a series of core sequences on the lower division level followed by a rigorous, individually planned upper division program.

**The Major Program**

Lower Division Courses.—Required: Rhetoric 1 and one course chosen from English 1, 2, 3, 4A, or 4B; 18 units or the equivalent of a foreign language through the intermediate level; and for humanities, History 4A–4B–4C is required and one from the following four course sequences is recommended: Philosophy 20A–20B–20C, English 46A–46B–46C or 30A–30B–30C, select three courses from Art 1A–1B–1C–1D, Music 27A–27B or for students with previous musical training, Music 4A–4B–4C or 21A–21B–21C. For the natural science and mathematics requirement choose one from the following five course sequences: Mathematics 16A–16B–16C; Chemistry 1A–1B–1C; Physics 2A–2B–2C; Chemistry 1A–1B, Biological Sciences 1, and one course from: Bacteriology 2, Botany 2, or Zoology 2 (Designed as a basic introductory sequence for students interested in the biological sciences.); Geology 1, 3, and 16 and either 1L or 3L. For social science choose one from the following four course sequences: Economics 1A and 1B; select three from Political Science 2, 3, 4, and 5; Anthropology 2, Sociology 1, and Sociology 3; Psychology 1A–1B–1C.

Students electing this major must also satisfy the area requirements established by the College of Letters and Science. The lower division requirements of the Liberal Arts major fully satisfy

the humanities area requirements but do not necessarily satisfy the natural science and social science area requirements. Elective courses should be selected with this in mind. With the permission of the adviser, transfer students may use courses from other institutions to satisfy lower division requirements of the major.

Upper Division Courses.—In consultation with his adviser, each student shall propose a plan of upper division course work which will satisfy his general educational objectives and meet the following requirements: the minimum of 45 units; at least 12 units must be in each of two departments; and during the senior year, a sequence of 20–25 units of independent study, concluding with one full quarter (15 units) in the Independent Study Program.

The intent is to require the student to plan a coherent upper division program that culminates in a 15-unit independent studies project which will encourage the integration of learning and result in a substantial written research paper. The student's proposed upper division program must be approved by both his adviser and the committee in charge of the major. It is expected that the student will work closely with his adviser in planning his program. Each student must have his plan approved by the end of his junior year. The one-quarter independent study project (15 units) must be approved by the Independent Studies Board of the Davis Division. (See pages 7 and 179 for filing.)

**LINGUISTICS**

Wayne C. Harsh, Ph.D., *Chairman of the Committee*  
Committee Office, 813 Sproul Hall

**Committee in Charge:**

- Ronald A. Arbini, Ph.D. (*Philosophy*)
- Jarvis R. Bastian, Ph.D. (*Psychology*)
- Martin A. Baumhoff, Ph.D. (*Anthropology*)
- Wilbur A. Benware, Ph.D. (*German and Russian*)
- Jonathan L. Butler, Ph.D. (*French and Italian*)
- Thomas P. Campbell, III, B.A. (*Acting; English*)
- Linnea C. Ehri, Ph.D. (*Education*)
- Gustavo Gonzalez, Ph.D. (*Education*)
- Wayne C. Harsh, Ph.D. (*English and Linguistics*)
- Larry N. Hillman, M.A. (*French and Italian*)
- Burt Liebert, M.F.A. (*Education*)
- Wolfgang W. Moelleken, Ph.D. (*German and Russian*)

- David L. Olmsted, Ph.D. (*Anthropology*)
- Edward J. Tully, Jr., Ph.D. (*Mathematics*)
- Carol F. Wall, M.A. (*Anthropology*)
- Benjamin E. Wallacker, Ph.D. (*Oriental Languages*)

*Major Adviser.*—Mr. Harsh  
*Graduate Adviser.*—Mr. Harsh

**The Major Program**

For the A.B. Degree in Linguistics students must complete 36 upper division units including Anthropology 109, 110, 111, 112, (phonetics; elementary linguistic analysis; intermediate linguistic analysis; comparative linguistics); Linguistics 140 (grammatical analysis); either Oriental Languages 100 (languages of Eastern Asia) and Anthropology 220 (field course in linguistics) or three quarters or the equivalent of one or more non-Indo-European language. Other courses which may be elected to complete the required upper division 36 units are Anthropology 120 (language and culture); English 105A, 105B, 105C, 192, 195, 196 (present-day English; history of the English language; lan-



guage change; theory and methods in modern linguistics; language, thought, and expression stylistics); French 160 (structure of French language); German 105, 106, 108 (history of German language; linguistic structure of German; contrastive structures of English and German); Linguistics 139, 150 (phonological analysis; contrastive analysis—English and Spanish); Oriental Languages 123A, 123B, 123C (Chinese phonology; Chinese morphology; Chinese syntax); Philosophy 137 (philosophy of language); Psychology 132, 180H (language and cognition; psycholinguistics); Spanish 131A, 131B, 132 (modern Spanish syntax; introduction to Spanish linguistics); Human Development 131, 133 (infancy and early childhood; case study of a preschool child).

**Graduate Study.**—Requirements for the M.A. degree are 30 units in addition to a thesis. The courses must be graduate courses or upper division undergraduate courses. At least 12 of the 30 units must be strictly graduate work in the major subject. The following courses, or their equivalents, are specifically required: Linguistics 140, 202, 225 (grammatical analysis; principles of historical linguistics; modern linguistic theory). Graduate courses in related departments that candidates may take include the following: Anthropology 220 (field course in linguistics); English 205, 207 (introduction to Old English; middle and early modern English); French 200, 201A, 201B, 230 (seminar in French linguistics; history of French language; old Provençal); German 200, 201, 202, 203 (Gothic; old high German; middle high German; old Saxon); Psychology 264 (psycholinguistics); Russian 200, 202, 204 (old Church Slavonic; descriptive Russian grammar; historical Russian grammar); Spanish 230A, 230B (history of Spanish language); English 301 (teaching of English as a foreign language).

#### Lower Division Course

### 35. Introduction to Linguistics. (4) I.

Lecture—3 hours; laboratory—2 hours. Introduction to the study of language: its nature, diversity, and structure. Mr. Butler, Mr. Harsh

#### Upper Division Courses

### 105C. Language Change Reflected in Literature.

(4) II, III.

Lecture—3 hours; term paper. Prerequisite: English 105A, 105B. 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. (Same course as English 105C.) Mr. Harsh, Mr. Campbell

### 138. Language Development. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 111. Theory and re-

search on children's acquisition of their native language including the sound system, grammatical structure, basic semantic categories, and social aspects of usage. Miss Wall

### 139. Phonological Analysis. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 111. Introduction to and application of phonological theory.

Mr. Campbell

### 140. Grammatical Analysis. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 111. Introduction to the theory of grammatical analysis; practice in solving exercise problems. The Staff

### 146. Comparative Study of European Languages.

(4) III.

Lecture—3 hours; discussion—1 hour. An introduction to morphemic analysis of both modern (Slavic, Baltic, Finno-Ugric) and old (Latin, Gothic) languages, with concentration on paradigmatic patterns and structural relationships.

The Staff

### 150. Contrastive Analysis: English and Spanish.

(4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Comparison of the linguistic structures of English and Spanish with emphasis on problems of the Spanish-speaker learning English. Analysis of the role of the school and of the sociolinguistic situation of Spanish-speakers in California and the Southwest.

Mr. Gonzalez

### 192. Theory and Methods in Modern Linguistics.

(4) II.

Lecture—3 hours; term paper. Prerequisite: English 105A, 105B. Survey of scholarship in linguistic studies from European backgrounds to present, concentrating primarily but not exclusively on descriptions of the English language. Contrastive analysis with other Germanic languages. (Same course as English 192.)

Mr. Campbell

### \*195. Language, Thought, and Expression. (4) II, III.

Seminar—3 hours; term paper. Prerequisite: course 192. Investigation of a range of theories on the relationship between language structure and thought, from philosophical, linguistic, and historical points of view. Readings will include Chomsky, Empson, Hayakawa, Ogden, Richards, Vygotsky, Whorf, et al. (Same course as English 195.)

### 196. Stylistics. (4) II, III.

Seminar—3 hours; term paper. Prerequisite: course 192. Analysis of linguistic stylistic variations in specific works to be selected from the corpus of writings in English. (Same course as English 196.)

Mr. Baker, Mr. Harsh

\* Not to be given, 1972-73.

**199. Special Study for Advanced Undergraduates.**  
(1-5) I, II, III.

The Staff (Mr. Harsh in charge)

**Graduate Courses**

**202. Principles of Historical Linguistics. (3) II.**

Lecture—3 hours. Prerequisite: Anthropology 112. Advanced treatment of the theory and method of historical linguistics. Mr. Butler

**210. Historical Germanic Linguistics. (4) II.**

Seminar—3 hours. The principles and techniques of historical linguistics will be used to study the development of the Germanic languages from Proto-Indo-European through Proto-Germanic and into early Germanic dialects such as Old Norse, Gothic, Old Saxon, and Old English. Mr. Benware

**215. Computational Linguistics. (2) III.**

Lecture—2 hours. Prerequisite: consent of instructor. The use of electronic computers and other computational devices in linguistic analysis, mechanical translation, and lexicography. The Staff

**220. Romance Linguistics. (4) II.**

Seminar—3 hours. Prerequisite: consent of instructor. Phonology, morphology, and lexicography of the major Romance languages. Mr. Butler

**225. Modern Linguistic Theory. (3) III.**

Lecture—3 hours. Prerequisite: course 140 and Anthropology 111. Survey of leading contributions to linguistic theory from de Saussure to the present. The Staff

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Harsh in charge)

**MANDARIN—See Oriental Languages**

**MATHEMATICS**

Kurt Kreith, Ph.D., *Chairman of the Department*

David G. Mead, Ph.D., *Vice-Chairman of the Department*

Department Office, 565 Academic Office Building III.

*Professors:*

\*Henry L. Alder, Ph.D.  
George A. Baker, Ph.D. (*Emeritus*)  
Dallas O. Banks, Ph.D.  
Donald C. Benson, Ph.D.  
\*Carlos R. Borges, Ph.D.  
Albert C. Burdette, Ph.D. (*Emeritus*)  
Gulbank D. Chakerian, Ph.D.  
\*Curtis M. Fulton, Ph.D.  
Robert D. Glauz, Ph.D.  
Charles A. Hayes, Jr., Ph.D.  
\*Kurt Kreith, Ph.D.  
Gary J. Kurowski, Ph.D.  
David G. Mead, Ph.D.  
Edward B. Roessler, Ph.D. (*Emeritus*)  
Sherman K. Stein, Ph.D.  
Takayuki Tamura, D.Sc.

*Associate Professors:*

Hubert A. Arnold, Ph.D.  
David W. Barnette, Ph.D.  
Doyle O. Cutler, Ph.D.  
\*Melven R. Krom, Ph.D.  
Donald A. Norton, Ph.D.  
\*Washek F. Pfeffer, Ph.D.  
George T. Sallee, Ph.D.  
Robert W. Stringall, Ph.D.  
Edward J. Tully, Jr., Ph.D.

*Assistant Professors:*

Howard J. Weiner, Ph.D.  
Robert J. Buck, Ph.D.  
James R. Diederich, Ph.D.  
Steven A. Douglass, Ph.D.  
George T. Duncan, Ph.D.  
Allan L. Edelson, Ph.D.  
Arthur J. Krener, Ph.D.  
Maxwell W. J. Layard, Ph.D.  
Peter Linz, Ph.D.  
E. O. Milton, Ph.D.  
John K. Moore, Ph.D.  
Raymond N. Sproule, Ph.D.

◇ ◇ ◇

*Associate Professor:*

Charles E. Franti, Ph.D. (*Biostatistics*)

*Assistant Professor:*

Alvin D. Wiggins, Ph.D. (*Biostatistics*)

*Lecturer:*

Shirley A. Goldman, M.S.

*Major Subject Advisers.*—Mr. Alder, Mr. Barnette, Mr. Benson, Mr. Borges, Mr. Buck, Mr. Chakerian, Mr. Diederich, Mr. Douglass, Mr. Glauz, Mr. Krom, Mr. Kurowski, Mr. Layard, Mr. Milton, Mr. Norton.

*Special Area Advisers.*—Statistics, Mr. Layard; Computer Science, Mr. Glauz; Biological Sciences, Mr. Moore; Physical Sciences, Mr. Banks; Social Sciences, Mr. Sallee.

<sup>1</sup> Absent on leave, 1972-73.

<sup>4</sup> Absent on leave, spring quarter 1973.



**Graduate Advisers.**—Mr. Cutler, Mr. Linz, Mr. Sproule, and Mr. Stein.

Assistance in planning an undergraduate major program in mathematics should be obtained from a major subject adviser. In addition, students seeking information pertaining to statistics, computer science, or applications of mathematics to the biological, physical, or social sciences may contact the appropriate special area adviser. Beyond this, students with particular questions concerning preparation for graduate work may contact a graduate adviser.

**The Major Programs.**—There are two degree programs: Bachelor of Arts and Bachelor of Science. 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.

Lower division requirements: courses 11 (or its high school equivalent), 21A–21B–21C, 22A–22B–22C, and 24.

Upper division requirements: courses 101, 108A. For the A.B. program, the student must complete an additional 31 units of upper division mathematics courses; for the B.S. program, 35 additional units of upper division mathematics must be completed. During the first quarter of the junior year, each mathematics major is required to submit to his adviser a statement of his mathematical objectives, together with a proposed upper division program consistent with those objectives. The form to be used for this statement is available from the Department, and must be submitted in time to receive approval of the proposed program prior to the last day of the quarter involved. A total of 9 units in special study courses, 198 and 199, may be counted toward the upper division requirements for either degree. Those special study courses which are to be applied toward this requirement, must have prior approval from the department. Certain mathematically-oriented courses given by other departments may be admissible in partial satisfaction of the above mentioned 31- or 35-unit requirements with prior departmental approval. For more detailed information, on recommended courses of study, obtain the undergraduate brochure which is available in the Department office.

Recommended preparation for *Graduate study in pure mathematics*: courses 127A–127B–127C and 151A–151B–151C. The remainder of the 31 or 35 units may be chosen from those courses reflecting special interests of the student. To ensure that appropriate combinations of courses are included, the student should seek the counsel of advisers in the department.

Recommended preparation for *secondary teaching in mathematics*: courses 108A–108B, 139A–139B–139C and 141 are virtually essential; a selection from courses 13, 19 (or 29), 36A–36B, 112, 114, 115A, 128A–128B–128C is highly recommended.

Recommended preparation for a career in *statistics*: courses 13, 29, 105A–105B, 127A–127B–127C, 131A–131B–131C, 132A–132B, and at least one quarter of 133, 134, or 135. It is strongly recommended that courses 127A–127B–127C and 131A–131B–131C be taken in the junior year.

Recommended preparation for a career in *applied mathematics*: Because of the great variety of possibilities, the student should obtain advice from advisers in the department concerning his special interests.

Recommended *B.S. Language Preparation*: B.S. degree candidates are advised (but not required) to satisfy the same language requirement as that for the A.B. degree, but to fulfill it in French, German or Russian.

**Graduate Study.**—The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.

**Qualifying Examinations.**—A student entering from high school who believes that he has had the equivalent of a course offered by the Department of Mathematics (e.g., analytic geometry and calculus) may demonstrate his proficiency in this course by examination. If, in the opinion of the department, his level of achievement is sufficiently high, he will be permitted to enter the next course in the sequence. No University credit is earned by passing such an examination. Arrangements for an examination must be made with the Department secretary on or before the Monday of registration week.

**Teaching Major.**—The teaching major is satisfied by either the A.B. or the B.S. degree in mathematics. Recommended preparation is given under the major programs section above.

**Teaching Minor.**—Thirty units of mathematics which must include: 4 units of fundamentals of mathematics (course 36A); 8 units of calculus (courses 11, 21A, 21B or 16A–16B–16C); 3 units of probability and/or statistics (course 13 or 131A); 3 units of geometry (course 37 especially recommended, 112, 114, 116, or 141).

The remainder of the 30 units are elective, except that students with a non-academic major must include 18 units in mathematics at the upper division or graduate level.

**Subject Representative:** Mr. Burdette.

#### Lower Division Courses

##### B. Elementary Algebra. (no credit) I.

Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. (There is a fee of \$45.)

The Staff

**C. Trigonometry. (no credit) II.**

Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. (There is a fee of \$30.) The Staff

**D. Pre-Calculus Algebra. (no credit) I.**

Lecture—3 hours. Basic concepts of algebra, intended primarily for students intending to take course 21A. Functions, equations, graphs, logarithms, systems of equations, and trigonometric functions. (There is a fee of \$45.) The Staff

**11. Analytic Geometry. (2) I, II, III.**

Lecture—2 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry. Analytic geometry in two dimensions. Not open to students who have received credit for course 16A. The Staff

**13. Elementary Statistics. (4) I, II, III.**

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; non-parametric statistics; regression and correlation theory. (Students having had courses 130A or 131A may not take course 13 for credit.) The Staff

**15. Discrete Mathematics. (3) I, II.**

Lecture—3 hours. Introduction to probability, vectors, and matrices. Applications to elementary Markov chains. The Staff

**16A. Analytic Geometry and Calculus. (3) I, II, III.**

Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry. Not open for credit to students who have received credit in course 21A. Only 2 units of credit allowed students who have received credit for course 11. A short course in analytic geometry and differential and integral calculus. Not recommended for students who may wish to major in the mathematical sciences. The Staff

**16B. Analytic Geometry and Calculus. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 16A or 21A. Not open for credit to students who have received credit in course 21B. Continuation of course 16A. The Staff

**16C. Analytic Geometry and Calculus. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 16B or 21B. Only 1 unit of credit will be allowed to students who have received credit for course 21B. Continuation of course 16B with special emphasis on the calculus of three dimensions including partial differentiation and total differentials; designed for students desiring to take physical chemistry. The Staff

**19. Basic Concepts of Computing. (3) I, II.**

Lecture—2 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Course not intended for students in physical science and mathematics. Students having had course 29, Engineering 5, or former course 30 may not receive credit for this course. Mr. Kurowski, Mr. Linz

**21A. Calculus. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: two years high school algebra, plane geometry, plane trigonometry, and analytic geometry. Basic concepts of the calculus, derivatives, definite integral, fundamental theorem of calculus. If analytic geometry has not been completed, course 11 must be taken concurrently. Only 2 units of credit will be allowed in course 21A for students who have received credit for 16A. The Staff

**21AH. Honors Calculus. (4) I.**

Lecture—4 hours. More intensive treatment of material covered in course 21A. Students completing 21AH can continue with course 21BH or the regular 21B. Mr. Milton

**21B. Calculus. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21A. Continuation of course 21A. Multiple integrals, improper integrals, partial derivatives. Only 2 units of credit will be allowed students who have received credit for 16B. The Staff

**21BH. Honors Calculus. (4) II.**

Lecture—4 hours. More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. Mr. Milton

**21C. Calculus. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21B or 16C. Continuation of course 21B. Infinite series, calculus of vector functions, Green's theorem in the plane. The Staff

**21CH. Honors Calculus. (4) III.**

Lecture—4 hours. More intensive treatment of material covered in course 21C. Mr. Milton

**22A. Linear Algebra. (3) I, II, III.**

Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms. (Courses 22A, 22B, 22C may be taken in any order. However, if enrolled in Physics 4 sequence, 4C, 4D, 4E, courses should be taken in reverse order, 22C, 22B, 22A.) The Staff

**22B. Differential Equations. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 21C.  
Solutions of elementary differential equations.  
The Staff

**22C. Vector Analysis. (3) I, II, III.**

Lecture—3 hours. Prerequisite: course 21C.  
Green's theorem, Stoke's theorem, divergence  
theorem. The Staff

**\*23. Applications of the Calculus. (2) III.**

Lecture—2 hours. Prerequisite: course 21C  
(may be taken concurrently). Significant applica-  
tions of the calculus in various sciences.  
The Staff

**24. Infinite Series. (2) II, III.**

Lecture—2 hours. Prerequisite: course 21C  
(may be taken concurrently). Elements of in-  
finite series including Fourier series and series  
with complex terms. The Staff

**29. Introduction to Computer Science. (3) I.**

Lecture—2 hours; laboratory—2 hours. Pre-  
requisite: course 21C. Introduction to prop-  
erties of a digital computer. Implementation of  
mathematical algorithms on a computer. Stu-  
dents electing this course may not receive credit  
for Engineering 5 and only two units of credit  
will be allowed for students who have had course  
19. Students may not receive credit for course  
29 if they have completed former course 30.

Mr. Norton

**36A. Fundamentals of Mathematics. (4) I, II, III.**

Lecture—4 hours. Introduction to funda-  
mental mathematical ideas selected from the  
principal areas of modern mathematics. Prop-  
erties of the primes, the fundamental theorem of  
arithmetic, properties of the rationals and irra-  
tionals, binary and other number systems.

The Staff

**36B. Fundamentals of Mathematics. (2) III.**

Lecture—2 hours. Prerequisite: course 36A.  
The content will be selected from the following  
topics: number systems, set theory, number  
theory, the axiomatic method, topology, and  
combinatorics. The Staff

**37. Topics in Geometry. (4) III.**

Lecture—4 hours. Prerequisite: one year  
high school geometry. Topics in Euclidian geom-  
etry selected from the theory of geometric trans-  
formations, the area and dissection of plane  
figures, convex polyhedra, foundations of geom-  
etry. Mr. Barnette

**Upper Division Courses****101. Survey of Contemporary Mathematics. (2) II.**

Lecture—2 hours. Prerequisite: course 21C.  
An introduction to modern mathematics, its  
methods and applications, including the rela-  
tionship between pure and applied mathematics.  
(Passed/Not Passed grading only.) The Staff

**105A. Applied Statistical Methods: Analysis of Variance. (4) II, III.**

Lecture—4 hours. Prerequisite: course 13.  
Design of experiments including randomized  
complete block designs, Latin squares, split-plot  
designs, factorial designs, and incomplete block  
designs. Mr. Weiner

**105B. Applied Statistical Methods: Multiple Regression. (3) III.**

Lecture—3 hours. Prerequisite: course 105A.  
Continuation of course 105A. Multiple regres-  
sion and analysis of covariance. Mr. Weiner

**108A. Introduction to Abstract Algebra and Analysis. (3) I, III.**

Lecture—3 hours. Prerequisite: course 21C.  
Introduction to abstract mathematics, including  
the real number system, sets, mappings, mathe-  
matical induction, and algebraic structures.

The Staff

**108B. Introduction to Abstract Algebra and Analysis. (3) II.**

Lecture—3 hours. Prerequisite: course 108A.  
Unique factorization, Gaussian integers and ap-  
plications. Introduction to integration theory.  
Course 108B may not be taken for credit after  
students have completed courses 127A or 151A,  
and may not be taken concurrently with 127A  
or 151A. The Staff

**\*112. Higher Geometry. (3) I.**

Lecture—3 hours. Prerequisite: course 108A  
or consent of instructor. Homogeneous point and  
line coordinates, cross ratio, one- and two-dimen-  
sional projective geometry, point and line  
conics. Offered in even-numbered years.

Mr. Fulton

**113. Synthetic Projective Geometry. (4) I.**

Lecture—4 hours. Prerequisite: course 108A  
or consent of instructor. Duality, perspectivity,  
harmonic sets, projectivity, definition of conics,  
theorems on conics, pole and polar. Offered in  
odd-numbered years. Mr. Fulton

**114. The Theory of Convex Sets. (3) III.**

Lecture—3 hours. Prerequisite: courses 21C,  
22A, 108A; or consent of instructor. Topics se-  
lected from the theory of convex bodies, convex  
functions, geometric inequalities, combinatorial  
geometry, and integral geometry. Offered in  
even-numbered years. Mr. Sallee

**115A. The Theory of Numbers. (3) I.**

Lecture—3 hours. Prerequisite: course 108A.  
Divisibility and related topics, diophantine equa-  
tions, selected topics from the theory of prime  
numbers. Mr. Barnette

\* Not to be given, 1972-73.

**\*115B. The Theory of Numbers. (3) II.**

Lecture—3 hours. Prerequisite: course 108A. Euler-function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years. Mr. Alder

**\*115C. The Theory of Numbers. (3) III.**

Lecture—3 hours. Prerequisite: course 108A. Continued fractions, partitions. Offered in even-numbered years. Mr. Alder

**116. Metric Differential Geometry. (4) III.**

Lecture—4 hours. Prerequisite: courses 22A, 22C; or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years. Mr. Chakerian

**118A. Partial Differential Equations. Elementary Methods of Solution. (3) I.**

Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C, 24. Partial differential equations of mathematical physics, solution by separation of variables, Fourier series. Mr. Banks

**118B. Partial Differential Equations: Boundary Value Problems and Special Functions. (3) II.**

Lecture—3 hours. Prerequisite: course 118A. Classical boundary value problems, expansion by orthogonal functions, Sturm-Liouville theory, special functions. Mr. Banks

**118C. Partial Differential Equations: Complex Analysis and Integral Transforms. (3) III.**

Lecture—3 hours. Prerequisite: course 118B or consent of instructor. Functions of a complex variable, Fourier and Laplace Transforms, applications to boundary value problems. Mr. Banks

**119. Theory of Ordinary Differential Equations. (3) I.**

Lecture—3 hours. Prerequisite: courses 22A, 22B. Existence and uniqueness theorems, theory of linear equations of the second and higher orders, regular singular points, Sturm-Liouville systems, Laplace transforms. Mr. Diederich

**\*125. Introduction to Mathematical Logic. (3) I.**

Lecture—3 hours. Prerequisite: course 108A or consent of instructor. Propositional calculus, predicate calculus, normal forms, completeness. Offered in odd-numbered years. Mr. Krom

**126. Introduction to the Theory of Sets. (3) II.**

Lecture—3 hours. Prerequisite: course 21C or consent of instructor. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in odd-numbered years. Mr. Cutler

**127A. Advanced Calculus. (4) I.**

Lecture—4 hours. Prerequisite: courses 22A, 22C. The real number system, continuity, differentiation and integration on the real line,

vector calculus and functions of several variables, theory of convergence. Mr. Buck

**127B. Advanced Calculus. (4) II.**

Lecture—4 hours. Prerequisite: course 127A. Continuation of course 127A. Mr. Buck

**127C. Advanced Calculus. (4) III.**

Lecture—4 hours. Prerequisite: course 127B. Continuation of course 127B. Mr. Buck

**128A. Numerical Analysis. (4) I.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 29 or a knowledge of FORTRAN or ALGOL. Error analysis, approximation, interpolation, numerical differentiation and integration. Mr. Glauz, Mr. Linz

**128B. Numerical Analysis in Solution of Equations. (4) II.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 22A, and course 29 or a knowledge of FORTRAN or ALGOL. Solution of non-linear equations, simultaneous equations, eigenvalues, linear programming. Mr. Glauz, Mr. Linz

**128C. Numerical Analysis in Differential Equations. (4) III.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 22A, 22B, and course 29 or a knowledge of FORTRAN or ALGOL. Difference equations, operators, numerical solution of differential equations, partial differential equations. Mr. Glauz, Mr. Linz

**129A. Introduction to the Theory of Programming. (3) II.**

Lecture—3 hours. Prerequisite: course 22A, course 29 or equivalent. Assembly languages; arrays and lists; data processing algorithms. Mr. Norton

**129B. The Theory and Structure of Computer Languages. (3) III.**

Lecture—3 hours. Prerequisite: course 129A. Theory of compilers; structure of computer languages, their limitations and ambiguities; study of a particular language. Mr. Norton

**130A-130B. Mathematical Statistics, Brief Course. (4-4) I-II.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 16B. A course in mathematical statistics for non-majors. Concepts of probability and sampling, principles of estimation, properties of estimators, sampling distributions, bivariate normal and principles of testing. Mr. Moore

**131A. Introduction to Probability Theory. (4) I.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 22A, 24. Fundamental con-

\* Not to be given, 1972-73.

cepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem.

Mr. Layard

**131B-131C. Introduction to Mathematical Statistics. (4-4) II-III.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 131A. Sampling, point estimation, exact sampling distributions, confidence intervals, hypothesis testing, linear regression and analysis of variance.

Mr. Layard

**132A-132B. Introduction to Stochastic Processes. (3-3) II-III.**

Lecture—3 hours. Prerequisite: course 131A. Random walks, recurrent events, Markov chains, birth-and-death processes.

Mr. Sproule

**\*133. Probabilistic Models in Operations Research. (3) I.**

Lecture—3 hours. Prerequisite: course 130B or 131B. Applications of probability and statistics to the study of systems and organizations. Topics in reliability theory, replacement models, waiting-line models, inventory models. Offered in odd-numbered years.

Mr. Sproule

**134. Nonparametric Inference. (3) II.**

Lecture—3 hours. Prerequisite: course 130B or 131B. Selected topics in nonparametric statistical inference from a one-sample and a k-sample point of view. Topics include Kolmogorov-Smirnov type tests; confidence intervals for quantiles, locations and scale parameters; rank tests, dispersion tests, efficiency.

Mr. Sproule

**135. Trend Analysis. (3) III.**

Lecture—3 hours. Prerequisite: course 130B or 131B. Trend analysis from masses of data using applied time series. Quantitative description and analysis of social and biological problems. Cluster analysis.

Mr. Duncan

**‡136A-136B. Development of Mathematical Ideas. (3-3) II, III.**

Lecture—3 hours. Prerequisite: course 21C. Topics and mathematicians studied with an emphasis on the origin of modern mathematics.

Mr. Hayes

**139A-139B-139C. Introduction to Algebra. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: courses 22A, 108A; or consent of instructor. Not open for credit to students who have received credit in course 151A without consent of Department, and may not be taken concurrently with 151A. Theory of equations, symmetric functions, vector space aspects of Galois theory, Euclidean rings, integers in quadratic fields.

Mr. Barnette

**140. Applications of Mathematics. (3) III.**

Lecture—3 hours. Prerequisite: course 108A. Applications of algebra, geometry and analysis in the natural, social and physical sciences.

Mr. Edelson

**141. Euclidean Geometry. (3) II.**

Lecture—3 hours. Prerequisite: course 108A. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometrics.

Mr. Sallee

**147. Topology. (3) II.**

Lecture—3 hours. Prerequisite: course 127C, and 151A or 139A-139B. The basic notions of point set and combinatorial topology.

Mr. Edelson

**151A. Algebra. (4) I.**

Lecture—4 hours. Prerequisite: course 108A. Introduction to groups, rings, fields and linear transformations.

Mr. Mead

**151B. Algebra. (4) II.**

Lecture—4 hours. Prerequisite: course 151A. Continuation of course 151A.

Mr. Mead

**151C. Algebra. (4) III.**

Lecture—4 hours. Prerequisite: course 151B. Continuation of course 151B.

Mr. Mead

**168. Linear Programming and Game Theory. (3) I.**

Lecture—3 hours. Prerequisite: course 21C, 7 or 15. Introduction to zero-sum, two-person games; the fundamental theory for matrix games; basic concepts of linear inequalities; the duality theorem; the simplex method. Offered in even-numbered years.

Mr. Sallee

**185A-185B. Functions of a Complex Variable. (3-3) I-II.**

Lecture—3 hours. Prerequisite: courses 22C, 24. Complex number systems, Cauchy-Riemann equations, elementary functions, Cauchy integral theorem, power series, Laurent series, residue theorem, conformal mapping, special topics.

Mr. Milton

**187. Lebesgue Measure and Integration. (3) III.**

Lecture—3 hours. Prerequisite: course 127C. Theory of Lebesgue measure and integration on the real line.

Mr. Milton

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. (Passed/Not Passed grading only.)

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

(Passed/Not Passed grading only.)

The Staff (Chairman in charge)

\* Not to be given, 1972-73.

‡ Not to be given, winter quarter 1973.

**Graduate Courses**

**201A-201B-201C. Real Analysis. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 127C. Point set topology; Lebesgue measure and integration on the real line; abstract spaces; general measure and integration. Mr. Benson

**\*202A-202B-202C. Functional Analysis.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: courses 127C, 151C, 201C. Hilbert spaces, spectral theorem, Banach spaces, commutative Banach algebras. Mr. Buck

**205A-205B-205C. Functions of a Complex Variable.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 127C. Theory of analytic functions, Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions. Mr. Douglass

**210A-210B-210C. Topics in Algebra, Analysis, and Geometry. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. This course presents topics in advanced algebra, analysis, and geometry that are closely related to the mathematics of the secondary and lower-division curriculum. Required in the M.A. program for prospective junior college and high school teachers. Mr. Sallee, Mr. Stein

**215A-215B-215C. Topology. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point set topology and homotopy theory. Mr. Edelson

**218A-218B-218C. Partial Differential Equations.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: courses 22A, 127C. Topics from the theory of partial differential equations and integral equations. Offered in even-numbered years. Mr. Chakerian

**\*219. Ordinary Differential Equations. (3) I.**

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 odd-numbered years. Mr. Kreith

**220A-220B-220C. Mathematics for the Physical Sciences. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 185A, 185B (may be taken concurrently). Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices and calculus of variations. Mr. Diederich

**\*225A-225B. Metamathematics. (3-3) II-III.**

Lecture—3 hours. Prerequisite: courses 151A and either 125 or Philosophy 12A-12B; or consent of instructor. Axiomatizability, consistency, and completeness of the formalized mathematical theories; definability in formal languages; topics from the theory of models. Offered in even-numbered years. Mr. Krom

**\*227A-227B-227C. Advanced Numerical Analysis.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Fundamental concepts in advanced numerical analysis, well-posedness, condition-numbers, truncation errors of finite algorithms, round-off error analysis, theory of iterative procedures, numerical integration, interpolation, approximation theory, applications of functional analysis. Mr. Linz

**228A-228B. Advanced Numerical Analysis of Ordinary Differential Equations. (3-3) I-II.**

Lecture—3 hours. Prerequisite: course 128C. Numerical solutions of initial and boundary value problems for systems of ordinary differential equations; error analysis and stability. Offered in even-numbered years. Mr. Kurowski

**\*229A-229B-229C. Numerical Methods in Linear Algebra and Selected Topics. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: consent of instructor. Computational methods and theoretical aspects in the solution of simultaneous algebraic equations and matrix eigenvalue problems. Numerical analysis in the solution of partial differential equations, optimization, data analysis, Monte Carlo, etc. Offered in odd-numbered years. Mr. Glauz

**231A-231B-231C. Mathematical Statistics.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: courses 22C and 131C, or consent of instructor. A first year graduate course in theoretical statistics. Offered in even-numbered years. Mr. Duncan

**232. Analysis of Variance. (3) I.**

Lecture—3 hours. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons. Offered in even-numbered years. Mr. Layard

**233A-233B. Design of Experiments. (3-3) II-III.**

Lecture—3 hours. Prerequisite: course 232. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Mr. Layard

**\*235A-235B-235C. Analytic Probability Theory.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 187 or equivalent. Measure-theoretic foundations of

\* Not to be given, 1972-73.

probability, distribution functions and characteristic functions, law of large numbers and central limit theorems, conditional probabilities, martingales. Mr. Sproule

**\*236A-236B-236C. Advanced Mathematical Statistics. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: courses 127C and 131C. Distribution theory, parametric and nonparametric estimation, principles of statistical tests, sequential analysis, statistical decision functions. Mr. Layard

**\*237A-237B. Nonparametric Inference. (3-3) II-III.**

Lecture—3 hours. Prerequisite: course 131C. A survey of nonparametric methods in estimation and hypothesis testing. Offered in odd-numbered years. Mr. Sproule

**\*238A-238B-238C. Analysis of Stochastic Processes. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 132B. The analytical theory of second-order stochastic processes, Poisson processes, birth-and-death processes, and Markov processes, including a study of statistical inference for these processes. Offered in odd-numbered years. Mr. Weiner

**\*240A-240B-240C. Differential Geometry. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 116. Transformation of coordinates, tensor analysis, intrinsic geometry of surfaces, parallel displacement, Riemannian manifolds, the geometry of subspaces, subspaces of a flat space, application of tensor analysis to the theory of relativity. Offered in odd-numbered years. Mr. Krener

**\*245A-245B-245C. Algebraic Topology. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: course 215C. Algebraic invariants of spaces and their behavior with respect to continuous functions. Offered in even-numbered years. Mr. Pfeffer

**250A-250B-250C. Algebra. (3-3-3) I-II-III.**

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. The theory of groups, rings, and fields. Mr. Tamura

**251A-251B. Theory of Groups. (3-3) I-II.**

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Normal subgroups, composition series, Sylow subgroups, nilpotent groups, solvable groups, group representations, groups with operators, group extensions, free groups, ordered groups. Mr. Stringall

**252. Linear Algebra. (3) I.**

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Vector spaces. Offered in even-numbered years. Mr. Mead

**253. Theory of Binary Systems. (3) III.**

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Elements of semigroups, quasigroups, and groupoids. Mr. Tamura

**290. Seminar. (1-6) I, II, III.**

Advanced study in various fields in mathematics as follows: applied statistics and statistical consulting (Mr. Duncan); K-theory (Mr. Edelson); differential geometry (Mr. Fulton); theory of distributions (Mr. Milton); convex bodies (Mr. Sallee); algebraic theory of semigroups (Mr. Tamura); stochastic processes (Mr. Weiner). (Satisfactory/Unsatisfactory grading only.)

**299. Research. (2-6) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Chairman in charge)

**Professional Courses**

**300A. The Teaching of Mathematics. (3) I, II, III.**

Lecture—3 hours. Prerequisite: senior or graduate standing. Mathematics for elementary school grades K-6. Anyone who has completed 20 units or more of college mathematics will receive only 1 unit credit. Mrs. Goldman

**300B. The Teaching of Mathematics. (3) II.**

Lecture—3 hours. Prerequisite: senior or graduate standing. Methods of teaching mathematics in grades 7-12. Mrs. Goldman

\* Not to be given, 1972-73.

**MEDICAL EDUCATION—See Medicine**

**MEDICAL MICROBIOLOGY—See Medicine**

**MEDICAL SCIENCES—See Medicine Bulletin**

**MEDICINE**

C. John Tupper, M.D., *Dean of the School*  
Alexander Barry, Ph.D., *Associate Dean*  
Loren D. Carlson, Ph.D., *Associate Dean*



Morton Levitt, Ph.D., *Associate Dean*  
 Earl F. Wolfman, Jr., M.D., *Associate Dean*  
 John R. Beljan, M.D., *Assistant Dean*

**Professors:**

Charles F. Abildgaard, M.D. (*Pediatrics*)  
 Neil C. Andrews, M.D. (*Surgery, Regional Medical Program*)  
 Len Hughes Andrus, M.D. (*Family Practice*)  
 Alexander Barry, Ph.D. (*Human Anatomy*)  
 Eliezer Benjamins, Ph.D. (*Medical Microbiology*)  
 Robert J. Bolt, M.D. (*Internal Medicine*)  
 Nemat O. Borhani, M.D. (*Community Health, Internal Medicine*)  
 Robert H. Brownson, Ph.D. (*Human Anatomy*)  
 Loren D. Carlson, Ph.D. (*Human Physiology*)  
 Marion A. Carnes, M.D. (*Anesthesiology*)  
 Robert S. Chang, M.D., D.Sc. (*Medical Microbiology*)  
 Loring F. Chapman, Ph.D. (*Behavioral Biology*)  
 Hamilton S. Davis, M.D. (*Anesthesiology*)  
 Pierre M. Dreyfus, M.D. (*Neurology*)  
 Robert E. Hodges, M.D. (*Internal Medicine*)  
 Paul D. Hoepflich, M.D. (*Internal Medicine, Pathology*)  
 Robert L. Hunter, Ph.D. (*Human Anatomy*)  
 Edward J. Hurley, M.D. (*Surgery*)  
 Lucille S. Hurley, Ph.D. (*Nutrition*)  
 Gordon D. Jensen, M.D. (*Psychiatry, Pediatrics*)  
 Keith F. Killam, Jr., Ph.D. (*Pharmacology*)  
 Edwin G. Krebs, M.D. (*Biological Chemistry*)  
 Lindy F. Kumagai, M.D. (*Internal Medicine*)  
 Donald G. Langsley, M.D. (*Psychiatry*)  
 Morton Levitt, Ph.D. (*Psychiatry*)  
 Jerry P. Lewis, M.D. (*Internal Medicine*)  
 Paul R. Lipscomb, M.D. (*Orthopedic Surgery*)  
 George H. Lowrey, M.D. (*Postgraduate Medicine, Pediatrics*)  
 Dean T. Mason, M.D. (*Internal Medicine, Human Physiology*)  
 Rashid Massumi, M.D. (*Internal Medicine*)  
 Arnold Meadow, Ph.D. (*Psychiatry*)

Kenneth R. Niswander, M.D. (*Obstetrics and Gynecology*)  
 Philip E. S. Palmer, M.D. (*Radiology*)  
 Demosthenes Pappagianis, M.D., Ph.D. (*Medical Microbiology*)  
 Antolin Raventos, M.D. (*Radiology*)  
 Boris H. Ruebner, M.D. (*Pathology*)  
 Robert S. Stempfel, Jr., M.D. (*Pediatrics*)  
 Harold M. Sterling, M.D. (*Physical Medicine and Rehabilitation, Pediatrics*)  
 Robert E. Stowell, M.D., Ph.D. (*Pathology*)  
 Wilfred E. Toreson, M.D., Ph.D. (*Pathology*)  
 Makepeace U. Tsao, Ph.D. (*Surgery*)  
 Joe P. Tupin, M.D. (*Psychiatry*)  
 C. John Tupper, M.D. (*Internal Medicine*)  
 Irving H. Wagman, Ph.D. (*Human Physiology*)  
 Sefton R. Wellings, M.D., Ph.D. (*Pathology*)  
 Theodore C. West, Ph.D. (*Medical Education, Pharmacology*)  
 Wallace D. Winters, M.D., Ph.D. (*Pharmacology, Family Practice*)  
 Earl F. Wolfman, Jr., M.D. (*Surgery*)  
 Julian R. Youmans, M.D., Ph.D. (*Neurosurgery*)  
 Antonio Zappala, M.D. (*Human Anatomy*)

**Associate Professors:**

John R. Beljan, M.D. (*Surgery*)  
 E. Jack Benner, M.D. (*Internal Medicine*)  
 Robert D. Cardiff, M.D., Ph.D. (*Pathology*)  
 Louis W. Conway, M.D. (*Neurosurgery*)  
 Gerald L. DeNardo, M.D. (*Radiology, Internal Medicine*)  
 William M. Fowler, Jr., M.D. (*Physical Medicine and Rehabilitation*)  
 Ernest M. Gold, M.D. (*Internal Medicine*)  
 Charles E. Franti, Ph.D. (*Community Health*)  
 Elliot Goldstein, M.D. (*Internal Medicine*)  
 Anthony J. Hance, Ph.D. (*Pharmacology*)  
 Arnold C. L. Hsieh, M.D., D.Sc. (*Human Physiology*)  
 Albert B. Iben, M.D. (*Surgery*)  
 Malcolm R. MacKenzie, M.D. (*Internal Medicine*)  
 John M. Palmer, M.D. (*Urology*)  
 V. James Polidora, Ph.D. (*Behavioral Biology*)

<sup>1</sup>Absent on leave, 1972-73.

<sup>2</sup>Absent on leave, fall quarter 1972.



Lawrence Rabinowitz, Ph.D. (*Human Physiology*)  
 Robert El. Smith, Ph.D. (*Human Physiology*)  
 Robert R. Traut, Ph.D. (*Biological Chemistry*)  
 John D. Trelford, M.D. (*Obstetrics and Gynecology*)  
 G. Worden Waring, Ph.D. (*Physical Medicine and Rehabilitation*)  
 David W. Watson, M.D. (*Internal Medicine*)

**Assistant Professors:**

Otmar W. Albrand, M.D. (*Neurosurgery*)  
 Ezra A. Amsterdam, M.D. (*Internal Medicine, Pharmacology*)  
 William F. Benisek, Ph.D. (*Biological Chemistry*)  
 Willard J. Blankenship, M.D. (*Pediatrics*)  
 Kurien Chacko, Ph.D. (*Human Anatomy*)  
 Nanine H. Clark, Ph.D. (*Human Anatomy*)  
 Sheldon E. Cohen, M.D. (*Surgery*)  
 Carroll E. Cross, M.D. (*Internal Medicine, Human Physiology*)  
 John H. Eisele, M.D. (*Anesthesiology, Human Physiology*)  
 Andrew J. Gabor, M.D., Ph.D. (*Neurology*)  
 Andrew M. Goldner, Ph.D. (*Human Physiology*)  
 Jerry F. Green, Ph.D. (*Human Physiology*)  
 Frederick W. Hanson, M.D., (*Obstetrics and Gynecology*)  
 Gary L. Henderson, Ph.D. (*Pharmacology*)  
 John W. B. Hershey, Ph.D. (*Biological Chemistry*)  
 Mannfred A. Hollinger, Ph.D. (*Pharmacology*)  
 Julian J. A. Irias, M.D. (*Pediatrics*)  
 Jess F. Kraus, Ph.D. (*Community Health*)  
 Thomas C. Lee, Ph.D. (*Human Physiology*)  
 Larry W. McDonald, M.D. (*Pathology*)  
 Stanley Meizel, Ph.D. (*Human Anatomy*)  
 Constantine A. Michas, M.D. (*Surgery*)  
 Lois F. O'Grady, M.D. (*Internal Medicine, Medical Education*)  
 Richard S. Riggins, M.D. (*Orthopedic Surgery*)  
 John A. Reitan, M.D. (*Anesthesiology*)  
 Don A. Rockwell, M.D. (*Psychiatry*)  
 Robert P. Scobey, Ph.D. (*Behavioral Biology*)  
 Bagher M. Sheikholislam, M.D. (*Pediatrics*)  
 Derek P. Stables, D.M.R.D. (*Radiology*)  
 Larry G. Stark, Ph.D. (*Pharmacology*)  
 Michael J. Sullivan, M.D. (*Urology*)  
 Jerold H. Theis, D.V.M. (*Medical Microbiology*)

Frederic A. Troy, II, Ph.D. (*Biological Chemistry*)  
 Thomas L. Volk, M.D. (*Pathology*)  
 Donal A. Walsh, Ph.D. (*Biological Chemistry*)  
 Richard F. Walters, Ph.D. (*Medical Education, Human Physiology*)  
 Lowell D. Wilson, M.D., Ph.D. (*Internal Medicine, Biological Chemistry*)  
 Robert F. Zelis, M.D. (*Internal Medicine, Human Physiology*)

**Professors:**

Marvin Goldman, Ph.D. (*Adjunct; Human Physiology*)  
 Eva K. Killam, Ph.D. (*in Residence; Human Physiology*)

**Associate Professors:**

Gerald A. Deneau, Ph.D. (*in Residence; Pharmacology*)  
 Lawrence M. Greenberg, M.D. (*in Residence; Psychiatry*)  
 Paul G. Hattersley, M.D. (*in Residence; Internal Medicine, Pathology*)  
 Paul R. Miller, M.D. (*in Residence; Psychiatry*)  
 Gerald L. Portney, M.D. (*Acting; Ophthalmology*)

**Assistant Professors:**

Robert D. D'Ambrosia, M.D. (*in Residence; Orthopedic Surgery*)  
 David G. Anderson, Ph.D. (*Adjunct; Obstetrics and Gynecology*)  
 W. Frank Emmons, M.D. (*in Residence; Neurosurgery*)  
 Stanley E. Geel, Ph.D. (*Adjunct; Neurology*)  
 Hanne M. Jensen, M.D. (*in Residence; Pathology*)  
 Glynn E. McArn, Ph.D. (*in Residence; Medical Education*)  
 Nazhiyath Vijayan, M.D. (*in Residence; Neurology*)  
 Craig E. Watson, Ph.D. (*in Residence; Human Anatomy*)  
 Florian W. Zielinski, Ph.D. (*in Residence; Radiology*)

**Lecturers:**

Arthur L. Barry, Ph.D. (*Internal Medicine, Pathology*)  
 Mary D. Fenley, R.N., M.S. (*Family Practice*)  
 Reed M. Nesbit, M.D. (*Urology*)  
 William R. Nesbitt, M.D. (*Family Practice*)  
 Constance E. Roth, M.P.H. (*Family Practice*)  
 James M. Stubblebine, M.D. (*Psychiatry*)

Vijaya K. Vijayan, M.B.B.S. (*Human Anatomy*)  
 Charles H. White, Ph.D. (*Medical Education, Regional Medical Program*)  
 Jean A. Zellé, B.A., (*Physical Medicine and Rehabilitation*)

**Instructor:**

Lee-jing Chen, Ph.D. (*Internal Medicine, Pathology*)

*Admission Requirements and Professional Curriculum.*—For details consult the *Bulletin of the School of Medicine.*

**Departmental Courses**

**Anesthesiology**

**Professional Courses**

**420. Case Management Conference. (1) I, II, III, IV.**

Discussion—1 hour. Prerequisite: interns and residents; advanced medical and veterinary students; consent of instructor. Informal discussion of current hospital case 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. (Honors/Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Davis in charge)

**421. Basic Science Conference. (1) I, II, III, IV.**

Discussion—1½ 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. (Honors/Satisfactory/Unsatisfactory grading only.)

Mr. Eisele

**490. Resident Seminar. (1) I, II, III, IV.**

Lecture—1 hour. Prerequisite: degree in medicine or veterinary medicine or consent of instructor. A 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 professors. Pertinent reference lists are circulated in advance of seminars. (Honors/Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Eisele in charge)

**499. Anesthesiology Research. (4-18) I, II, III, IV.**

Laboratory—3-15 hours. Prerequisite: third- or fourth-year medical students or consent of instructor. Problems in clinical and/or laboratory research. (Honors/Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Munson in charge)

**Behavioral Biology**

**Lower Division Courses**

**98. Directed Group Study. (1-3) I, II, III, IV.**

Discussion—1-3 hours. Prerequisite: consent

of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research.

Departmental Staff (Mr. Chapman in charge)

**99. Special Study for Undergraduates. (1-3)**

I, II, III, IV.

Discussion—1 hour; laboratory—2-4 hours. Prerequisite: consent of instructor. Laboratory research on selected topics relating to the biological bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problems.

Departmental Staff (Mr. Chapman in charge)

**Upper Division Courses**

**198. Directed Group Study. (1-3) I, II, III, IV.**

Discussion—1-3 hours. Prerequisite: consent of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research.

The Staff (Mr. Chapman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-3) I, II, III, IV.

Discussion—1 hour; laboratory—2-4 hours. Prerequisite: consent of instructor. Laboratory research on selected topics relating to the biological bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problem.

The Staff (Mr. Chapman in charge)

**Graduate Courses**

**235. Mood, Motivation, Arousal and Sleep. (3)**

I, II, III, IV.

Lecture—3 hours. Prerequisite: consent of instructor; open to graduate students. A critical examination of the current concepts and research on the physiological and biochemical correlates of these behavior processes.

Mr. Polidora

**\*240. Medical Aspects of Sleep. (3) I, II, III, IV.**

Lecture—3 hours. Prerequisite: consent of instructor. A consideration of clinical aspects of sleep. After a general review of sleep, emphasis is placed on topics of special medical interest: psychiatric conditions (depression, schizophrenia, etc.), drug effects, epilepsy, enuresis, and others.

Mr. Scott

**290. Seminar. (2) I, II, III, IV.**

Seminar—2 hours. Prerequisite: consent of instructor; open to graduate students. Group discussion and critique of current topics of importance and relevance to Behavioral Biology.

The Staff (Mr. Chapman in charge)

\*Not to be given, 1972-73.

**298. Group Study. (1-5) I, II, III, IV.**

Discussion—1-5 hours. Prerequisite: consent of instructor; open to graduate students. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research. The Staff (Mr. Chapman in charge)

**299. Research. (1-12) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students. Laboratory research on selected topics relating to the physiological and biochemical bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problem. The Staff (Mr. Chapman in charge)

**Biological Chemistry****Upper Division Course****199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III, IV.

Prerequisite: consent of instructor.  
The Staff (Mr. Krebs in charge)

**Graduate Courses****213. Principles of Comparative Biochemistry. (3) I.**

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. An advanced treatment of comparative biochemistry. Comparisons of living systems, their structures and functions on a molecular basis, biochemical unity and diversity; protein structures and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism, and excretion. Offered in odd-numbered years. (Same course as Biochemistry 213.)

Mr. Benisek, Mr. Feeney

**\*215. Structure and Metabolic Functions of Proteins. (3) I.**

Discussion—1 hour; laboratory—7 hours. Prerequisite: Biochemistry 101B or consent of instructor; open to graduate students. Introduction to the laboratory investigation of protein structure, enzyme mechanism and the metabolic roles that these molecules play in the intact animal. Emphasis will be placed on aspects of these topics that can be correlated with phenomena of medical interest.

Messrs. Benisek, Troy, Walsh

**220. Molecular Biology Laboratory. (4) I.**

Lecture—1 hour; laboratory—9 hours. Prerequisite: medical and graduate students with consent of instructors. A variety of laboratory techniques will be used to repeat significant experiments in the formation of our present concept of information transfer from gene to protein. Preparation of a protein synthesizing

system; analysis of enzymic, nucleic acid and ribosomal components. (Honors/Satisfactory/Unsatisfactory for medical students; Satisfactory/Unsatisfactory grading only for graduate students.)  
Mr. Traut, Mr. Hershey

**290. Current Topics in Biological Chemistry.**

(1) I, II, III.

Seminar—1 hour. Prerequisite: previous course in biochemistry; open to graduate students. Biochemical topics of current research interest will be discussed. Students will participate in presentation of papers and/or reviews of laboratory work in progress.

The Staff (Mr. Krebs in charge)

**298. Group Study. (1-5) I, II, III, IV.**

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. The Staff (Mr. Krebs in charge)

**299. Research. (1-12) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students.

The Staff (Mr. Krebs in charge)

**Community Health****Upper Division Course****101. Perspectives in Community Health. (2) I, II, III.**

Lecture—1 hour; discussion—1 hour. Prerequisite: undergraduate standing. Lectures and discussions to consider in a comprehensive manner the responsibilities, obligations, and role and professional activities of various disciplines of health manpower in the community, and to orient the students with perspectives of medicine in society.  
Mr. Borhani

**Professional Courses****401. Medical and Environmental Epidemiology.**

(3) I, II, III, IV.

Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: medical and veterinary medicine students with consent of instructor. Lectures, group discussions and laboratory exercises on the basic concepts of medical and environmental epidemiology as related to selected infectious, non-infectious or environmental disease processes including applications to: community health, environmental control, medical ecology, and prevention and disease control. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Borhani, Mr. Kraus

**402. Community and Preventive Medicine. (1-9)**

I, II, III, IV.

Lecture-discussion-laboratory — 1-9 hours. Prerequisite: medical and veterinary medical stu-

\*Not to be given, 1972-73.

dents with consent of instructor. Basic principles of preventive medicine and actual participation in community health programs utilizing both specific community models of primary and secondary prevention dealing with specific disease entities in the populations at risk. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Borhani, Mr. Kraus and Staff

**403. Medicine and the Environment. (2) I.**

Lecture—1 hour; discussion—2 hours. Prerequisite: medical students, graduate students, and consent of instructor. Lecture and seminar-type open discussions and directed readings led by residence and guest lecturers on issues of environmental health as they relate to changing patterns or accelerated onset of disease. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Borhani, Mr. Kraus

**404. Medical and Health Care Delivery Patterns. (3) II.**

Lecture—2 hours; discussion—2 hours. Prerequisite: medical or graduate students and consent of instructor. Lectures and seminar-type open discussions led by resident and guest lecturers on current problems and practices in medical health care practice; delivery organization and financing systems. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Bauer, Mr. Kraus

**405. Issues in Community Health. (3) I, III.**

Lecture—2 hours; discussion—2 hours. Prerequisite: medical students and consent of instructor. Seminar-type discussions and lecture on selected topics and problems in community health including population control, drug abuse, malnutrition, abortion, suicide, and health problems of certain population groups. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Borhani, Mr. Kraus

**498. Group Study in Community Health. (1-9) I, II, III, IV.**

Prerequisite: medical or graduate students and consent of instructor. Directed readings, discussions or community investigations in issues or problems of community health. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) The Staff

**499. Research in Community Health. (1-9) I, II, III, IV.**

Prerequisite: medical or graduate students and consent of instructor. Directed population and community based research in selected topics in community health. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) The Staff

**Family Practice**

**Upper Division Courses**

**127. Health Sciences Practicum. (5) I, II, III, IV.**

Lecture—1 hour; laboratory—12 hours. Prerequisite: consent of instructor. Introduction to the health professions and health care delivery system through lecture and experience in clinical settings. Mr. Andrus

**198. Special Study for Advanced Undergraduates. (1-5) I, II, III, IV.**

To be arranged. Prerequisite: consent of instructor. Special study for advanced undergraduates interested in the Health Care Delivery System. The Staff (Mr. Andrus in charge)

**Graduate Courses**

**298. Special Study for Graduate Students. (1-5) I, II, III, IV.**

To be arranged. Prerequisite: consent of instructor. Special study for graduate students to explain selected areas of primary care and the Health Care Delivery System. The Staff (Mr. Andrus in charge)

**Professional Courses**

**420A. Fundamentals of Medicine for Family Nurse Practitioners. (7) I.**

Lecture—3 hours; laboratory—12 hours. Prerequisite: graduate standing and consent of instructor. Instruction and practice in medical history taking; use of tools of the physical examination; and examination of the head, neck and respiratory systems, including implications of abnormal findings. Mr. Andrus and Staff

**420B. Fundamentals of Medicine for Family Nurse Practitioners. (7) II.**

Lecture—3 hours; laboratory—12 hours. Prerequisite: course 420A; graduate standing and consent of instructor. Instruction and practice in examination of the thorax and respiratory system including diagnostic procedures; examination and study of abnormal conditions of the cardiovascular system; examination of the abdomen as it relates to the gastro-intestinal system. Mr. Andrus

**420C. Fundamentals of Medicine for Family Nurse Practitioners. (7) III.**

Lecture—3 hours; laboratory—12 hours. Prerequisite: course 420B; graduate standing and consent of instructor. Instruction and practice in the examination of the genito-urinary system, examination of the neuro-muscular-skeletal system, and the areas of pre- and post-natal care and pediatrics. Selected patient problem solving situations in the framework of organ systems. Mr. Andrus

**420D. Fundamentals of Medicine for Family Nurse Practitioners. (7) IV.**

Lecture—3 hours; laboratory—12 hours. Prerequisite: course 420C; graduate standing and consent of instructor. Instruction and practice in provision of primary health care services, including obtaining a complete history, performing a physical examination and making recommendations and/or referrals for care of assigned patients. Focus is on use of a problem solving approach. Mr. Andrus

**421A–421B–421C–421D. Seminar for Family Nurse Practitioners. (2) I, II, III, IV.**

Seminar—2 hours. Prerequisite: limited to students enrolled in the Family Nurse Practitioner program. Group discussion of selected topics relevant to the role of Family Nurse Practitioner. (Satisfactory/Unsatisfactory grading only.) Miss French

**Human Anatomy****Upper Division Courses****102. Development and Structure of the Human Body. (4) III.**

Lecture—4 hours. Prerequisite: Biological Sciences 1 or 10; Physiology 2, 2L or Zoology 2 recommended. The development and structure of the human body. Not open to predoctoral or premedical students.

The Staff (Mrs. Vijayan in charge)

**102L. Development and Structure of the Human Body. (2) III.**

Laboratory—6 hours. Prerequisite: course 102 (may be taken concurrently). A laboratory analysis of the structure of the human body.

Mrs. Vijayan

**198. Directed Group Study. (2–4) I, II, III, IV.**

Discussion—2 hours; laboratory—0–6 hours. Prerequisite: consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics.

The Staff (Mr. Hunter in charge)

**199. Special Study for Advanced Undergraduates. (1–5) I, II, III, IV.**

Prerequisite: consent of instructor.

The Staff (Mr. Hunter in charge)

**Graduate Courses****201A. Gross Anatomy. (3) IV.**

Lecture—1 hour; discussion—2 hours; laboratory—1 hour. Prerequisite: consent of instructor; open to graduate students. Study of the head and neck and upper extremities. Mrs. Vijayan

**201B. Gross Anatomy. (3) I.**

Lecture—1 hour; discussion—2 hours; laboratory—1 hour. Prerequisite: course 201A and

consent of instructor; open to graduate students. Study of the trunk and lower extremities.

Mr. Zappala

**205. Biochemical and Morphological Aspects of Animal Gametogenesis and Fertilization. (2) II.**

Discussion—2 hours. Prerequisite: consent of instructor. Emphasis on the molecular and ultrastructural mechanisms of gamete development and gamete maturation and fertilization. Critical reading and discussion of current and background papers. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Meizel

**207. Survey of Human Morphogenesis. (3) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: consent of instructor. A comprehensive survey of human development from fertilization through fetal development. Lectures, student-directed discussions and demonstrations.

Mr. Barry, Mr. Hendrickx

**208. Normal and Abnormal Human Morphogenesis. (2) II.**

Lecture—1 hour; discussion—1½ hours. Prerequisite: course 207 or consent of instructor; open to graduate students. Consideration of the normal and abnormal development of one organ system in detail. Each student will select area for individual study and will present paper to class.

Mr. Barry, Mr. Hendrickx

**280. Human Surgical Anatomy. (4) III.**

Discussion—2 hours; laboratory—4 hours. Prerequisite: human gross anatomy or completion of second-year medical curriculum, and consent of instructor; open to graduate students. Regional and radiological anatomy as applied to the clinical sciences. Offered in odd-numbered years.

Mr. Zappala

**290. Seminar. (1) I, II, III, IV.**

Seminar—1 hour. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only for graduate students; Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Mr. Meizel

**298. Advanced Group Study. (1–5) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students.

The Staff (Mr. Hunter in charge)

**299. Research. (2–12) I, II, III, IV.**

Laboratory 6–36 hours. Prerequisite: consent of instructor; open to graduate students.

The Staff (Mr. Hunter in charge)

**Professional Courses****400A. Topographical Anatomy of the Brain and Spinal Cord. (2) I.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. The course is

designed to provide the student with detailed understanding of the human skull and vertebrae and their contents. Special emphasis will be placed on structural relationships and their functional or clinical importance. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mrs. Vijayan

**400B. Brain Dissection and Regional Anatomy. (2) II.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 400A or its equivalent with consent of instructor; open to graduate students. This course will provide the student with the opportunity to study three-dimensional brain sections on human fresh fixed material and glass preparations. Special emphasis will be placed on orange stick dissection techniques. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Brownson

**402A. Neuroanatomy. (4) I.**

Lecture—2 hours and laboratory—6 hours (2 days a week). Prerequisite: consent of instructor; human or sub-human gross anatomy and/or comparative neuroanatomy is recommended. Includes microscopic and gross anatomy of the nervous system, stressing the internal organization of brain and brain stem. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Brownson

**402B. Neuroanatomy. (4) II.**

Lecture—2 hours and laboratory—6 hours (2 days a week). Prerequisite: course 402A or its equivalent with consent of instructor; open to graduate students. Emphasizes: 1) spinal and cranial pathways to cortical and subcortical levels; 2) cerebral cortex; 3) voluntary and involuntary motor systems; 4) autonomic hypothalamic and limbic systems; and 5) special senses. The course will stress human neuroanatomy and basic neurology. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Brownson

**406. Brain Reconstruction. (4) III.**

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: consent of instructor; open to graduate students. Building a human brain model in three dimension using wire, wood, plastics and precut forms as the basis for teaching clinical neuroanatomy and neurophysiology to all qualified students. Also includes human wet specimens and slides. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Brownson

**407. Case Studies in Anatomy. (4) III.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: medical students or consent of instructor. This course is designed to demonstrate the application of anatomy to clinical medicine. Actual case histories will be presented with a view to understanding and exploring the clinical

problem from an anatomical point of view. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Chacko

**421. Anatomy of Integumentary, Musculoskeletal and Peripheral Nervous System. (1) III.**

First two weeks of quarter—6 hours; individual laboratory project—2 hours. Prerequisite: medical and graduate students and/or consent of instructor. Microscopic, gross, and developmental anatomy of the specific organ systems. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Chacko and Staff

**422. Anatomy of Cardiovascular, Respiratory, Hematopoetic, and Lymphoreticular Systems. (1) III.**

First two weeks of quarter—6 hours; individual laboratory project—2 hours. Prerequisite: medical and graduate students and/or consent of instructor. Microscopic, gross, and developmental anatomy of the specific organ systems. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Barry and Staff

**423. Anatomy of Digestive, Reproductive, and Urinary Systems. (1) III.**

First two weeks of quarter—6 hours; individual laboratory project—2 hours. Prerequisite: medical and graduate students and/or consent of instructor. Microscopic, gross, and developmental anatomy of the specific organ systems. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Meizel and Staff

**424. Anatomy of Nervous and Endocrine Systems. (1) III.**

First three weeks of quarter—6 hours; individual laboratory project—2 hours. Prerequisite: medical and graduate students and/or consent of instructor. Microscopic, gross, and developmental anatomy of the specific organ systems. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Brownson and Staff

**Human Physiology**

**Upper Division Courses**

**151. Information Systems: Design and Analysis of Computerized Information Systems. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: programming desirable; consent of instructor. Basic storage devices; organization of information; design of information systems, on-line, off-line and multilevel; relation of systems design to retrieval requirements and storage elements. Laboratory in preparation of modest information system. Mr. Walters

**198. Directed Group Study. (1-5) I, II, III, IV.**

Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics.

The Staff (Mr. Carlson in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III, IV.**

Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. Undergraduate research project.

The Staff (Mr. Carlson in charge)

**Graduate Courses****\*200D. Advanced General Physiology. (3) I.**

Lecture—3 hours. Prerequisite: Biochemistry 101B, Chemistry 110B, Physiology 100B; 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 odd-numbered years. Mr. Goldner

**221. Surgical Approaches to Physiology. (2) I, II, III, IV.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: Physiology 210B or Medical Sciences 411A-411B. A practical laboratory experience in the classical surgical techniques used to obtain physiological information.

The Staff (Mr. Carlson in charge)

**231. Renal Physiology. (3) I.**

Lecture—3 hours. Prerequisite: Physiology 110B or the equivalent; graduate standing and consent of instructor. Topics in mammalian renal physiology and related areas of biological transport, fluid and electrolyte homeostasis comparative renal physiology, and pathophysiology of the kidney in man. Offered in odd-numbered years. Mr. Rabinowitz

**\*231L. Renal Physiology Laboratory. (1) I.**

Laboratory—3 hours. Prerequisite: Physiology 110B or equivalent; graduate standing and consent of instructor. Experimental study of renal function in mammals including measurement of renal blood flow, filtration rate, concentrating ability, excretion of ions and the action of hormones and drugs. Offered in odd-numbered years. Mr. Rabinowitz

**260. Physiological Systems Analysis. (5) I.**

Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematics 16B and Physiology 108 and 110B; or consent of instructor; open to graduate students. The quantitative analysis of physiological control systems; mathematical models and analytic methods appropriate for the study of different types of physiological control; the application of these techniques to investigations of homeostasis. Mr. R. El. Smith

**280. Pulmonary Function Evaluation. (4) I, II, III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Medical Sciences 411B or Physiological Sciences 140A-140B; open to graduate students. Clinical laboratory, physiological evaluations of pulmonary function.

The Staff (Mr. Cross in charge)

**282. Comparative Pulmonary Physiology. (3) I, II, III.**

Laboratory—8 hours. Prerequisite: Medical Sciences 411B or Physiological Sciences 140A-140B; open to graduate students. Comparative studies of pulmonary function.

The Staff (Mr. Cross in charge)

**298. Group Study. (1-5) I, II, III, IV.**

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. The Staff (Mr. Carlson in charge)

**299. Research. (1-12) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students.

The Staff (Mr. Carlson in charge)

**Internal Medicine****Professional Course****490. Clinical Aspects of Human Nutrition. (1) II, III.**

Discussion—1 hour; seminar—1 hour. Prerequisite: one year of graduate work and/or consent of instructor. Each student selects and presents seminar topic dealing with some aspect of nutrition as applied to clinical medicine. Basic principles emphasized, especially when applying to therapeutic problems or to preventive medicine. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Hodges

**Internal Medicine—Hematology****Graduate Course****298. Topics in Hematology. (1-4) I, II, III, IV.**

Prerequisite: one year of graduate work and consent of instructors. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics will be offered for study. The specific topics to be dictated by the interest and background of the students. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

The Staff (Mr. Bolt in charge)

**Professional Courses****400. Blood and Marrow Morphology in Disease.**

(1-2) I, II, III, IV.

Discussion—1-2 hours; laboratory—1-4 hours. Prerequisite: one year of human or

\* Not to be given, 1972-73.



veterinary medicine and consent of instructor; open to graduate students. Study of the morphologic changes in hematological disease presented through case description and including review of pathophysiology and appropriate therapeutics. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Miss O'Grady

**402. Topics in Medical Immunology. (1) I, II, III, IV.**

Discussion—1 hour; library work. Prerequisite: one year of post-baccalaureate work and consent of instructor. Outside reading and discussion of current advances in medical immunology with emphasis on application of laboratory studies to clinical disease. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. MacKenzie

**Internal Medicine—Infectious Diseases**

**Graduate Course**

**292. Topics in Infectious Diseases and Immunology, Medical Microbiology. (1) I, II, III, IV.**

Seminar—1 hour. Prerequisite: consent of instructor. Assigned reading and discussion on recent advances in infectious diseases and immunology, medical microbiology. Offered in odd-numbered years. (Satisfactory/Unsatisfactory grading only.) (Same course as Medical Microbiology 292.)

Mr. Pappagianis, Mr. Hoeprich

**Professional Courses**

**498. Pulmonary Bacterial Infections. (2) I, II, III, IV.**

Seminar—1 hour; laboratory—4 hours. Prerequisite: first-year medical student or consent of instructor. Weekly seminar and research project in the field of pulmonary infection. Seminars and research projects concerned with bacterial virulence; host mechanisms of bacterial resistance and the roll of exogenous agents in interfering with the "normal" host-parasite interrelationships. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Mr. Goldstein

**499. Research Topics in Infectious Disease. (2-12) I, II, III, IV.**

Prerequisite: successful completion of the first year of study in School of Medicine, graduate students, and/or consent of instructor. A 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. (Honors/Satisfactory/Unsatisfactory grading only.)

Messrs. Hoeprich, Benner, Goldstein, Barry

**Medical Education**

**Upper Division Courses**

**155. Biomedical Applications of Computers. (2) III.**

Lecture—2 hours; computer demonstrations. Prerequisite: consent of instructor. Survey of computer applications in patient monitoring, simulation of biological systems, data acquisition and reduction systems, interpretation of electrocardiograms, and the use of analytical programs for research purposes. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Mr. Walters

**160. Instructional Media in Biomedical Education.**

**(2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: Medical Sciences 410 and 411A or equivalent; consent of instructor. Didactic and practical experience in the variety, operation and uses of instructional aids in the presentation of instruction in biology and medicine.

Mr. West, Mr. Walters

**Graduate Courses**

**220. Evaluation in the Medical Curriculum. (2) III.**

Lecture—1 hour; discussion—1 hour. Prerequisites: Medical Sciences 410 and 411A or equivalent; consent of instructor; open to graduate students. Development of educational goals and objectives; criteria for measurement of results as related to stated objectives; evaluation of instructional methodology; evaluation of learning achieved; comparative evaluation of alternate instructional pathways.

Mr. West, Mr. Walters

**290. Course Planning and Implementation in a Interdisciplinary Medical Curriculum. (1) I.**

Seminar—1 hour. Prerequisite: Medical Sciences 410 and 411A or equivalent; consent of instructor; open to graduate students. A weekly seminar-discussion presentation on the history, present problems and future trends of the medical curriculum, particularly in the United States.

Mr. West, Mr. Walters

**Medical Microbiology**

**Upper Division Courses**

**198. Group Study. (1-5) I, II, III, IV.**

To be arranged. Prerequisite: upper division standing and consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

The Staff (Mr. Pappagianis in charge)

**199. Research in Medical Microbiology. (1-5) I, II, III, IV.**

To be arranged. Prerequisite: upper division standing and consent of instructor. Individual research. The Staff (Mr. Pappagianis in charge)



**Graduate Courses****292. Topics in Medical Microbiology, Infectious Diseases and Immunology. (1) I, II, III.**

Seminar—1 hour. Prerequisite: consent of instructor; open to graduate students. Assigned reading and discussion on recent advances in medical microbiology, infectious diseases, and immunology. (Same course as Infectious Diseases 292.) (Satisfactory/Unsatisfactory grading only.) Mr. Pappagianis, Mr. Hoeprich

**298. Group Study in Medical Microbiology and Immunology. (1-5) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics.

The Staff (Mr. Pappagianis in charge)

**299. Research. (1-12) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. The Staff (Mr. Pappagianis in charge)

**Professional Course****401. Medical Virology. (2) II.**

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 410 and consent of instructor. Deals with the clinical epidemiological, and experimental aspects of viral diseases of man. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Chang

**Neurosurgery****Graduate Course****286. Diseases of the Nervous System. (3) I, II, III, IV.**

Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: general pathology or special training in pathology and neurological sciences; consent of instructor. Reaction of the nervous system to injury and infection; degenerative and vascular diseases of the nervous system; neoplasia in the nervous system. Given jointly with Departments of Neurology and Pathology. Mr. Youmans

**Professional Course****423. Brain-Cutting Conference. (1) I, II, III, IV.**

Seminar—1 hour. Prerequisite: for medical and veterinary students, interns and residents; consent of instructor. Current specimens are sectioned and discussed. Given jointly with Departments of Neurology and Pathology. (Honors/Satisfactory/Unsatisfactory grading only; same course as Pathology 405, Medicine.) Mr. Youmans

**Pathology****Graduate Courses****210. Introduction to Human Pathology. (6) IV.**

Lecture—2 hours; discussion—2 hours; laboratory—4 hours. Prerequisite: open to upper division undergraduate, graduate, and veterinary students with an adequate background in gross anatomy, histology, physiology, and biochemistry. Study of the processes, causes, and effects of disease, including inflammation, neoplasia, immunology, parasitism, degeneration, abnormalities of growth, injuries due to environmental and toxic agents. Offered in even-numbered years. Mr. Ruebner and Staff

**298. Advanced Group Study. (1-5) I, II, III, IV.**

Lecture—1-2 hours; discussion—1-2 hours; laboratory—2 hours. Prerequisite: consent of instructor; open to graduate students. Group study in a variety of advanced topics in general and special pathology.

The Staff (Mr. Wellings in charge)

**299. Research. (1-12) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students. Research in the mechanisms of disease, the effects and causes of injury, neoplasia, neuropathology and comparative pathology. The Staff (Mr. Wellings in charge)

**Professional Courses****400. Ultrastructure of Disease. (3) III.**

Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor; open to graduate students. The contribution of ultrastructure to the understanding of disease processes. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Volk and Staff

**401. Conference in Primate Pathology. (1) I, II, III.**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion of selected topics in primate pathology based on currently available material. Given jointly by the Department of Pathology in the Medical and Veterinary Schools, and the National Center for Primate Biology. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Ruebner and Staff

**402. Current Topics in Tumor Biology. (1) I, II, III.**

Seminar—2 hours. Prerequisite: graduate students and medical students. A 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. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)

Messrs. Wellings, Bustad, Faulkin

**403. Gross Autopsy Review. (1) I, II, III.**

Discussion-seminar—1 hour. Prerequisite: medical students or consent of instructor; open to graduate students. Current autopsies are reviewed in detail with clinicopathological correlation. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Mr. Ruebner and Staff

**404. Forensic Pathology. (2) I.**

Lecture—1 hour; laboratory—1 hour. Prerequisite: medical students or consent of instructor; open to graduate students. Systemic study of current forensic cases with emphasis on differential diagnosis, preservation of evidence, and medicolegal procedure. Includes introduction to histopathologic diagnosis and toxicology. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Mr. Rooney and Staff

**405. Brain-cutting Conference. (1) I, II, III.**

Seminar—1 hour. Prerequisite: medical student or consent of instructor; open to graduate students. Current specimens are sectioned and discussed. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
The Staff (Mr. McDonald in charge)

**406. Histopathologic Diagnosis. (1) II.**

Seminar—1 hour. Prerequisite: medical student or consent of instructor; open to graduate students. Intensive and detailed histopathologic diagnosis. Material covered varies. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
The Staff (Mr. Volk in charge)

**407. Diseases of the Nervous System. (3) III.**

Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: general pathology or special training in pathology and neurological sciences; consent of instructor; open to graduate students. Reaction of the nervous system to injury and infection; degenerative and vascular diseases of the nervous system; neoplasia in the nervous system. Given jointly with the Departments of Neurology and Neurosurgery. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
The Staff (Mr. McDonald in charge)

**408. Autopsy Case Studies. (1-12) I, II, III, IV.**

Discussion—1-4 hours; laboratory—3-24 hours. Prerequisite: medical and veterinary students; consent of instructor; open to graduate students. Participation and performance under supervision of complete autopsies with correlative studies of clinical material, gross, microscopic, and laboratory findings. (Honors/Satisfactory/Unsatisfactory grading for medical students.)  
Mr. Ruebner and Staff

**409. Neuropathology Conference. (1) I, II, III.**

Seminar—1 hour. Prerequisite: medical stu-

dents or consent of instructor; open to graduate students. Neuropathological findings are correlated with clinical findings. Given jointly with Departments of Neurology and Neurosurgery. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Mr. McDonald and Staff

**490. Seminar in Pathology. (2) I, II, III.**

Seminar—2 hours. Prerequisite: consent of instructor; open to graduate students. Student participation course in the mechanisms of disease. Given jointly by the Departments of Pathology in the Medical and Veterinary Schools. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
The Staff (Mr. Ruebner in charge)

**491. Surgical Pathology Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisites: medical student or consent of instructor; open to graduate students. Gross and microscopic pathology of current surgical specimens and study sets with clinicopathological correlation. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Mr. Tesluk and Staff

**492. Ultrastructure Seminar. (1) I, III.**

Seminar—1 hour. Prerequisites: medical, veterinary, or graduate student; or consent of instructor. Electron micrograph and methodology; workshop participants are encouraged to bring their own material and problems for discussion. Limited enrollment. (Honors/Satisfactory/Unsatisfactory grading only for medical students.)  
Mr. Jensen and Staff

**Pediatrics**

**Upper Division Course**

**199. Special Study in Pediatric Research. (1-5) I, II, III, IV.**

Laboratory—3-15 hours. Prerequisite: limited to undergraduates with consent of instructor, based on adequate preparation in chemistry and/or physiology. Problems related to growth and development including the functions of different organ systems. Also learn different laboratory techniques and use of different laboratory equipment. The Staff (Mr. Stempfel in charge)

**Pharmacology**

**Upper Division Courses**

**101. Principles of Pharmacology. (2) III.**

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 410 or equivalent. Drug-enzyme interactions; receptor sites and characteristics; absorption, distribution, metabolism and excretion of drugs; drug tolerance, dependence, addiction and abuse; special toxic-

ties; allergy, behavioral toxicity and teratology, and drug alteration of subcellular function.

Mr. Hollinger, Mr. Stark

### 102. Pharmacodynamics A. (2) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 410 and 411B or equivalent. Pharmacology of the automatic system; pharmacology of the cardiovascular system; renal pharmacology and pharmacology of nerve and neuromuscular junction.

Messrs. Hance, Schmitt, West

### 103. Pharmacodynamics B. (2) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: Medical Sciences 410, 411B, and 413A–413B–413C, or equivalent. Pharmacology of general anesthetics, hypnotics, sedatives, analgesics and antipyretics; narcotic analgesics; convulsants and stimulants, anticonvulsants and drug altering behavior.

Mrs. E. K. Killam, Mr. K. F. Killam

### 104. Pharmacology Laboratory A: Pharmacodynamics. (2) I.

Discussion—1 hour; laboratory—4 hours. Prerequisite: courses 102 and 103 or equivalent. Laboratory techniques used to evaluate the action of drugs. Offered in even-numbered years.

Messrs. Hollinger, Schmitt, West

### 105. Pharmacology Laboratory B: Neuropharmacology. (2) II.

Discussion—1 hour; laboratory—4 hours. Prerequisite: Medical Sciences 410, 411B, and 413A–413B–413C, or equivalent. Specialized laboratory techniques used to evaluate centrally acting drugs. Offered in odd-numbered years.

Mr. Hance, Mrs. Killam

### 106. Pharmacology Laboratory C: Psychopharmacology. (2) III.

Discussion—1 hour; laboratory—4 hours. Prerequisite: Medical Sciences 410, 411B and 413A–413B–413C, or equivalent. Specialized laboratory techniques used to evaluate drugs altering behavior. Offered in odd-numbered years.

Mr. Killam, Mr. Stark

### 199. Special Study for Advanced Undergraduates.

(1–3) I, II, III, IV.

Laboratory—3–9 hours. Prerequisite: consent of instructor. The Staff (Mr. Killam in charge)

#### Graduate Courses

### 201. Pharmacology of the Nervous System I: Transmitter Substances. (1–3) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102 and 103 or Medical Sciences 410, 411B and 413A–413B–413C, or equivalent; open to graduate students. Pharmacology of substances affecting nervous transmission. Offered in odd-numbered years.

Mr. Hance

### 202. Pharmacology of the Nervous System II: Hypnotics, Sedatives, and Anesthetics. (1–3) I.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102, 103 or Medical Sciences 410, 411B and 413A–413B–413C, or equivalent; open to graduate students. Pharmacology of centrally acting sedative, hypnotic and anesthetic agents with emphasis on alterations in brain function. Offered in even-numbered years.

Mrs. Killam

### 203. Pharmacology of the Nervous System III: Stimulants and Anticonvulsants. (1–3) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102, 103 or Medical Sciences 410 and 411B, or equivalent; open to graduate students. Pharmacology of stimulant and convulsant agents, anticonvulsant agents and their evaluation in animal models. Offered in even-numbered years.

Mr. Stark

### 204. Pharmacology of the Nervous System IV: Drug Alteration of Behavior. (1–3) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101, 102, 103 or Medical Sciences 410 and 411B, or equivalent; open to graduate students. Activity of drugs altering mood and behavior: psychopharmacologic agents, hallucinogens, antidepressants. Offered in odd-numbered years.

Mr. Killam

### 205. Drug Distribution and Metabolism. (1–3) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 101 or Medical Sciences 410 and 411B, or equivalent; open to graduate students. Evaluation of problems of drug distribution and metabolism with special reference to autoradiographic techniques. Offered in even-numbered years.

Mr. Stark

### 207. Drug Alteration of Subcellular Function. (1–3) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 101 or Medical Sciences 410 or equivalent; open to graduate students. The interaction of drugs and subcellular components with special emphasis on mechanism of action. Offered in odd-numbered years.

Mr. Hollinger

### 208. Application of Computers to Pharmacology A. (1–2) I, II, IV.

Lecture—1 hour. Prerequisite: consent of instructor; open to graduate students. Presentation of basic concepts and problems.

Mr. Stark

### 209. Application of Computers to Pharmacology B. (1–2) I, II, III, IV.

Lecture—1 hour. Prerequisite: course 208; open to graduate students. Use of laboratory based devices employed in data reduction.

Mr. Killam

**210. Application of Computers to Pharmacology C.**  
(1-3) I, II, III, IV.

Lecture—1 hour. Prerequisite: course 209; open to graduate students. Advanced applications and programming. Mr. Hance

**298. Group Study.** (1-5) I, II, III, IV.

Prerequisite: consent of instructor; open to graduate students. Directed reading and discussion of topics in modern pharmacology.

The Staff (Mr. Killam in charge)

**299. Research.** (1-12) I, II, III, IV.

Prerequisite: consent of instructor; open to graduate students.

The Staff (Mr. Killam in charge)

**Physical Medicine and Rehabilitation**

**Professional Courses**

**451. Physical Medicine Basic Science Seminar.**

(2) I, II, III.

Lecture—1 hour; discussion—1 hour. Prerequisite: completion of first-year medical curriculum and physical therapy students. Faculty and consultants from other departments lecture on neuroanatomy, anatomy, neurophysiology. Electrophysiology, research methods and basic principles of Physical Medicine and Rehabilitation. Research by members of the staff is also reported. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Waring

**452. Physical Modality Laboratory and Seminar.**

(2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: completion of third year of Medical School and physical therapy students. Designed to acquaint the resident with the physiology, biophysics and methodology of the various physical modalities. In the laboratory, instruction is given in the technical use, contraindications and indications for these modalities. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Waring

**470. Rehabilitation Medicine for Allied Health Sciences.** (2) I, II, III, IV.

Lecture—1 hour; laboratory—3 hours. Prerequisite: open to allied health students and graduate students. Designed to acquaint the allied health science student in the clinical application of the physical modalities and the principles of medical and vocational rehabilitation including the physical, psychosocial and occupational aspects. Mr. Zellé

**Psychiatry**

**Graduate Courses**

**220. Interdisciplinary Research Seminar in Family Psychology.** (3) I, II, III, IV.

Seminar—3 hours. Prerequisite: medical, law,

or social sciences graduate student; consent of instructor. Participation in research project designed to study the relationship between family structures and communication processes and normal and abnormal behavior. Families will be selected from patient and "normal" populations, ethnic groups, and a variety of socioeconomic classes. The Staff (Mr. Langsley in charge)

**222. Sociology of Mental Illness.** (4) I, II, III, IV.

Lecture—2 hours; discussion—4 hours. Prerequisite: medical student or social sciences graduate student; consent of instructor. Social and cultural aspects of mental illness; theories of "mental illness," mental illness as deviance, exploration of social and organizational responses, sociologic studies of the mental hospital. (Honors / Satisfactory / Unsatisfactory grading only for medical students.) Mr. Rockwell

**Professional Courses**

**401. Family and Marital Counseling.** (2) III.

Lecture—1 hour; discussion—2 hours. Prerequisite: enrollment as medical student; open to graduate and professional school students with consent of instructor. Principles and techniques of family and marital counseling as conducted by the practicing physician. Cases will be presented. Videotaped clinical examples of marriage counseling. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Langsley

**402. Psychosomatic Problems.** (1-6) I, II, III, IV.

Discussion—1-6 hours. Prerequisite: medical students who have completed first year and graduate students or consent of instructor. Ward rounds, case discussions of patients hospitalized on medical and surgical wards seen in psychiatric consultation. Focus will be on psychosocial events related to alteration of body function and the impact of physical disease on psychosocial function. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) Mr. Tupin

**403. Medical Aspects of Human Sexuality.** (2) I, II.

Lecture—2 hours. Prerequisite: completion of the first year of medical school or consent of instructor. An integrated multidisciplinary study of human sexuality in its normal patterns and dysfunctional variations. Basic techniques of diagnosis and therapy for the general physician will be emphasized. Participating faculty from Departments of Obstetrics and Gynecology, Urology, and Pediatrics. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Miller

**420. Grand Rounds for Department of Psychiatry.**

(1) I, II, III, IV.

Prerequisite: student or staff School of Medicine or other qualified mental health professionals with consent of instructor. One and one-half hour weekly conference at Sacramento Medical Center for presentation of selected clinical cases, presentation of lecture and re-

search reports. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Langsley

**\*430B. Diagnostic Interviewing. (1) I, IV.**

Lecture—1 hour; discussion—1 hour. Prerequisite: first-year psychiatric residents or consent of instructor. Demonstration and discussion of interviewing techniques for psychiatric case assessment. Readings assigned from current literature. Discussion of treatment planning. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Blacker

**\*430C. Clinical Neurology for Psychiatrists. (1) I, II, III, IV.**

Discussion—2 hours. Prerequisite: first- or second-year psychiatric residents or consent of instructor. Lecture, discussion, and case presentation of neurological examination, differential diagnosis and treatment of neurological diseases. (Honors/Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Dreyfus in charge)

**\*430D. Readings in General Psychiatry. (1) I, II, III, IV.**

Discussion—1 hour. Prerequisite: residents in psychiatry or students in other mental health professions with consent of instructor. Assigned readings from classical and recent psychiatric literature on clinical and research topics. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. J. T. Barter

**\*430E. Biological Psychiatry. (1) I, IV.**

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Lecture and discussion on biological underpinnings of behavior to include neurophysiology, neurochemistry, neuropsychopharmacology and pertinent topics. (Honors/Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Langsley in charge)

**\*430F. Social and Environmental Influences on Human Behavior. (1) II, III.**

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Lectures and assigned readings on social and environmental factors which influence human behavior. Emphasis on contributions of sociology, anthropology and other behavioral sciences to understanding of behavior. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Rockwell

**\*430G. Treatment of Child and Adolescent Problems. (1) II, III.**

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor.

Lectures, assigned readings and clinical examples illustrating principles and practice of treatment of children and adolescents with psychiatric illness. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Shatkin

**\*430H. Psychological Theories of Behavior. (1) II, III.**

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Lectures, readings and clinical examples illustrating the various psychological theories of human behavior. Emphasis on psychoanalytic psychology. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Blacker

**\*430I. Psychodiagnostic Evaluation. (1) II, III.**

Lecture—1 hour. Prerequisite: first-year psychiatric residents or students in other mental health professions with consent of instructor. Theory and clinical examples of evaluation of disorders of behavior and psychiatric illness using psychodiagnostic testing and consultation techniques. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Meadow

**473. Anti-Social Behavior. (3-18) I, II, III, IV.**

To be arranged—variable time experience and clinical assignment and selected conferences. Prerequisite: medical students or consent of instructor. The primary focus will be work with juvenile and adult offenders in one of several settings: Sacramento County Jail, Juvenile Center for Sacramento County or California Medical Facility. May be repeated for credit. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Tupin

**498. Directed Group Study. (1-5) I, II, III, IV.**

To be arranged—lectures, conferences, and seminars. Prerequisite: consent of instructor. For medical students desiring to explore particular topics in depth. (Honors/Satisfactory/Unsatisfactory grading only.) Mr. Langsley

## Radiology

### Professional Courses

**498. Group Study. (1-12) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) The Staff (Mr. Raventos in charge)

**499. Research in Radiology. (1-12) I, II, III, IV.**

Prerequisite: consent of instructor; open to graduate students. (Honors/Satisfactory/Unsatisfactory grading only for medical students.) The Staff (Mr. Raventos in charge)

**MICROBIOLOGY—See Also Veterinary Microbiology**

## MICROBIOLOGY (A Graduate Group)

Robert E. Hungate, Ph.D., *Chairman of the Group*  
Group Office, 156 Hutchison Hall

### Graduate Courses

#### 290. Seminar. (1) I, II, III.

Seminar—1 hour. One seminar offered each quarter. One weekly meeting is held. (Satisfactory/Unsatisfactory grading only.) Mr. Kessler

#### 299. Research. (1-12) I, II, III.

Laboratory—variable. Research under the guidance of dissertation committee. (Satisfactory/Unsatisfactory grading only.) The Staff

## MICRONESIAN LANGUAGES—See Oriental Languages

## MILITARY SCIENCE

Bruce M. Carswell, Colonel, *Chairman of the Department*  
Department Office, 125 Gymnasium

### Professor:

Bruce M. Carswell, Colonel

### Associate Professors:

Jay C. Cook, Major  
George W. Crofoot, Major  
James R. Ramos, Major

### Assistant Professor:

Justin R. Hughes, Captain

The Military Science Department extends the educational opportunities and provides extra-curricular activities which, when combined with a baccalaureate degree, qualifies a student for a commission in the Army Reserve. The objective of the ROTC program is to educate young men to become officers who are capable of further development through active duty training and service in the Reserves. The program assists qualified men in all academic fields to prepare for positions of leadership in a military or civilian career. A continuing effort is made to assign graduates to military career fields aligned with their major field of study, individual capabilities and preferences. Active duty obligation for upper division ROTC will not exceed two years.

### Department Programs

Students are enrolled in military science under one of two programs.

**Four-Year Program.**—Students are enrolled in lower division for the first two years on a voluntary basis. No military obligation is accrued during completion of the lower division courses. Admission to the upper division is by application from those second-year lower division students who meet the academic, physical, and military aptitude requirements.

Upper division students receive \$100 subsistence per month after executing a contract

agreeing to complete the course and accept a commission if offered. The commission must be obtained prior to the student's 28th birthday. During the course all military science textbooks, uniforms and equipment are provided without cost to the student. Students are trained at summer camp between their third and fourth advanced years of the course. Camp training stresses the evaluation and practical application of tactical, technical and administrative procedures with particular emphasis on individual participation, leadership development and the capability to function effectively in positions of significant responsibility. Each cadet is paid half of a Second Lieutenant's pay during the period of the camp, plus travel expenses.

**Two-Year Program.**—This program is primarily designed for the student who has not had the opportunity to pursue lower division ROTC. Applications are accepted during the winter term of the year preceeding enrollment in the two-year program. In lieu of lower division courses the applicant must successfully complete a six-week summer camp conducted during the summer preceeding enrollment in the upper division program. All other provisions explained above regarding upper division apply to the two-year program.

**Scholarship Program.**—Four-year scholarship students are selected by nationwide competitive examination. Successful candidates receive all tuition, fees, books, uniforms and \$100 subsistence per month. One-, two- and three-year scholarships with similar benefits are awarded by the department to outstanding students enrolled in the ROTC program.

**Leadership Laboratory.**—Students enrolled in ROTC for the purpose of pursuing a commission are required to participate in approximately 10 hours of leadership laboratory per quarter in addition to classroom instruction. No academic

credit will be given for leadership laboratory. In addition, these students are required to take ½ unit of Physical Education 1 (rifle marksmanship) during any quarter of their freshman or sophomore years, and 1 unit of Physical Education 10 (physical conditioning) during the spring quarter preceding attendance at ROTC Advanced Summer Camp.

#### *Academic Credit*

*College of Letters and Science.*—The Bachelor of Arts degree requires the completion of 180 units, of which at least 150 units shall be in courses given by teaching departments in the College of Letters and Science. Military Science courses do not fall within this category and must be counted in the 30-unit allowance indicated above.

*College of Agricultural and Environmental Sciences.*—The Bachelor of Science degree in agriculture requires the completion of 180 units. All units of upper and lower division military science courses combined may be accredited toward this requirement.

*College of Engineering.*—Up to six units of military science may be accredited as free electives toward the requirement of the College of Engineering for the Bachelor of Science degree.

*School of Veterinary Medicine.*—The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

#### *Lower Division Courses*

### **2. Introduction to Military Science. (1) I.**

Lecture—1 hour. Discussion of the nature of armed conflict, traditions of the military service, and principles of warfare, with emphasis on examples drawn from both classical and contemporary conflicts. The Staff

### **3. Growth and Development of the U. S. Army. (1) II.**

Lecture—1 hour. Examination of the growth, development, and magnitude of management of the present-day Army, with emphasis on evolution of current personnel, logistical, and operational organization and policies. The Staff

### **4. Principles of Basic Tactics. (1) III.**

Lecture—1 hour. Principles of basic operations, tactics, and military combat formations, with emphasis on the individual and small unit. Relationship between the small unit and parent organization. The Staff

### **21. Fundamentals of Military Communications Systems. (1) I.**

Lecture—1 hour. An introduction to the elements of military communications systems and their application to civil and military operations. The Staff

### **22. Military Maps and Aerial Photograph Interpretation. (1) I.**

Lecture—1 hour. Military map systems and aerial photography; interpretation and application of the military grid system, including terrain evaluation, basic map data, military and civil map symbols, methods of orientation, and use of grid references. The Staff

### **23. Introduction to Military Operations. (1) III.**

Lecture—1 hour. Prerequisite: course 4 or consent of instructor. Analysis and application of the principles of offensive and defensive combat as applied to small tactical units. The Staff

### **26. Military History. (3) II.**

Lecture—3 hours. An analysis of selected military battles of history, with emphasis on the strategical and tactical concepts employed. The Staff

#### *Upper Division Courses*

### **131. Principles of Military Instruction. (2) I.**

Lecture—2 hours. Principles and practice in fundamentals applicable to military instruction, briefings and staff studies, to include those used in planning, presenting and evaluating. Student's presentation exemplifying lecture material. The Staff

### **132. Theory of Leadership. (2) II.**

Lecture—2 hours. Principles and theory of leadership; individual and group solution of leadership problems common to small groups. The Staff

### **133. Advanced Military Operations. (2) III.**

Lecture—2 hours. Prerequisite: course 23 or consent of instructor. An advanced study of military operations, to include an analysis of the functions of primary and supporting branches and commands. The Staff

### **141. The Military Team. (2) I.**

Lecture—2 hours. Prerequisite: course 133. Fundamentals and dynamics of the military team to include command and staff structures, functions and operations at division and lower levels. Analysis of logistical operations and intelligence collection and collation. The Staff

### **142. Managerial Principles and Theories. (2) II.**

Lecture—2 hours. Military administrative principles and personnel management theories, including the military occupational structure, and the administration of military justice. The Staff

### **143. Unconventional Warfare. (2) III.**

Lecture—2 hours. Prerequisite: course 141. An analysis of unconventional warfare, to include an examination of insurgency and counter-insurgency operations in the world arena. The Staff



**150. The Development and Control of Nuclear Weapons. (3) III.**

Lecture—3 hours; term paper. A survey of the development of nuclear weapons and post-

war attempts at arms control, including the Baruch Plan, strategic weapons control, test ban treaty, nonproliferation treaty, and problems of verification in arms control. Mr. K. Kreith

**MUSIC**

Theodore C. Karp, Ph.D., *Chairman of the Department*  
Department Office, 112 Music Building

*Professors:*

- Larry D. Austin, M.M.
- Theodore C. Karp, Ph.D.
- Jerome W. Rosen, M.A.
- Richard G. Swift, M.A.

*Associate Professors:*

- Sydney R. Charles, Ph.D.
- Albert J. McNeil, M.S.

*Assistant Professors:*

- Duyong Chung, M.M.
- Sven H. Hansell, Ph.D.



*Lecturer:*

- Arthur N. Woodbury, M.M.

*Major Subject Advisers.*—Mr. Swift, Mr. Karp.

*The Major Program*

Preparation for the major—required: first year, Music 4A–4B–4C; second year, 5A–5B–5C and 21A–21B–21C; one year of Music 30. Beginning and transfer students must take an examination in piano playing. Those showing deficiencies will be required to take Music 405. 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 transferring from other colleges should take the Placement Examination and consult with departmental major advisers before enrolling in any music course.

The major—required: Music 104A–104B–104C, one year of Music 130, and at least 20 units selected from the following courses: 107, 108A–108B, 111, 112, 114, 115, 116, 117, 118, 119, 120, 198, and 199. In addition, a total of at least 14 units in performance courses is required of all music majors. These courses include Music 41, 42, 43, 44, 45, 46, 141, 142, 143, 144, 145, 146.

Attention is called to the requirements in foreign languages for higher degrees in music: a reading knowledge of French or German for the M.A. degree in both composition and musicology. Undergraduates contemplating advanced study in music should prepare to satisfy these requirements as they proceed to the bachelor's degree.

*Individual Group Major.*—Individual group majors may be established by combining the work offered in this department with courses in allied fields. The major subject adviser should be consulted for details.

*Graduate Study.*—The Department of Music offers programs of study and research leading to the M.A. degree in composition or musicology. Detailed information regarding graduate study may be obtained from the Graduate Adviser for Music, Mrs. Charles.

*Teaching Major.*—Requirements for the teaching major are the same as for the departmental major. In addition, teaching methods courses (Music 321A–321B, 322, 323A–323B) are required. Music 300 or 301 recommended.

*Teaching Minor.*—Required: courses 4A–4B–4C, 5A–5B–5C, 108A–108B, 405A–405B–405C or equivalent, and either 111 or 112. In addition, students are advised to enroll in at least two quarters of performance courses. Music 300 is recommended. Students must consult with the subject representative.

*Subject Representative:* Mr. McNeil.

**Lower Division Courses**

**4A–4B–4C. Elementary Theory. (5–5–5) I–II–III.**

Lecture—5 hours. The development of writing and listening techniques through the study of music fundamentals; ear training; beginning tonal counterpoint and harmony; keyboard harmony, score reading; analysis of repertory.

Messrs Chung, Karp, Stauffer

**5A–5B–5C. Intermediate Theory. (4–4–4) I–II–III.**

Lecture—4 hours. Prerequisite: course 4C. Intermediate tonal counterpoint and harmony.

Mr. Austin

**10. Basic Musicianship. (2) I, II, III.**

Lecture—3 hours. Fundamentals of music, singing, ear-training, and conducting for the general student.

The Staff (Mr. McNeil in charge)

**21A–21B–21C. History and Literature of Music.**

(4–4–4) I–II–III.

Lecture—3 hours; listening section—1 hour. Prerequisite: course 4C.

Mr. Hansell

**27A. Introduction to Musical Literature. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Lectures, guided listening and readings designed to



furnish the student with an understanding of basic music concepts. Intended primarily for non-majors. Mr. Stauffer, Mr. Woodbury

#### 27B. Introduction to Musical Literature. (4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 27A or consent of instructor. A survey of the history of musical styles from antiquity to the present. Lectures, guided listening and readings. Intended primarily for non-majors. Mr. Hansell, Mrs. Charles

#### 28. Introduction to Afro-American Music. (4) II.

Lecture—3 hours; listening and discussion—1 hour. A historical and stylistic survey of Afro-American music. Mr. McNeil

#### 30. Applied Study of Music Literature: Intermediate. (1) I, II, III.

Performance instruction—1 hour. Prerequisite: admission by audition only. Student must perform before authorized faculty member of the committee in charge. Ability to perform scales and small compositions required. Class instruction in individual wind, brass, string, or keyboard instruments and voice. Required for music majors; recommended for the music minor. Course may be repeated for credit. Auditors not accepted.

The Staff (Mr. Karp in charge)

#### 41. University Symphony. (2) I, II, III.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestra literature. Mr. Chung

#### 42. Repertory Band. (2) I, III.

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 wind ensembles. Mr. Austin

#### 43. University Concert Band. (2) II.

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. Mr. Woodbury

#### 44. University Chorus. (2) I, II, III.

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. Mr. McNeil

#### 45. Madrigal Singers. (1) I, II, III.

Rehearsal—2 hours per week. Prerequisite: course 44 (may be taken concurrently); consent

of instructor. Rehearsal and performance of music for vocal chamber ensemble. Mr. Rosen

#### 46. Chamber Music Ensemble. (2) I, II, III.

Rehearsal—3 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, piano, harpsichord, and organ. Mr. Hansell

#### 98. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Karp in charge)

#### 99. Special Study for Undergraduates. (1-5) I, II, III.

The Staff (Mr. Karp in charge)

#### Upper Division Courses

#### 104A-104B-104C. Advanced Theory.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 5C. Continuation of Music 5. Mr. Swift

#### 107. Electronic Music. (2) I, II, III.

Laboratory—6 hours. Prerequisite: consent of instructor; enrollment limited to 10 students with priority to music majors. Composition of electronic music using the Moog and Buchla synthesizers. May be repeated for credit. (Only 2 units count toward the music major.) Messrs. Austin, Rosen, Woodbury

#### 108A-108B. Orchestration. (2-2) I-II.

Lecture—2 hours. Prerequisite: course 5C. The techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. Mr. Chung

#### 111. Choral Conducting. (2) III.

Lecture—2 hours. Prerequisite: course 5C. A study of the principles and techniques of conducting choral ensembles. Mr. McNeil

#### \*112. Instrumental Conducting. (2) III.

Lecture—2 hours. Prerequisite: course 108B. A study of the principles and techniques of conducting instrumental ensembles. Mr. Woodbury

#### 114. Music of the Middle Ages. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the middle ages. Mr. Karp

#### \*115. Music of the Renaissance. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from 1430-1600. Mrs. Charles

\* Not to be given, 1972-73.

**\*116. Music of the Baroque Period. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from Monteverdi to Handel and J. S. Bach. Mr. Karp

**\*117. Music of the Classical Period. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the eighteenth century. Mr. Hansell

**118. Music of the Romantic Period. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the nineteenth century. Mrs. Charles

**119. Music of the Twentieth Century. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the twentieth century. Mr. Swift

**120. Introduction to Musical Analysis. (2) III.**

Lecture—2 hours. Prerequisite: course 4C. Introduction to modes of analyzing music of all style periods. Mrs. Charles

**127A. Musical Literature: The Opera. (3) I.**

Lecture—3 hours. Prerequisite: course 27B or consent of instructor. A study of selected operas such as Monteverdi's *Orfeo*, Mozart's *Don Giovanni*, Wagner's *Tristan und Isolde*, Verdi's *Otello*, Debussy's *Pelleas et Mélisande*, and Berg's *Wozzeck*. Intended primarily for non-majors. Mr. Hansell

**\*127B. Musical Literature: The Symphony. (3) III.**

Lecture—3 hours. Prerequisite: course 27B or consent of instructor. A study of selected symphonies by composers such as Haydn, Mozart, Beethoven, Schubert, Brahms, and Stravinsky, emphasizing form and style. Intended primarily for non-majors.

**130. Applied Study of Music Literature: Advanced.**

(1) I, II, III.

Performance instruction—1 hour. Prerequisite: admission by audition only. Student must perform before authorized faculty member of the committee in charge. Ability to perform scales and small compositions required. Class instruction in individual wind, brass, string, or keyboard instruments and voice. Required for music major; recommended for the music minor. Course may be repeated for credit. Auditors not accepted.

The Staff (Mr. Karp in charge)

**141. University Symphony. (2) I, II, III.**

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestra literature.

Mr. Chung

**142. Repertory Band. (2) I, III.**

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 wind ensembles. Mr. Austin

**143. University Concert Band. (2) II.**

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. Mr. Woodbury

**144. University Chorus. (2) I, II, III.**

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. Mr. McNeil

**145. Madrigal Singers. (1) I, II, III.**

Rehearsal—2 hours per week. Prerequisite: course 45; consent of instructor. Rehearsal and performance of music for vocal chamber ensemble. Mr. Rosen

**146. Chamber Music Ensemble. (2) I, II, III.**

Rehearsal—3 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, piano, harpsichord, and organ. Mr. Hansell

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Karp in charge)

**199. Special Study for Advanced Undergraduates.**

(2-4) I, II, III.

The Staff (Mr. Karp in charge)

**Graduate Courses**

**200A-200B. Music Research. (4-4) I, II.**

Seminar—3 hours. Survey of basic materials for music research. Selected projects.

Mrs. Charles

**200C. Notation. (4) III.**

Seminar—3 hours. Study of selected notation practices.

Mr. Karp

**203A-203B-203C. Composition. (4-4-4) I-II-III.**

Seminar—3 hours. Technical projects and free composition.

Mr. Austin

**240A-240B-240C. Techniques of Analysis.**

(4-4-4) I-II-III.

Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods.

Mrs. Charles

\* Not to be given, 1972-73.

**\*291A-291B-291C. Seminar: Topics in Music History. (4-4-4) I-II-III.**

Seminar—3 hours. Studies in selected areas of music history and theory. Mrs. Charles

**\*297. Topics in Twentieth Century Music. (4) III.**

Seminar—3 hours. Analytical approaches to musical thought of the twentieth century.

Mr. Swift

**299. Individual Study. (2-5) I, II, III.**

Special studies and projects in musical composition or music history.

The Staff (Mr. Karp in charge)

**Teaching Methods Courses**

**Instrumental Methods**

The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools.

**300. The Teaching of Music. (3) II, III.**

Lecture—3 hours. Prerequisite: course 10 or equivalent. Methods of teaching music in grades K-6. The Staff (Mr. McNeil in charge)

**301. The Teaching of Music. (3) III.**

Lecture—3 hours. Prerequisite: course 5C or equivalent. Methods of teaching music in grades 7-12. Mr. McNeil

**321A-321B. Stringed Instruments. (1-1) I-II.**

Discussion—2 hours. Prerequisite: course 4C.

**\*322. Brass Instruments. (2) I.**

Discussion—2 hours. Prerequisite: course 4C. Mr. Austin

**\*323A-323B. Woodwind Instruments. (1-1) II-III.**

Discussion—2 hours. Prerequisite: course 4C. Mr. Woodbury

**Professional Course**

**405A-405B-405C. Elementary Piano.**

(1-1-1) I-II-III.

Laboratory—2 hours. Prerequisite: open to music majors and candidates for the general secondary credential with a minor in music.

**NATIVE AMERICAN STUDIES**

*Related Undergraduate Major.*—See page 71.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**1. Introduction to Native American Studies. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Introduction to U.S. Indian tribal-reservation culture; relationship of Native American Studies to other academic disciplines. Mr. Risling

**20. The Native American Experience. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. An 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. (Same course as Anthropology 20.) Mr. Martin

**26. Native American Traditional Governments. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 20 or consent of instructor. Intensive study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Mr. Martin

**32A. Native American Music and Dance. (4) I.**

Lecture—1 hour; discussion—3 hours. Prerequisite: course 1 or 20 or consent of instructor.

\* Not to be given, 1972-73.

General introduction to music and dance of the native peoples of the U. S. Students will study appropriate nonreligious songs and dances.

Mr. Risling

**32B. Native American Music and Dance. (4) III.**

Lecture—1 hour; discussion—3 hours. Prerequisite: course 1 or 20 or consent of instructor. Continuation of course 32A. Introduction to music and dance of the native peoples of California and the west. Students will study appropriate nonreligious songs and dances. Mr. Risling

**33. Native American Art in the U. S. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 20 or consent of instructor. Introduction to the cultural-historical significance and practical application of Native American art in the U. S. area, with emphasis on the Southwest. Mr. Gorman

**34A. Native American Art Workshop. (4) I.**

Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native American Art. Mr. Gorman

**34B. Native American Art Workshop. (4) II.**

Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native American design in textiles, weaving, and weaving apparel. Mr. Gorman

**34C. Native American Art Workshop. (4) III.**

Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recommended. Studio proj-

ects in Native American design in leather, beadwork, miscellaneous crafts. Mr. Gorman

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Risling in charge)

**99. Special Study for Undergraduates. (1-5)**

I, II, III.

Prerequisite: consent of instructor.  
The Staff (Mr. Risling in charge)

**Upper Division Courses**

**106. Native Cultures of the Northern Plains. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20 or consent of instructor. Introduction to the cultures and history of the Indian Nations of the Northern Plains region with emphasis upon the area from Alberta to Colorado. Intertribal relations and white-Indian relations will be considered. Mr. Martin

**110. Fundamentals of Native American Education. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 20 or consent of instructor. An introduction to major issues relating to American Indian education including pupil-teacher relationships, teacher-community relationships, curriculum, and school organization. Mr. Risling

**113. Navajo History and Culture. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 20 or consent of instructor. An introduction to the history and life-way of the DINEH (Navajo) people and taught from the Navajo perspective. Attention will be given to both ancient and modern time periods. Mr. Gorman

**124. Contemporary Affairs of Native Americans in California. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 20 or consent of instructor. Intensive survey of the contemporary problems, issues, and developments involving Native Amer-

icans, both urban and rural, in California.

Mr. Risling

**161A. Native American Community Development. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 20 or consent of instructor. An intensive 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. Mr. Martin

**161B. Native American Economic Development and Planning. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and/or 20, 161A, Anthropology 108. Planning in economic development from the reservation standpoint, concentrating on using those institutions located on Indian reservations. Mr. Martin

**197T. Tutoring in Native American Studies. (1-5)**

I, II, III.

Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Leading of small voluntary discussion groups.

The Staff (Mr. Risling in charge)

**197TC. Community Tutoring in Native American Studies. (1-5) I, II, III.**

Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Supervised tutoring in community. The Staff (Mr. Risling in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: upper division standing; consent of instructor.

The Staff (Mr. Risling in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Risling in charge)

**NEMATOLOGY**

*Related Undergraduate Major.*—See pages 76 and 91.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Upper Division Courses**

**100. General Plant Nematology. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1 or 10. An intro-

duction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops. Mr. Lownsbery

**110. Introduction to Nematology. (2) II.**

Lecture—2 hours. The relationship of nematodes to man's environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil and as parasites of plants and invertebrate animals. Mr. Allen

**130. Principles of Nematode Control. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Recommended: Chemistry 8B; Mathematics 13. Principles and techniques used for derivation of data and their interpretation as the basis for control of plant parasitic nematodes. The biological, physical, and chemical factors influencing nematodes and their control are studied in laboratory and greenhouse. Some field trips required. Mr. Lear

**Graduate Courses**

**\*220. Principles and Techniques of Nematode Taxonomy and Morphology. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material. Mr. Maggenti

**222. Nematode Pathogenicity to Plants. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 100. Investigations of problems in proving nematode pathogenicity; the role of nematodes in plant diseases. Offered in odd-numbered years only. Mr. Lownsbery

**\*225. Nematode Taxonomy and Comparative Morphology. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes. Offered in even-numbered years only. Mr. Allen

**290. Seminar. (1) II.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Raski in charge)

**299. Research. (1-9) I, II, III.**

The Staff (Mr. Raski in charge)

**NEUROLOGY—See Medicine**

**NEUROSURGERY—See Medicine**

**NUTRITION**

*Major Advisers.—See Class Schedule listing.*

*Major Program and Graduate Study.—See pages 75, 89, and 172.*

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**10. Discoveries and Concepts in Nutrition. (3) II.**

Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. Mr. Hill

**99. Individual Study for Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor. To provide opportunity for students to undertake individual projects in library study, laboratory study, field study, and information analysis in nutrition. The Staff (Mr. Hill in charge)

**Upper Division Courses**

**102A-102B. General Nutrition. (4-4) I-II.**

Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 101 or 2; not open for credit to students who have taken Nutrition 110 and 111. Introduction to the principles of nutrition; study

of the nutrients and their chemical and physiological roles in metabolism; nutrient requirements of man. Miss Oace

**102L. General Nutrition Laboratory. (1) II.**

Laboratory—3 hours. Prerequisite: course 102A; course 102B (should be taken concurrently); not open for credit to students who have taken 111L. Laboratory study of the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism. Miss Oace

**103. Animal Nutrition and Feeding. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B. The basic principles of animal nutrition as they are applied to livestock feeding; the composition and uses of feedstuffs in their relation to the feeding of farm animals and poultry; the balancing of rations. Not open for credit to animal science majors. Mr. Garrett

**109. Nutritional Principles of Livestock Feeding. (3) I.**

Lecture—3 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. The principles of nutrition and their application to the solution of problems in animal feeding. Nutritive requirements for maintenance and productive functions, nutritional disorders. composition and use of feedstuffs. (Passed/Not Passed grading only.) Mr. Morris

\* Not to be given, 1972-73.

**110. Principles of Nutrition. (5) II.**

Lecture—5 hours. Prerequisite: Biochemistry 101B (may be taken concurrently); a course in physiology or zoology. The fundamental principles of the nutrition of man and other animals. The nutrients in relation to physiological processes of growth, maintenance, and reproduction. Nutritional disorders.

Messrs. Robinson, Grau, Rucker

**111. Human Nutrition. (4) III.**

Lecture—4 hours. Prerequisite: course 110. Nutrition of man; critical study of nutrient requirements at various phases of the life cycle.

Mr. Rucker

**111L. Nutrition Laboratory. (1) III.**

Laboratory—3 hours. Prerequisite: course 110. Laboratory study of the chemical and physiological roles of nutrients in metabolism; use of experimental animals in determining the essentiality and function of nutrients.

Mr. Rucker

**114. Nutrition and Development. (4) III.**

Lecture—4 hours. Prerequisite: course 110 or 102B. The role of nutritional factors in embryonic and postnatal development. Offered in odd-numbered years.

Mrs. Hurley

**116A-116B. Diet Therapy. (3-3) I-II.**

Lecture—3-3 hours. Prerequisite: course 111 or 102B; Physiology 101 or equivalent. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions.

Miss Zeman, Mr. Clifford

**117. Experimental Nutrition. (5) I.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 111 or 102B; Biochemistry 101B or Physiological Sciences 101B; a laboratory course in nutrition or biochemistry. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition.

Mr. Clifford

**118. Community Nutrition. (3) II.**

Lecture—3 hours. Prerequisite: course 102B or 111. Examination of nutrition problems in contemporary communities. Consideration of social, political, and economic forces in development and implementation of community nutrition programs. Principles and methods of nutrition education. Evaluation of community nutrition programs and resources.

Mrs. Adams

**118L. Laboratory in Community Nutrition. (1) II.**

Laboratory—3 hours. Prerequisite: course 118 (must be taken concurrently). Observation and evaluation of various community nutrition programs.

Mrs. Adams

**119. Field Work in Community Nutrition. (3) III.**

Discussion—1 hour; laboratory—6 hours.

Prerequisite: courses 118, 118L; consent of instructor. Student participation in community nutrition programs in public, private, and volunteer agencies and in citizens' groups with active nutrition programs. Analysis of the methods used and evaluation of the effectiveness of the programs. Restricted opportunity for field study may limit enrollment.

**121. Animal Nutrition Laboratory. (2) III.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 110. Studies, demonstrations, and exercises in the measurement of nutritional values of feeds, nutrient requirements for physiological functions, and ration formulation. Students who have completed course 123 may only receive 1 unit of credit for this course.

Mr. Heitman

**122. Ruminant Nutrition and Digestive Physiology. (3) III.**

Lecture—3 hours. Prerequisite: course 110; Bacteriology 2; Physiology 110B. A study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant.

Mr. Morris

**123. Nutrition of Non-Ruminant Animals. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110. Application of nutrition principles to the feeding of non-ruminant species, including swine, poultry and laboratory animals. Students who have completed course 121 may only receive 2 units of credit for this course.

Mr. Robinson, Mr. Kratzer

**190. Proseminar in Nutrition. (1) I, II, III.**

Seminar—1 hour. Prerequisite: senior standing, course 102B or 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated for credit with consent of instructor.

The Staff (Mr. Hill in charge)

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Hill in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Mr. Hill in charge)

**Graduate Courses****201. Advanced Protein and Amino Acid Nutrition. (4) I.**

Lecture—4 hours. Prerequisite: course 110, Bacteriology 2, Biochemistry 101B, Physiology 110B. 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. A study of dietary requirements and interrelationships among amino acids.

The Staff

**202. Advanced Animal Energetics and Energy Metabolism. (3) II.**

Lecture—3 hours. Prerequisite: course 110, Bacteriology 2, Biochemistry 101B, Physiology 110B. History of nutritional energetics; evaluation of energy transformations associated with food utilization by animals; energy expenditures at cellular, tissue and animal levels as affected by physiological and nutritional states and functions.

The Staff (Mr. Baldwin in charge)

**203. Advanced Vitamin and Mineral Nutrition. (3) III.**

Lecture—3 hours. Prerequisite: course 110, Bacteriology 2, Biochemistry 101B, Physiology 110B. Advanced studies of metabolic function and nutritional interrelationships of vitamins and minerals. Comparative aspects.

The Staff (Mr. Kratzer in charge)

**216. Advanced Diet Therapy. (3) III.**

Lecture—3 hours. Prerequisite: graduate standing; Nutrition 116A, 116B; Physiology 110A, 110B. Nutrition and disease interrelationships at cellular, tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of nutrition in disease states.

Miss Zeman

**218. Advanced Field Work in Community Nutrition. (2-12) I, II, III.**

Discussion—1 hour. Prerequisite: graduate standing; courses 118, 118L, 119; consent of instructor. Individual field projects in community nutrition. Organization and implementation of community programs in nutrition. May be repeated for a maximum of 12 units.

The Staff (Miss Zeman in charge)

**250. Concepts of Animal Nutrition. (3) II.**

Lecture—3 hours. Prerequisite: courses 201, 202, 203. Dynamic interrelationships between food animals and environment including concepts in food intake, digestion, absorption, and utilization of nutrients.

**\*251. Single Carbon Metabolism in Nutrition. (2) I.**

Lecture—2 hours. Prerequisite: course 203. Nutritional and metabolic interrelationships involved in the transfer of single carbon units in various animals; the involvement of the metabolic function of biotin, folic acid, vitamin B<sub>12</sub>, pyridoxine, choline, methionine and other nutrients. Offered in odd-numbered years.

Miss Oace, Mr. Vohra, Mr. Kratzer

**\*252. Nutrition and Development. (3) II.**

Lecture—3 hours. Prerequisite: courses 201, 202, 203. The relationship of nutrition to prenatal and early postnatal development. Offered in even-numbered years.

Mrs. Hurley, Miss Zeman, Mr. Grau

\* Not to be given, 1972-73.

**\*253. Control of Food Intake. (3) III.**

Lecture—2 hours; discussion—1 hour; 2 or 3 laboratory demonstrations. Prerequisite: courses 201, 202 or Physiology 210B or consent of instructor. A comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. The 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. Messrs. Rogers, Robinson, Mendel

**254. Ruminant Digestion and Metabolism. (3) I.**

Lecture—3 hours. Recommended: courses 122, 201, 202, 203. Qualitative and quantitative aspects of ruminant digestive and metabolic processes; nutrient requirements; rumen microbiology and biochemistry; digestive physiology; nutrient absorption; patterns, rates and mechanisms of nutrient utilization; regulatory processes. Offered in even-numbered years.

Messrs. Hungate, Robinson

**255. Natural Toxicants in Foods. (2) II.**

Lecture—2 hours. Prerequisite: courses 201, 202, 203. The occurrence, mode of action and alleviation of several natural toxicants in foods and feeds. Offered in odd-numbered years.

Messrs. Vohra, Kratzer, Walker

**256. Nutritional and Hormonal Control of Animal Metabolic Function. (3) III.**

Lecture—3 hours. Prerequisite: courses 201, 202, 203; Physiological Sciences 205A, 205B. Significance and interpretation of enzyme, metabolite, *in vitro* and *in vivo* isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diet-hormone interactions in carbohydrate, amino acid and lipid metabolism will be discussed. Offered in odd-numbered years.

Mr. Baldwin, Mr. Freedland

**280. Supervised Teaching in Dietetics. (10-12) I, II, III, IV.**

Lecture—3 hours; seminar—1 hour; laboratory—9 hours; discussion periods and supervised research. Prerequisite: graduate standing; consent of instructor. Directed teaching in approved dietetic internships.

Miss Henderson, Mrs. Hopkins

**290. Beginning Nutrition Seminar. (1) I, II, III.**

Discussion—1 hour; seminar—1 hour. Prerequisite: first-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field.

The Staff (Mr. Peterson in charge)

**291. Advanced Nutrition Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation.



ation of advanced topics in nutrition research. (Satisfactory/Unsatisfactory grading only.)

The Staff

**292. Seminar in Dietetics. (1) I.**

Seminar—1 hour. Prerequisite: graduate standing. Selected topics related to problems in dietetics-oriented research.

The Staff (Miss Zeman in charge)

**ORIENTAL LANGUAGES**

**(Department of Anthropology)**

Department Office, 328 Young Hall

*Professor:*

Benjamin E. Wallacker, Ph.D.

*Assistant Professor:*

Marian B. Ury, Ph.D.

◇ ◇ ◇

*Lecturers:*

Key H. Kim, M.A.  
Peter Leung, E.D.  
San-pao Li, M.A.

*The Major Program*

*Emphasis in Chinese.*

Lower Division Courses.—Required: courses 1M-2M-3M, 4M-5M-6M. Recommended: elementary Japanese; Art 1D; History 9A-9B.

Upper Division Courses.—Required: Courses 100, 123A, 123B, 123C; at least 12 units of courses 101-102; courses from the following list to bring the total upper division units to 45: Anthropology 190; History 191A, 191B, 191C, 192A, 192B, 193; Political Science 148A, 148B.

*Emphasis in Japanese.*

Lower Division Courses.—Required: courses 1J-2J-3J, 4J-5J-6J. Recommended: elementary Modern Mandarin, courses 35A, 35B; Art 1D; History 9A-9B.

Upper Division Courses.—Required: course 100 or other course in linguistics; 12 units from courses 121, 131, 132A, 132B. Choose from the following to bring the total upper division units to 45: Anthropology 191; History 194A, 194B; Political Science 148A, 148B.

**Lower Division Courses**

**1C-2C-3C. Elementary Standard Cantonese.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. (Same course as Asian American Studies 1C-2C-3C.)

Mr. Leung

**1J-2J-3J. Elementary Modern Japanese.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours.

Mr. Kim

**298. Group Study. (1-5) I, II, III.**

The Staff (Mr. Weir in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Weir in charge)

Related Courses: see Avian Sciences 150; Institution Management; Wildlife and Fisheries Biology 108.

**1M-2M-3M. Elementary Modern Mandarin.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Introduction to the "National Language" (Kuo Yü) of China.

Mr. Li

**4J-5J-6J. Intermediate Modern Japanese.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 3J. A continuation of course 3J.

Mr. Kim

**4M-5M-6M. Intermediate Modern Mandarin.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 3M. A continuation of course 3M.

Mr. Li

**\*22. Indonesian Civilization. (4) III.**

Lecture—3 hours; discussion—1 hour. A survey of Indonesian civilization and the effects of contacts with Indian, Islamic, and Western cultures. Emphasis on Hinduism, Buddhism, and Islam.

**35A-35B. Great Books of Eastern Asia. (2-2) I-II.**

Lecture—1½ hours; readings and term paper. Lectures and readings on the great classics of Eastern Asia, in English translation, such as Confucian *Analects*, Mencius, Lao-Tzu, the *Book of Poetry*, Kojiki, and *The Tale of Genji*. Knowledge of an oriental language not required.

Mr. Wallacker

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**99. Special Study for Undergraduates. (1-5)**

I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**Upper Division Courses**

**\*100. Languages of Eastern Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. A survey course on the nature and distribution of the main languages of Eastern Asia.

Mr. Wallacker

\* Not to be given, 1972-73.



**101. Classical Chinese. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6M. Readings in selected texts. May be repeated twice for credit. Mr. Wallacker

**102. Chinese Fiction. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6M. Readings in selected texts. May be repeated twice for credit. Offered in quarters when course 101 is not being given. Mr. Wallacker

**121. Advanced Japanese. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6J. Practice in reading modern Japanese, and introduction to classical Japanese. May be repeated twice for credit. Mrs. Ury

**\*123A. Chinese Phonology. (4) I.**

Lecture—3 hours. Prerequisite: consent of instructor. Offered if sufficient number of students enroll.

**\*123B. Chinese Morphology. (4) II.**

Lecture—3 hours. Prerequisite: consent of instructor. Offered if sufficient number of students enroll.

**\*123C. Chinese Syntax. (4) III.**

Lecture—3 hours. Prerequisite: consent of instructor. Offered if sufficient number of students enroll.

**\*131. Research and Bibliography: Japanese. (5) I.**

Lecture—3 hours; discussion—2 hours. Prerequisite: open also to qualified graduate students in history. Students are introduced to the reference aids available in libraries and to the methods and aims of research in Japanese. Emphasis will be on research—history and literature. Mrs. Ury

**132A–132B. History of Japanese Literature. (4–4) II–III.**

Lecture—3 hours; discussion—1 hour. From

the beginning to modern times, with emphasis on Chinese, Buddhist, and Western influences. Knowledge of Japanese not required. Mrs. Ury

**\*142. Civilization of Eastern Asia: Japan. (4) I.**

Lecture—3 hours; discussion—1 hour. A broad survey of Japanese civilization dealing with cultural, literary, religious, and social developments. Mrs. Ury

**170. Chinese and Japanese Buddhism. (3) III.**

Lecture—2 hours; discussion—1 hour. Lectures and related readings on development of Buddhism in China and Japan from the earliest time to the present day. The influence of Buddhism on various Far Eastern art forms. Mrs. Ury

**\*174. Chinese Folk Religion. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Knowledge of Chinese not necessary. Exploration of the eclectic but unsystematic religious beliefs common in varying forms and degrees to nearly all Chinese and discussion of the influence of this form of religion on various aspects of Chinese society.

**198. Directed Group Study. (1–5) I, II, III.**

Prerequisite: consent of instructor. The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1–3) I, II, III.**

The Staff (Chairman in charge)

**Graduate Courses**

**201. Proseminar in Sinological Methods. (4) III.**

Seminar—3 hours. Prerequisite: knowledge of classical Chinese. Mr. Wallacker

**299. Research. (1–12) I, II, III.** Mr. Wallacker

**ORTHOPEDIC SURGERY—See Medicine**

**PARK AND RECREATION ADMINISTRATION**

—See Environmental Planning and Management

**PATHOLOGY—Veterinary Medicine, this page; Medicine, see page 364**

**PATHOLOGY**

Donald L. Dungworth, B.V.Sc., Ph.D., *Chairman of the Department*  
Department Office, 1126 Haring Hall

*Professors:*

Donald R. Cordy, D.V.M., Ph.D.  
Donald L. Dungworth, B.V.Sc., Ph.D.

Peter C. Kennedy, D.V.M., Ph.D.  
Jack E. Moulton, D.V.M., Ph.D.

\* Not to be given, 1972–73.

**Associate Professor:**

B. I. Osburn, D.V.M., Ph.D.

**Assistant Professors:**

David H. Gribble, D.V.M., Ph.D.

R. R. Pool, Jr., D.V.M., Ph.D.

◇ ◇ ◇

**Professors:**Richard A. Griesemer, D.V.M., Ph.D.,  
(Adjunct)Gordon H. Theilen, D.V.M. (Clinical  
Sciences)**Associate Professors:**Leslie J. Faulkin, Jr., Ph.D. (Anatomy)  
Thomas G. Kawakami, Ph.D. (Adjunct)**Assistant Professor:**Anthony A. Stannard, D.V.M., Ph.D.  
(Clinical Sciences)**Lecturer:**

Lynn A. Griner, D.V.M., Ph.D.

**Upper Division Courses****122A. Veterinary Pathology. (5) I.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The fundamental degenerative, vascular, and inflammatory processes, disturbances of cell growth, including oncology.

Messrs. Cordy, Moulton, Pool, Osburn

**122B. Veterinary Pathology. (5) II.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases.

Messrs. Dungworth, Kennedy, Pool, Osburn

**122C. Veterinary Pathology. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases.

Messrs. Cordy, Gribble, Griesemer, Moulton

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses****282. Tumor Pathology. (3) II.**

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 122A-122B-122C. 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.

Mr. Moulton, Mr. Dungworth

**283. Tumor Biology. (3) I.**

Lecture—2 hours; discussion—1 hour. 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.

Messrs. Dungworth, Faulkin, Kawakami, Theilen

**284. Pathology of Reproductive Failure. (2) III.**

Lecture—1 hour; discussion—1 hour. Prerequisite: course 122A-122B-122C. Selected topics on cause and effects of fetal disease. Offered in odd-numbered years.

Mr. Kennedy, Mr. Osburn

**285. Neuropathology. (3) II.**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 122C and 295C. Patterns of nervous tissue reaction in disease. Offered in odd-numbered years.

Mr. Cordy

**290. Seminar in Veterinary Pathology. (1) I, II, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Osburn in charge)

**291. Histopathology Conference. (1) I, II, III.**

Discussion—1 hour. Prerequisite: course 295C. Discussion of selected cases based on records and slides. Defense of diagnoses. (Satisfactory/Unsatisfactory grading only.) The Staff

**292. Surgical Pathology Conference. (1) I, II, III.**

Discussion—1 hour. Prerequisite: course 295C. Diagnosis and discussion of current surgical pathology cases based on clinical records and microscopic study. (Satisfactory/Unsatisfactory grading only.)

Mr. Gribble, Mr. Moulton

**293. Necropsy and Surgical Pathology.**

(1-4) I, II, III.

Discussion—1 hour; laboratory—32 hours. Prerequisite: course 295C. Responsible diagnostic casework. Performance of necropsies, slide reading and case reporting. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Kennedy in charge)

**294. Primate Pathology Conference. (1) I, II, III.**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion of selected topics in primate pathology based on currently available material. Given jointly by Departments of Pathology in the Medical and Veterinary Schools, and the National Center for Primate Biology. (Satisfactory/Unsatisfactory grading only.) (Same course as Pathology 294, Medicine.)

Mr. Gribble, Mr. Griesemer

**295A-295B-295C. Necropsy Laboratory. (1) I-II-III.**

Laboratory—33 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine.

Supervised experience in necropsy diagnosis, including techniques and interpretation. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Kennedy in charge)

**298. Group Study. (1-4) I, II, III.**

Prerequisite: course 122A-122B-122C.

Group Study of advanced topics in pathology.  
The Staff

**299. Research in Veterinary Pathology.**

(1-9) I, II, III (Summer).

(Satisfactory/Unsatisfactory grading only.)

The Staff

**PEDIATRICS—See Medicine**

**PHARMACOLOGY—See Medicine**

**PHILOSOPHY**

William H. Bossart, Ph.D., *Chairman of the Department*

Department Office, 922 Sproul Hall

*Professors:*

William H. Bossart, Ph.D.

Arthur Child, Ph.D.

Neal W. Gilbert, Ph.D.

<sup>1</sup>Marjorie Grene, Ph.D.

*Associate Professors:*

Ronald A. Arbini, Ph.D.

<sup>1</sup>John F. Malcolm, Ph.D.

*Assistant Professors:*

Melvin W. Beal, Ph.D.

Fred R. Berger, Ph.D.

Joel I. Friedman, Ph.D.

Vernon E. Wedin, Ph.D.

*The Major Program*

Lower Division Courses.—Required: courses 12A and 20A-20B-20C.

Upper Division Courses.—Required: 36 units of upper division courses in philosophy, selected with the approval of the departmental major adviser.

*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.

**Lower Division Courses**

**6. Introduction to Philosophy. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Political, aesthetic, religious, metaphysical, and other concerns of philosophy, as exemplified in major works from various periods. The Staff

**\*6F. Freshman Seminar in Philosophy. (4) III.**

Seminar—4 hours. Prerequisite: consent of

<sup>1</sup> Absent on leave, 1972-73.

<sup>0</sup> Not to be given, 1972-73.

instructor. An intensive introduction to philosophical inquiry. Open only to freshmen with strong interest or background in philosophy.

The Staff

**12A. Introduction to Logic. (4) I.**

Lecture—3 hours; discussion—1 hour. Theorems and principles of inference of formal deductive systems; propositional calculus and predicate calculus; translation of English into symbolic formulas. Mr. Berger

**12B. Introduction to Logic. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 12A or consent of instructor. Development of the full predicate calculus; identity and description calculus; decision procedures; more advanced translation of English; elementary theory of classes and relations. Mr. Friedman

**20A. History of Philosophy. (4) I.**

Lecture—3 hours; discussion—1 hour. A survey of Greek philosophy with special attention to the Pre-Socratics, Plato and Aristotle.

Mr. Wedin

**20B. History of Philosophy. (4) II.**

Lecture—3 hours; discussion—1 hour. The seventeenth century and its background.

Mr. Berger

**20C. History of Philosophy. (4) III.**

Lecture—3 hours; discussion—1 hour. Eighteenth-century philosophy.

Mr. Arbini

**Upper Division Courses**

**101. Metaphysics. (4) II.**

Lecture—3 hours. Prerequisite: two courses in philosophy to be chosen from the 20A, 20B, 20C sequence and the upper division course list with the exception of 105, 114A, 114B, 117, 123. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom and

determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments.

Mr. Wedin

**102. Theory of Knowledge. (4) II.**

Lecture-discussion—3 hours. Prerequisite: two courses in philosophy to be chosen from the 20A, 20B, 20C sequence and the upper division course list with the exception of 105, 114A, 114B, 117, 123. Philosophical problems of perception and thought, memory and precognition, imagination, truth and error, belief and knowledge. Types of epistemology. Mr. Beal

**103. Philosophy of Mind. (4) I.**

Lecture-discussion—3 hours. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. Offered in even-numbered years.

**105. Philosophy of Religion. (4) III.**

Lecture—3 hours. Prerequisite: two courses in philosophy. Logical, metaphysical, epistemological and existential aspects of selected religious concepts and problems. Mr. Child

**107A. Philosophy of the Physical Sciences. (4) I.**

Lecture-discussion—3 hours. Prerequisite: one philosophy course or a major in science. Introduction to the nature of scientific laws, theories, explanations, and models. Problems of causality, determinism and indeterminism, induction and probability. Mr. Friedman

**\*107B. Philosophy of the Biological Sciences. (4) II.**

Lecture-discussion—3 hours. Prerequisite: one philosophy course or a major in science. The relation of the biological to the physical sciences; the nature of theories, explanations, and models in biology and psychology. Problems of taxonomy, ethology, and evolutionary theory. Mrs. Grene

**\*107C. Philosophy of the Social Sciences. (4) III.**

Lecture-discussion—3 hours. Prerequisite: one philosophy course or a major in a social science. The nature of laws and explanations in the social sciences; their relation to mathematics and the physical sciences; the role of value judgments in the social sciences; theories of historical knowledge; theoretical problems of data-processing.

**114A. Introduction to Ethics. (4) II.**

Lecture—3 hours; term paper. Prerequisite: one course in philosophy. An 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. Mr. Arbini

**114B. Problems of Ethical Theory and Practice.**

(4) III.

Lecture—3 hours; term paper. Prerequisite: course 114A or consent of instructor. 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. Mr. Berger

**117. Political Philosophy. (4) II.**

Lecture-discussion—3 hours. Recommended: course 6 or 6F. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. Offered in even-numbered years. Mr. Berger

**118. Philosophy of History. (4) III.**

Lecture-discussion—3 hours; term paper. A survey of philosophical theories of history and an analysis of contemporary problems of historical explanation. Offered in odd-numbered years. Mr. Child

**123. Aesthetics. (4) I.**

Lecture—3 hours. Prerequisite: one course in philosophy; one course in music, the plastic arts, or literature. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment. Mr. Child

**131. Philosophy of Logic and Mathematics. (4) III.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 12A or a major in mathematics. The nature of formal systems and mathematical theories, with selected topics from: logical and semantical paradoxes; set theory and type theory as foundations of mathematics; philosophy of geometry; heuristics and history of mathematics; non-standard logics (e.g., intuitionistic and modal logic). Mr. Friedman

**132. History of Logic. (4) II.**

Lecture-discussion—3 hours; term paper or conferences. Study of special problems or authors in the history of logic. Offered in even-numbered years. Mr. Malcolm

**\*134. Metalogic. (4) II.**

Lecture-discussion—3 hours. Prerequisite: course 12B or consent of instructor. Systematic treatment of formal languages and metalanguages; theorems about theorems of logic; consistency and completeness of formal systems; theory of models of formal systems. Offered in odd-numbered years. Mr. Friedman

\* Not to be given, 1972-73.

**137. Philosophy of Language. (4) III.**

Lecture-discussion—3 hours. Recommended: course 20C, 156A, or Linguistics 35. 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. Mr. Arbini

**143. Hellenistic Philosophy. (4) III.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 20A. Offered in even-numbered years. Mr. Gilbert

**\*145. Medieval Philosophy. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20A. A study of major philosophers in the medieval period. Mr. Malcolm

**146. Renaissance Philosophy. (4) III.**

Lecture-discussion—3 hours. Renaissance conceptions of man, as found in the writings of Valla, Ficino, Pico, Pomponazzi, Erasmus, Vives, and Montaigne. Some reference to current religious and social developments. Offered in odd-numbered years. Mr. Gilbert

**151. Philosophy of the Nineteenth Century. (4) II.**

Lecture-discussion—3 hours. Recommended: courses 20A, 20B, or 20C. The idealism of Hegel, his contemporaries and his successors; Marxism; the positivism of Comte and Mill; the irrationalism of Kierkegaard and Nietzsche. Offered in even-numbered years. Mr. Bossart

**155. American Philosophy. (4) II.**

Lecture-discussion—3 hours. Recommended: course 6 or 6F. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C. I. Lewis. Offered in odd-numbered years. Mr. Berger

**156A. Contemporary British Philosophy. (4) I.**

Lecture—3 hours; term paper. Recommended: course 20C or 151. Interpretation and analysis of the most influential work of Bertrand Russell, G. E. Moore, Wittgenstein, J. L. Austin, and G. Ryle. Offered in odd-numbered years. Mr. Arbini

**156B. Special Topics in Contemporary British Philosophy. (4) I.**

Lecture—3 hours; term paper. Recommended: course 155 or 156A. Intensive study of special topic or author in contemporary British or American philosophy. Mr. Arbini

**157A. Contemporary European Philosophy. (4) II.**

Lecture-discussion—3 hours. Recommended: course 20C, 151, 175A, or 175B. A study of contemporary directions in European philosophy, with particular attention to the development of phenomenology and *Existenzphilosophie*

in Germany. Readings in Husserl, Heidegger, Jaspers, and related philosophers. Offered in even-numbered years. Mr. Bossart

**157B. Contemporary European Philosophy. (4) III.**

Lecture-discussion—3 hours. A study of contemporary directions in European philosophy, paying particular attention to the development of phenomenology and existentialism in France. Readings in Sartre, Marcel, Merleau-Ponty, and related philosophers. Offered in even-numbered years. Mr. Bossart

**157C. Contemporary European Philosophy. (4) III.**

Lecture—3 hours; term paper. Recommended: course 157A or 157B. Intensive study of special topic or author from the general field covered in 157A and 157B. Offered in odd-numbered years. Mr. Bossart

**161. Plato. (4) I.**

Lecture-discussion—3 hours. Prerequisite: course 20A. Offered in odd-numbered years. Mrs. Grene, Mr. Wedin

**162. Aristotle. (4) I.**

Lecture-discussion—3 hours. Prerequisite: course 20A or consent of instructor. Offered in even-numbered years. Mr. Gilbert

**168. Descartes. (4) II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 20B. Offered in even-numbered years. Mr. Arbini

**169. Spinoza. (4) II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 20B. Offered in odd-numbered years. Mr. Friedman

**170. Leibniz. (4) II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 20B. Offered in even-numbered years. Mr. Friedman

**171. Hobbes. (4) II.**

Lecture-discussion—3 hours; term paper. Recommended: course 20B. Offered in even-numbered years. Mr. Gilbert

**172. Locke. (4) I.**

Lecture-discussion—3 hours. Offered in odd-numbered years. Mr. Child

**173. Berkeley. (4) II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 20C. Offered in even-numbered years. Mr. Beal

**174. Hume. (4) III.**

Lecture-discussion—3 hours. Offered in even-numbered years. Mrs. Grene

**175A. Kant. (4) I.**

Lecture-discussion—3 hours. Prerequisite: course 20C. Offered in even-numbered years. Mr. Bossart

\* Not to be given, 1972-73.

**\*175B. Kant. (4) II.**

Lecture-discussion—3 hours. Prerequisite: course 20C. Offered in odd-numbered years.  
Mr. Bossart

**176. Hegel. (4) I.**

Lecture-discussion—3 hours. Recommended: courses 20C, 175A, 175B. Offered in odd-numbered years.  
Mr. Bossart

**178. Kierkegaard. (4) I.**

Lecture—3 hours. Prerequisite: course 20A; course 20C or 185. Offered in odd-numbered years.  
Mr. Child

**183. Russell. (4) II.**

Lecture-discussion—3 hours. Recommended: course 12A or Mathematics 125. Offered in odd-numbered years.  
Mr. Wedin

**185. Founders of Modern Thought. (4) I.**

Lecture-discussion—3 hours; term paper. Not open to philosophy majors or students who have had course 20B or 20C. A survey of modern philosophy from Descartes to Kant. Major emphasis upon problems still current today.  
Mr. Beal

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Malcolm in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Malcolm in charge)

**Graduate Courses**

Graduate courses 201, 202, 207, 214, and 290 are offered every year by different instructors and may be repeated for credit with permission of the Graduate Adviser. The other graduate courses will be varied from year to year.

**201. Metaphysics. (4) I.**

Seminar—3 hours. Mr. Arbini

**202. Theory of Knowledge. (4) II.**

Seminar—3 hours. Mr. Child

**206. Philosophical Argumentation. (4) II.**

Seminar—3 hours. Prerequisite: graduate standing. Investigation and evaluation of philosophical arguments. Critical discussion of stu-

dent papers on various aspects of philosophical disputes.

**207. Philosophy of Science. (4) III.**

Seminar—3 hours. Mr. Friedman

**209. Theory of History. (4) I.**

Seminar—3 hours. Offered in odd-numbered years.

**214. Ethics. (4) I.**

Seminar—3 hours. Mr. Berger

**223. Aesthetics. (4) II.**

Seminar—3 hours. Offered in even-numbered years.

**261A. Plato. (4) I.**

Lecture-discussion—3 hours. Offered in odd-numbered years.  
Mrs. Grene

**261B. Plato. (4) III.**

Seminar—3 hours. Offered in odd-numbered years.  
Mr. Wedin

**262A. Aristotle. (4) I.**

Lecture-discussion—3 hours. Offered in even-numbered years.  
Mr. Wedin

**262B. Aristotle. (4) II.**

Seminar—3 hours. Offered in even-numbered years.  
Mr. Wedin

**274 Hume. (4) III.**

Lecture-discussion—3 hours. Offered in even-numbered years.  
Mrs. Grene

**\*275A. Kant. (4) I.**

Lecture-discussion—3 hours. Offered in even-numbered years.  
Mr. Bossart

**275B. Kant. (4) II.**

Lecture-discussion—3 hours. Prerequisite: course 275A. Offered in odd-numbered years.  
Mr. Bossart

**290. History of Philosophy. (4) II, III.**

Seminar—3 hours. Special topics in the history of philosophy. Messrs. Beal, Gilbert

**298. Group Study. (1-5) I, II, III.**

The Staff (Mr. Malcolm in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Malcolm in charge)

**PHYSICAL EDUCATION**

E. Dean Ryan, Ed.D., *Chairman of the Department*  
Department Office, 264 Gymnasium

*Professors:*

Charles R. Kovacic, Ed.D.  
Willard S. Lotter, Ed. D.  
E. Dean Ryan, Ed.D.

*Associate Professors:*

William C. Adams, Ph.D.

\* Not to be given, 1972-73.

Edmund M. Bernauer, Ph.D.

*Assistant Professor:*

Jack H. Wilmore, Ph.D.



*Assistant Professor:*

Melvin R. Ramey (*Civil Engineering*)

*Lecturer and Supervisor of Physical Education:*

George A. Stromgren, M.S.

*Supervisors:*

Robert R. Brooks, M.A.

Barbara J. Heller, Ed.D.

Herbert A. Schmalenberger, M.A.

Marya Welch, Ed.D.

*Associate Supervisors:*

Joseph E. Carlson, M.A.

Jere H. Curry, M.A.

Robert I. Hamilton, M.S.

Jerry W. Hinsdale, A.B.

John W. Pappa, M.A.

Joe L. Singleton, M.A.

James L. Sochor, Ed.D.

Phillip S. Swimley, M.A.

*Assistant Supervisors:*

Robert L. Foster, A.B.

Deanna Sciaraffa, A.B.

The incidental fee payable by all students at the time of registration, entitles students to the use of gymnasium, shower, towels, lockers, tennis courts, and the athletic fields. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction. Courses may be elected with or without academic credit. Lockers will be turned in on the last day of class, 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.

*Major Advisers.*—Mr. Bernauer, Miss Heller, Mr. Kovacic, Mr. Ryan, Miss Welch.

*Minor Adviser.*—Mr. Adams.

*The Major Program*

Students will specialize in one of two areas: biological aspects or psychosocial aspects of physical education.

*Lower Division Courses.*—Required of all students: Biological Sciences 1, Chemistry 1A, Mathematics 13, Physical Education 45, Physics 2A or 10, Psychology 1A. Students interested in the biological aspects of physical education will be required to take Chemistry 8A, 8B.

*Upper Division Courses.*—Required of all students: Human Anatomy 102, Physiology 101, Physical Education 103, 104A–104B, 110, 120,

and 135. Required of students in the biological area: A minimum of 12 additional upper division units in Physiology or Zoology, selected in consultation with the major adviser. Required of students in the psychosocial area: Psychology 112 and three upper division psychology or sociology courses selected in consultation with the major adviser.

*Teaching Major.*—The teacher-training curriculum in physical education requires not only the departmental major, but also courses 130, 180, 380B, and 380C.

*Teaching Minor.*—The teaching minor consists of 34 quarter units of course work, including 12 lower division units, 16 upper division units, and 6 units for teacher certification. Course selection must be made in consultation with the minor adviser.

*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.

**Lower Division Courses**

**1. Physical Education for Men and Women. (½)**

I, II, III.

*Laboratory*—2 hours. Sections in archery, badminton, dance (ballet, modern, social, folk and square), baseball, basketball, fencing, football, golf, trampolining, tumbling, wrestling, volleyball, handball, soccer, tennis, touch football, track, swimming. (Men qualified for athletics may enroll in any sport pursued at Davis, such as baseball, basketball, football and receive credit.) This course may be repeated for credit not to exceed a total of 6 units.

The Staff (Mr. Ryan in charge)

**5. First Aid. (2) I, II, III.**

*Lecture*—2 hours. Standard course. Upon successful completion of the course the Red Cross Certificate is awarded.

Messrs. Stromgren, Pappa, Sochor, Swimley

**10. Professional Physical Education Activities**

(Men). (1) I, II, III.

*Lecture*—1 hour; *laboratory*—2 hours. Fundamental knowledges and skills in swimming, basketball, football, track, baseball, tennis, golf, combative sports, developmental activities, court sports, tumbling and gymnastics.

The Staff (Mr. Ryan in charge)

**22. Professional Physical Education Activities**

(Women). (1) I, II, III.

*Lecture*—1 hour; *laboratory*—2 hours. Fundamental skills in aquatics (swimming—beginning, intermediate, advanced, synchronized; diving; lifesaving; water safety); archery; badminton; basketball; dance (folk and square, modern, social); tennis; track; tumbling; gymnastics; volleyball.

The Staff (Mr. Ryan in charge)



**25. The Theory of Lifesaving and Water Safety.**

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: course I and a course in intermediate swimming. Basic skills in swimming and small craft safety. Lifesaving procedures and techniques for which Red Cross Senior Lifesaving Certificates will be awarded upon successful completion of necessary requirements.

Mr. Hinsdale

**27. Organization and Teaching of Recreational and Competitive Swimming and Diving Skills.**

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: Red Cross Lifesaving Certificate and Advanced Swimming and Diving. Organization and teaching of swimming and lifesaving skills. (Red Cross Water Safety instructors certificate awarded upon successful completion of necessary requirements.) Organization of competitive swimming and diving programs and coaching techniques.

Mr. Hinsdale

**29. Basic Scuba. (2) I, II, III.**

Lecture—2 hours; laboratory—2 hours; two 8-hour field trips of ocean diving. Prerequisite: advanced swimming skills equivalent to course 25; diver medical examination; and consent of instructor. Development of physical skills and knowledge required for S.C.U.B.A. diving, viz., function and maintenance of equipment, physics and physiology of diving, safety and first aid, currents and wave action, marine life and underwater communication.

Mr. Bernauer

**35A-35B. Dance Composition. (2-2) I-II.**

Discussion-demonstration—3 hours. Prerequisite: intermediate dance. Principles of choreography for solo and group compositions.

Mr. Curry

**36A-36B. History of Dance. (3-3) I-II.**

Lecture—3 hours. A 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.

Mr. Curry

**44. Principles of Healthful Living. (2) I.**

Lecture—2 hours. Use of scientific information, proper attitudes, knowledge, and health practices in daily living.

Miss Heller

**45. Foundations of Physical Education. (4) I, III.**

Lecture—4 hours. An introduction to the historical, biological, psychological, sociological and philosophical foundations of physical education.

Mr. Adams

**97T. Tutoring in Physical Education. (1-5) I, II, III.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: lower division standing and consent of Department Chairman. 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.

The Staff (Chairman in charge)

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**Upper Division Courses****103. Analysis of Human Movement. (5) I.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: Physics 2A; Human Anatomy 102. Anatomical and physiological concepts and physical laws as applied to human movement.

Mr. Kovacic

**104A-104B. Physiology of Muscular Activity.**

(3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1, Physiology 2. Circulatory-respiratory and metabolic response to exercise in man under various physiological and ambient conditions.

Mr. Bernauer

**105A. Physical Education for the Handicapped.**

(4) II.

Lecture—4 hours. The role of exercise, physical retraining and remedial work in the improvement of movement for handicapped individuals.

Mr. Kovacic

**105B. Internship in Physical Education for the Handicapped. (3) III.**

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 105A. Teaching-research projects at off-campus sites under departmental supervision.

Mr. Kovacic

**110. Psychosocial Factors in Motor Performance.**

(4) I, III.

Lecture—3 hours. Prerequisite: Psychology 1A. Analysis of various psychological and social factors affecting the development and use of motor skills.

Mr. Ryan

**115. Growth and Development in Human Performance. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1, Physiology 2, and Human Anatomy 102. Development of human performance potential from conception to old age, including influence of racial differences, exercise, athletic participation, and preventive medicine. Alterations in motor skill patterns, morphology and body composition, physiological capacities, coordination, and balance with aging.

Mr. Wilmore

**120. Sports in American Society. (4) III.**

Lecture—4 hours. Prerequisite: History 17A.



The interrelationships of sports with other aspects of society, including the family, church, school and government; consideration of the manner in which sports may be used to contribute to human welfare in our advanced technological society. Miss Welch

### 130. Principles and Theory of Physical Education.

(4) II.

Lecture—4 hours. A critical analysis of the assumptions underlying the physical education program. Mr. Lotter

### 135. Research Design and Instrumentation in Physical Education. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13. Methods, techniques, and design of experimental research in physical education. Mr. Bernauer

### 140. Recreation in the Community. (3) III.

Lecture—3 hours. The nature, scope and significance of recreation with its implications for leisure. The development, organization, and purpose of public and voluntary agencies which serve the recreational needs of the community. Mr. Lotter

### 145. School Health Education. (3) III.

Lecture—3 hours. Prerequisite: course 44 or consent of instructor. A study of the school health program as an integral part of the school curriculum; the underlying principles and functions of health instruction, health service, healthful school living and the contributing community health agencies. Miss Heller

### 171. Conditioning of Athletes and Care of Injuries. (2) III.

Lecture—2 hours. Prerequisite: course 5. A study of current concepts in the care and prevention of accidents in athletic and recreational programs. Analysis and evaluation of associated educational principles and teachings. The American Red Cross instructor certificate will be awarded upon successful completion of requirements. Mr. Stromgren, Mr. Pappa

### 171L. Conditioning and Accident Emergency Care Services. (1) I.

Laboratory—3 hours. Prerequisite: course 5 and consent of instructor. Prevention and care of injuries; adhesive strapping, protective devices, and injury care therapies. Training and first aid room organization, equipment and supplies. Mr. Stromgren

### 180. Physical Education in the Secondary School. (3) I.

Lecture—3 hours. An analysis and study of the principles and methods basic to physical education in the secondary school. Miss Sciaraffa, Mr. Schmalenberger

### 197T. Tutoring in Physical Education. (1-5) I, II, III.

Tutorial—1-5 hours. Prerequisite: consent of instructor. 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.

The Staff (Chairman in charge)

### 198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

### 199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of department.

The Staff (Chairman in charge)

### Graduate Courses

### 200. Proseminar in Physical Education. (3) I.

Seminar—3 hours. Prerequisite: course 135. The meaning, methods, and techniques of research procedure as applied to physical education; a critical review of selected studies, literature, practices, and procedures in the field; application to a particular problem in the field. Mr. Adams

### 210. Historical and Cultural Bases of Physical Education. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 120. An examination of political, economic, social, and religious factors which have influenced sports in various countries and cultures. Miss Welch

### 220. Kinesiology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103. Critical review of current literature and research in kinesiology; neurophysiological concepts and physical laws. Mr. Kovacic

### 221. Anthropometry in Relation to Physical Performance. (4) II.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 104 and 135. Consideration of growth, physical constitution, body proportions and body composition in man as they affect physical performance; measurement of selected structural and functional changes accompanying prolonged, systematic physical conditioning. Mr. Adams

### 222. Metabolic Functions in Exercise. (4) III.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 104B, Physiology 110B. A review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions. Mr. Bernauer

**230. Motor Performance: Psychological Aspects.**  
(4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 110. Critical review of current literature on motor learning; coordination; kinesiology; and reaction time; consideration of sensory-motor perception, motivation, and personality factors in relation to physical activities.

Mr. Ryan

**290. Physiological Basis of Physical Fitness.**  
(2) II.

Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical fitness. Mr. Bernauer

**298. Group Study. (1-3) I, II, III.**

Prerequisite: graduate study and consent of instructor. The Staff (Chairman in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Chairman in charge)

**Professional Courses**

**300. Physical Education Activities and Methods in the Elementary School. (2) II, III.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing. Principles, theories, materials, and practices of the elementary school physical education program.

Mr. Curry, Mr. Adams

**380A-380B-380C. Methods of Physical Education in the Secondary School. (3-3-3) I, II, III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 180 and demonstrated competence in selected skills. The methods of teaching group and individual activities in the secondary school; program planning; class management; organization of the intramural and extramural programs.

Mr. Schmalenberger

**PHYSICAL MEDICINE AND REHABILITATION—See Medicine**

**PHYSICAL SCIENCES**

Roderick V. Reid, Jr., Ph.D., *Chairman of the Committee*

Committee Office, 175 Geology Building

**Committee in Charge:**

Ian D. MacGregor, Ph.D. (*Geology*)

Roderick V. Reid, Jr., Ph.D. (*Physics*)

Peter A. Rock, Ph.D. (*Chemistry*)

*Major Adviser: See Class Schedule.*

The major in physical sciences is designed primarily for students who wish to obtain a general secondary credential. The lower division course requirements are similar to those of the major in chemistry or physics. This major may lead to the Bachelor of Arts or the Bachelor of Science degree.

*Preparation for the Major*

Required: Chemistry 1A, 1B, 1C; Physics 4A, 4C, 4D, 4E; Geology 1-1L or 60-60L, 105, 106, 107; Mathematics 21A, 21B, 21C. Recommended: Chemistry 5; Physics 4B; Mathematics

22A, 22B. The choice of recommended courses will be governed by the field of specialization within the major.

*The Major Program*

A total of 36 units of upper division courses in the physical sciences, of which not less than 23 units must be taken of the physical sciences in either chemistry, physics, or geology.

*Teaching Major.*—Requirements for the teaching major are the same as for the undergraduate major.

*Teaching Minor.*—The teaching minor must take at least 30 quarter units in two of the physical science fields with at least 18 units in one of these two fields. The program must have the approval of the subject representative.

*Subject Representative:* Mr. Reid.

**PHYSICS**

William J. Knox, Ph.D., *Chairman of the Department*

Department Office, 141 Young Hall

*Professors:*

James E. Draper, Ph.D.

Milton E. Gardner, Ph.D. (*Emeritus*)

Kenneth R. Greider, Ph.D.

John A. Jungerman, Ph.D.

William J. Knox, Ph.D.

Richard L. Lander, Ph.D.

Charles G. Patten, Ph.D. (*Emeritus*)

William W. True, Ph.D.

*Associate Professors:*

Franklin P. Brady, Ph.D.  
 Thomas A. Cahill, Ph.D.  
 Glen W. Erickson, Ph.D.  
 Claude Garrod, Ph.D.  
 James P. Hurley, Ph.D.  
 Douglas W. McCollm, Ph.D.

*Assistant Professors:*

Ching-Yao Fong, Ph.D.  
 Olaf S. Leifson, Ph.D.  
 Neal Peek, Ph.D.  
 David E. Pellett, Ph.D.  
 Wendell H. Potter, Ph.D.  
 Roderick V. Reid, Jr., Ph.D.

◇ ◇ ◇

*Lecturer:*

Philip M. Yager, M.S.

*Major Subject Advisers.* — Mr. Peek, Mr. Pellett.

*The Major Programs*

**Lower Division Courses.**—Recommended for the Bachelor of Arts and required for the Bachelor of Science degrees: Physics 4A, 4B, 4C, 4D, 4E; Chemistry 1A and either 1B-1C or 4B-4C; Mathematics 21A, 21B, 21C, 22A, 22B, 22C. Recommended: a reading knowledge of French, German, or Russian.

**Upper Division Courses.**—Both *Bachelor of Arts* and *Bachelor of Science* programs require the completion of the core program consisting of: Physics 104A-104B, 105A-105B, 115A, 110A-110B (-110C for B.S. only), one quarter of an upper division lab, Physics 112A. Additional upper division units are required to add up to the following requirement totals: Bachelor of Arts—38 upper division units total. Bachelor of Science—55 upper division units total. Any upper division physics courses open to majors satisfy the additional units requirement. Substitutions from other departments for these upper division units, as well as the core, may be made by written permission of the Undergraduate Curriculum Committee Chairman as approved by the Department Chairman. Upper division lab requirement satisfied by any one of the following: courses 116A, 116B, 122, or approved substitution. Recommended: Mathematics 24, 118, 119, 185; Mathematics 128 or Applied Science 115.

**Honors and Honors Program.**—The honors program in physics consists of 4 units of course 194H, open to seniors who qualify for the honors program. Students may be graduated with honors in physics on completion of the required major and this program.

**Graduate Study.**—The Department of Physics offers programs of study and research leading to the M.A. and Ph.D. degrees.

**Lower Division Courses**

Physics 4A, 4B, 4C, 4D, and 4E are for stu-

dents whose major is physics and for students preparing for applications of physics in Engineering and Chemistry.

All students planning to take lower division courses (except course 10) should have completed trigonometry.

The Physics 2 series may be started in any quarter and completed without interruption since either sequence, 2A-2B-2C or 2A-2C-2B, is satisfactory. Also, 2B and 2C may be taken concurrently.

The Physics 4 series may be started in either winter or spring quarter and completed without interruption since either sequence, 4A-4B-4C-4D-4E or 4A-4C-4D-4B-4E, is satisfactory.

**Upper Division Courses**

Courses 4A, 4B, 4C, 4D, 4E, or their equivalent, and Mathematics 21A, 21B, 21C, and 22A, 22B, 22C or their equivalents are prerequisite to all upper division courses. Some prerequisites may be waived with consent of the instructor.

**Teaching Major.**—Requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

**Teaching Minor.**—The teaching minor must take Physics 4A, 4B, 4C, 4D, 4E, and any other upper division physics courses necessary to complete 30 quarter units.

**Subject Representative:** Mr. Leifson.

**Astronomy****Lower Division Courses****1A. Introduction to General Astronomy: The Solar System. (4) II.**

Lecture—4 hours. Introduction to the celestial sphere, constellations of the seasons, effects of diurnal and annual motions of the Earth; planetary motions, phases and configurations, including study of Earth as a planet. Not intended for advanced physical science majors. (Courses 1A and 1B may be taken in either order.)

**1B. Introduction to General Astronomy: Stars and the Universe. (4) III.**

Lecture—4 hours. Introduction to stellar motions, magnitudes and distances; distribution of stars in space; the sun; the galaxy. Not intended for advanced physical science majors. (Courses 1A and 1B may be taken in either order.)

**Physics****Lower Division Courses****2A. General Physics Lecture. (3) I, II, III.**

Lecture—3 hours. Mechanics; introduction to electricity and magnetism.

I. ———, Mr. Potter;  
 II. Mr. Potter, Mr. Brady;  
 III. Mr. Potter

**2B. General Physics Lecture. (3) II, III.**

Lecture—3 hours. Prerequisite: course 2A. Electricity and magnetism, heat, kinetic theory, and thermodynamics.

II. Mr. Hurley, Mr. Pellett; III. Mr. Potter

**2C. General Physics Lecture. (3) I, III.**

Lecture—3 hours. Prerequisite: course 2A. Wave motion, optics, modern physics.

I. Mr. Potter; III. Mr. Garrod, Mr. Hurley

**3A. General Physics Laboratory. (1) I, II, III.**

Laboratory—3 hours. Prerequisite: course 2A (may be taken concurrently). Mechanics, introduction to electricity and magnetism. Experimental work planned to accompany the lectures in course 2A. Recommended for all students who elect course 2A.

I. Mr. Potter, Mr. Brady; II. Mr. Potter; III. Mr. Potter

**3B. General Physics Laboratory. (1) II, III.**

Laboratory—3 hours. Prerequisite: course 2B (may be taken concurrently). Electricity and magnetism, heat, kinetic theory, and thermodynamics. Experimental work planned to accompany the lectures in course 2B. Recommended for all students who elect course 2B.

II. Mr. Hurley, Mr. Pellett; III. Mr. Potter

**3C. General Physics Laboratory. (1) I, III.**

Laboratory—3 hours. Prerequisite: course 2C (may be taken concurrently). Wave motion, optics, modern physics. Experimental work planned to accompany the lectures in course 2C. Recommended for all students who elect course 2C.

I. Mr. Potter; III. Mr. Hurley

**4A. General Physics. (4) II, III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21B (may be taken concurrently). Mechanics.

II. Mr. Cahill; III. Mr. Erickson

**4B. General Physics. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A; Mathematics 21C (may be taken concurrently). Properties of many body systems; rigid body motion, hydrodynamics, kinetic theory, thermodynamics and statistical physics.

Mr. Leifson

**4C. General Physics. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A and Mathematics 21C; Mathematics 22A and 22C recommended. Fundamentals of electromagnetic theory; Maxwell's equations.

Mr. McCollm

**4D. General Physics. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4C; Mathematics 22B recommended. Fundamentals of electromagnetic theory (continuation of course 4C), A.C. circuitry,

electromagnetic waves, optics, electric and magnetic fields in matter.

Mr. McCollm

**4E. General Physics. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D; Mathematics 22A recommended. Physics since 1900: special relativity, quantum mechanics and particle physics.

Mr. Reid

**10. Basic Concepts of Physics. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of the basic principles of physics and how they have evolved since the time of Copernicus. Includes lecture-demonstrations and problem solving using elementary algebra.

I. Mr. Cahill; III. Mr. Knox

**Upper Division Courses**

**104A-104B. Introduction to Methods of Mathematical Physics. (3-3) I-II.**

Lecture—3 hours. Prerequisite: course 4C; Mathematics 22C. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

Mr. Erickson

**105A-105B-105C. Analytical Mechanics.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4A; Mathematics 22C. Principles and applications of Newtonian mechanics.

Mr. Pellett

**110A-110B-110C. Electricity and Magnetism.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4D; Mathematics 22C. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

Mr. Reid

**112A-112B. Thermodynamics and Statistical Physics. (3-4) I-II.**

Lecture—3 hours; (4th unit) outside work—9 hours. Prerequisite: course 4; Mathematics 22C. Thermodynamics, kinetic theory, and introduction to statistical mechanics.

Mr. Knox

**115A-115B. Introduction to Quantum Mechanics.**

(3-4) III, I.

Lecture—3 hours; (4th unit for 115B) problem sets. Prerequisite: courses 4E, 104B, 105B. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

Mr. Yager

**116A. Electronic Instrumentation. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D; Mathematics 22C. Recommended: course 104B, partial differential equations and Laplace transforms. An experimental and theoretical study of important electronic circuits commonly used in physics.

Mr. Cahill

**116B. Electronic Instrumentation. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 116A. Continuation of course 116A with special emphasis on recent developments in semiconductor circuitry. Mr. Cahill

**121. Foundations of Atomic and Molecular Physics. (4) III.**

Lecture—3 hours; outside work—9 hours. Prerequisite: course 4E; Mathematics 21C. The phenomena of atomic physics; introduction to quantum phenomena and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and the solid state. Mr. McCollm

**122. Advanced Physics Laboratory. (2) II, III.**

Laboratory—3-6 hours; outside work—0-3 hours. Prerequisite: course 4. Experimental techniques and measurements in atomic, nuclear, and solid-state physics. May be repeated for credit not to exceed a total of 4 units.

II. Mr. Pellett; III, Mr. Brady

**129A. Nuclear Physics. (4) II.**

Lecture—3 hours; outside work—9 hours. Prerequisite: course 4E; Mathematics 22C. Survey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics. Mr. Draper

**129B. Nuclear Physics. (4) III.**

Lecture—3 hours; outside work—9 hours. Prerequisite: courses 115B, 129A. Continuation of course 129A. Mr. Draper

**140A. Introduction to Solid State Physics. (4) II.**

Lecture—3 hours; outside work—9 hours. Prerequisite: course 115A. A survey of basic concepts and classification of experimental phenomena in solids. Introduction to band theory. Mr. Leifson

**140B. Introduction to Solid State Physics. (4) III.**

Lecture—3 hours; outside work—9 hours. Prerequisite: course 140A. A thorough treatment of one or more of the following: energy bands and fermi surfaces, transport phenomena, cooperative phenomena, magnetic resonance. Mr. Leifson

**150. Topics in Current Research. (2) I, II, III.**

Discussion—1 hour; outside work—5 hours. Prerequisite: consent of instructor. Discussion of topics of current interest in physics. May be taken for credit not more than four times.

I. ———; II. Mr. Pellett; III. Mr. Lander

**194H. Special Study for Honors Students.**

(4) I, II, III.

Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III. The Staff (Chairman in charge)

**Graduate Courses****200A. Theory of Mechanics and Electromagnetics. (3) I.**

Lecture—3 hours. Prerequisite: courses 105C and 110C or equivalent, Mathematics 220A concurrently. Special theory of relativity, covariant formulation of mechanics and electromagnetic theory, Lagrange's equations, variational principles for discrete and continuous mechanical and electromagnetic systems. Courses 200A, 200B, 200C, 200D, an integrated sequence, will emphasize physical content as they are coordinated with Mathematics 220A, 220B, 220C. Mr. Garrod

**200B. Theory of Mechanics and Electromagnetics. (3) II.**

Lecture—3 hours. Prerequisite: course 200A, Mathematics 220B concurrently. Hamilton's equations. Hamilton-Jacoby theory and contact transformations, action-angle variables and perturbation theory, selected topics in mechanics of continuous media; incompressible and compressible flow, gravity waves and shock theory. Mr. Garrod

**200C. Theory of Mechanics and Electromagnetics. (3) III.**

Lecture—3 hours. Prerequisite: course 200B, Mathematics 220C concurrently. Brief review of static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics. Mr. True

**200D. Theory of Mechanics and Electromagnetics. (3) I.**

Lecture—3 hours. Prerequisite: course 200C. Diffraction theory. Radiating systems and electron theory. Mr. Jungerman

**215A. Quantum Mechanics. (3) I.**

Lecture—3 hours. Prerequisite: course 115B. Non-relativistic quantum mechanics. Formal development and interpretation of quantum mechanics, including the Schrödinger wave equation, matrix mechanics, and use of state vectors in describing a dynamical system. Mr. Fong

**215B. Quantum Mechanics. (3) II.**

Lecture—3 hours. Prerequisite: course 215A. Wave packets, Wentzel-Kramers-Brillouin approximation, and perturbation methods applied to atomic, nuclear, molecular, and solid-state problems. Mr. Fong

**215C. Quantum Mechanics. (3) III.**

Lecture—3 hours. Prerequisite: course 215B. Scattering theory, radiation theory, and a brief introduction to relativistic quantum mechanics and the Dirac equation. Mr. Fong

**219A. Statistical Mechanics. (3) I.**

Lecture—3 hours. Prerequisite: courses 112B and 115B. Foundations of classical and quantum statistical mechanics. Mr. Garrod

**219B. Statistical Mechanics. (3) II.**

Lecture—3 hours. Prerequisite: course 219A. Applications to properties of solids, real gases, nuclear matter, fluctuations about the equilibrium state. Mr. Garrod

**221A–221B–221C. Atomic Physics. (3–3–3) I–II–III.**

Lecture—3 hours. Prerequisite: course 215C. Term structure of atoms using the angular momentum formalism; methods of computing wave functions and radial integrals; splitting in external fields; term structure in crystals; scattering and collisions.

I. Mr. Leifson; II. Mr. McCollm; III. \_\_\_\_\_

**224A. Nuclear Physics. (3) I.**

Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics. Mr. Brady

**224B. Nuclear Physics. (3) II.**

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. Mr. Brady

**224C. Nuclear Physics. (3) III.**

Lecture—3 hours. Prerequisite: course 224B. Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions. Mr. Brady

**229A. Advanced Nuclear Theory. (3) I.**

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. Mr. True

**229B. Advanced Nuclear Theory. (3) II.**

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. Mr. True

**\*230A. Quantum Theory of Fields. (3) I.**

Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization. Mr. Erickson

**\*230B. Quantum Theory of Fields. (3) II.**

Lecture—3 hours. Prerequisite: course 230A. Continuation of 230B, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations. Mr. Erickson

**239A. Quantum Many-Body Systems. (3) III.**

Lecture—3 hours. Prerequisite: courses 215C

and 219B. The quantum theory of many-particle systems. Theoretical analysis of superfluids, superconductors, and nuclear matter. Mr. Garrod

**239B. Quantum Many-Body Systems. (3) I.**

Lecture—3 hours. Prerequisite: course 239A. Perturbation and variation techniques in many-particle systems. Band theory of solids, electron-phonon interactions, and other topics.

Mr. Garrod

**\*240A–240B. Solid State Physics. (3–3) I–II.**

Lecture—3 hours. Prerequisite: course 221A–221B. One electron model of solids. Properties of lattice waves. Optical and magnetic properties of solids. Fermi surface. Superconductivity.

Mr. Leifson, Mr. Fong

**245A–245B. High Energy Physics. (3–3) I–II.**

Lecture—3 hours. Prerequisite: course 215A. Systematics of elementary particle interactions; determination of quantum numbers; interpretation of experiments; selected special topics in second quarter. Mr. Lander

**250. Modern Physics Colloquium. (2–3) I.**

Seminar—1½ hours; lecture—¼ hour and/or discussion—1 hour. Prerequisite: graduate standing in physics. To familiarize students with the forefront of physics, guest lecturers report current research in *diverse* fields at a weekly colloquium, preceded by intensive preparation and followed by a critical review. Mr. McCollm

**251. Frontier Physics. (3) II.**

Lecture—3 hours. Prerequisite: courses 200C, 215B; or consent of instructor. Provides an introduction to and summary of the types of research that are of current interest in physics and a detailed analysis of a particularly important recent discovery in each major area.

Mr. Reid

**252. Techniques of Experimental Physics. (3) III.**

Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples will be drawn from various fields of current experimental research—low temperature solid state to high energy scattering experiments. Mr. Potter

**290. Seminar. (1–3) I, II, III.**

Seminar—1–3 hours. (Satisfactory/Unsatisfactory grading only.)

I. Mr. Lander; II. Mr. Knox; III. Mr. McCollm

**291. Seminar in Nuclear Physics. (1–2) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

I. Mr. Draper; II. Mr. Brady; III. Mr. Cahill

**292. Seminar in Theoretical Physics. (1–2) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

I. Mr. Hurley; II. Mr. Reid; III. Mr. Erickson

**299. Research. (1–12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

\* Not to be given, 1972–73.

**PHYSIOLOGICAL SCIENCES**

Arthur L. Black, Ph.D., *Chairman of the Department*  
 Department Office, 2163 Haring Hall

**Professors:**

Arthur L. Black, Ph.D.  
 Victor W. Burns, Ph.D.  
 Leo K. Bustad, D.V.M., Ph.D.  
 Richard A. Freedland, Ph.D.  
 Stuart A. Peoples, M.D.  
 Robert E. Smith, Ph.D.

**Associate Professors:**

Jerry R. Gillespie, D.V.M., Ph.D. (*Physiological Sciences and Human Physiology*)  
 Alfred A. Heusner, Ph.D.  
 Harold R. Parker, D.V.M., Ph.D.  
<sup>1</sup>Quinton R. Rogers, Ph.D.

**Assistant Professors:**

Caylord M. Conzelman, Jr., Ph.D.  
 Donald L. Curry, Ph.D.  
 Shri N. Giri, B.V.Sc., A.H., Ph.D.  
 Robert J. Hansen, Ph.D.  
 Robert M. Joy, Ph.D.

**Associate Professor:**

Richard L. Bell, Ph.D. (*Chemical Engineering*)

**Lecturers:**

Allen C. Andersen, V.M.D., Ph.D.  
 Marvin Goldman, Ph.D.  
 Sally Huff, Ph.D.  
 Michael Momeni, Ph.D.

**Upper Division Courses****101A-101B. Physiological Chemistry. (4-3) I, II.**

Lecture—4-3 hours. Prerequisite: quantitative and organic chemistry. Recommended: a course in physiology (may be taken concurrently). 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; energy metabolism and nutrition. (Deferred grading only, pending completion of the sequence.)

Mr. Black, Mr. Hansen

**102A-102B. Physiological Chemistry Laboratory.**

(1-2) I-II.

Laboratory—3-6 hours. Prerequisite: course 101A-101B (should be taken concurrently); open to first-year Veterinary Medicine Students; or consent of instructor. Laboratory practice to illustrate the chemical and physical properties of important constituents of animal cells includ-

ing enzymes; blood and urine analysis; animal experiments on intermediary metabolism using isotopes. (Deferred grading only, pending completion of the sequence.)

Sec. 1: Mr. Freedland; Sec. 2: Mr. Hansen

**123. Comparative Pharmacology. (5) III.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: regular standing in the School of Veterinary Medicine or consent of instructor. The action of drugs on the physiological mechanisms of domestic animals.

Messrs. Peoples, Giri, Conzelman, Joy

**124. Comparative Pharmacology. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 123 or consent of instructor. The effect of drugs on organ systems of domestic animals and their application to the treatment of disease. Laboratory exercises to illustrate the principles of therapeutics and toxicology. Messrs. Peoples, Giri, Conzelman, Joy

**140A-140B. Mammalian Physiology. (5-5) II-III.**

Lecture—5 hours. Prerequisite: good standing in the School of Veterinary Medicine or consent of instructor, based upon evidence of adequate preparation in mathematics and the physical and biological disciplines. A general survey of comparative mammalian physiology with emphasis on systemic mechanisms. (Deferred grading only, pending completion of sequence.)

Physiology Staff

**141A-141B. Laboratory in Mammalian Physiology.**

(1-2) II-III.

Laboratory—3-6 hours. Prerequisite: courses 140A-140B (must be taken concurrently). Non-veterinary students must obtain consent of instructor. Laboratory exercises designed to illustrate physiological interactions among systems in different animal species. (Deferred grading only, pending completion of sequence.)

Physiology Staff

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses****200. Cell Physiology: Biophysical Aspects. (2) III.**

Lecture—2 hours. Prerequisite: consent of instructor. Recommended: Physiology 100B or Bacteriology 130B; Biochemistry 101B and Chemistry 107B or 110C. Discussion of modern approaches to understanding the cell as an organized system. Topics include: analysis of regulation and coordination in the cell; energetic and statistical relations in the cell; tracer ki-

<sup>1</sup> Absent on leave, 1972-73.



netics applied to cells; fluorescence of cells and constituents. Offered in even-numbered years.

Mr. Burns

**205A. Intermediary Metabolism of Animals. (3) I.**

Lecture—3 hours. Prerequisite: biochemistry and physiology or consent of instructor. General considerations in use of 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.

Messrs. Black, Hansen, Freedland

**205B. Intermediary Metabolism of Animals. (3) II.**

Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids, proteins, nucleotides and porphyrins; including hormonal, nutritional, and genetic effects.

Messrs. Black, Freedland, Hansen

**225. Fundamentals of Radiation Biology. (5) I.**

Lecture—5 hours. Prerequisite: one year of physics, biochemistry and physiology or consent of instructor. Radiation effects at atomic, molecular, cellular, tissue, and organism levels including genetic, immunologic, carcinogenic, and aging responses in terms of dose quality and quantity. Included also are discussions of dose-effect relationships, environmental radiation, radiation protection criteria and radiation therapy.

Mr. Bustad, Mr. Goldman

**243A–243B. Use of Isotopes as Tracers in**

**Biological Research. (2–2) I–II.**

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.

Mr. Burns

**243L. Laboratory in Use of Isotopes as Tracers in Biological Research. (2) II.**

Laboratory—6 hours. Prerequisite: course 243B. Study of radioisotope properties, uses and measurement methods relevant to the biological sciences.

Mr. Burns

**253. Drug Metabolism. (2) II.**

Lecture—2 hours. Prerequisite: courses 101A–101B, 140A–140B or Physiology 110A–110B; consent of instructor. General pathways of drug metabolism; and factors influencing the drug metabolism. Emphasis will be laid upon the species, age, and genetic differences affecting the biological disposition of the drugs. Offered in even-numbered years.

Mr. Giri

**254. Applied and Clinical Pharmacology. (2) III.**

Lecture—2 hours. Prerequisite: courses 123, 124; or consent of instructor. Course will be

structured to reinforce and strengthen the students' knowledge of pharmacology. Some sessions will resemble therapeutic conferences in which clinicians and pharmacologists will discuss actions and dangers of drugs used in management of specific animal diseases.

Messrs. Conzelman, Giri, Peoples, Joy

**255. Pharmacogenetics. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: consent of instructors. The genetic basis of interspecific and intraspecific differences in animals to the action of drugs. The laboratory exercises are designed to illustrate these differences and their biological basis.

Mr. Peoples, Mr. Stormont

**256. Medical Toxicology. (3) II.**

Lecture—3 hours. Prerequisite: course in pharmacology or consent of instructor. Studies considered essential to preclinical evaluation of new drugs intended for use in human or veterinary medicine are discussed in depth. The following facets of toxicity tests are covered: hypersensitivity; blood dyscrasias; hepatotoxicity, nephrotoxicity, behavioral effects; addiction potential; teratogenicity; carcinogenicity.

Messrs. Peoples, Conzelman, Giri, Joy

**257. Pharmacology Literature. (1) I.**

Discussion—1 hour. A critique of selected papers in pharmacology with the objective of discerning those general principles, techniques, and guides for procedures which successful investigators have found helpful in the pursuit of their research. Offered in even-numbered years.

Mr. Conzelman

**258. Physicochemical Relationships in Drug Action.**

**(2) II.**

Lecture—2 hours. Prerequisite: consent of instructor. An advanced graduate level coverage of major theories of drug activity and their kinetics. Emphasized are drug-receptor interactions; protein binding; the transport of drugs across biological membranes; the uptake, distribution and elimination of drugs; and the specificity of drug responses.

Mr. Joy, Mr. Giri

**260. Comparative Bioenergetics. (4) II.**

Lecture—2 hours; discussion—2 hours. Prerequisite: working knowledge of calculus; consent of instructor. Fundamentals of thermodynamics: first and second law, probability and information, entropy and information, Poikilothermy, heterothermy, homeothermy, dimensional analysis, theory of biological similarity applied to energy metabolism.

Mr. Heuser

**265. Experimental Physiology. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Selected lectures and experiments on cardiovascular, renal and pulmonary mechanisms with emphasis on chronically maintained preparations and peri-



natal problems. Offered in odd-numbered years.  
Mr. Parker

**290. Seminar. (1) I, II, III.**

Seminar—1 hour.  
The Staff (Chairman in charge)

**298. Group Study. (1-4) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Chairman in charge)

**PHYSIOLOGY—Also see Zoology, page 443**

**PHYSIOLOGY**

*Major Advisers.*—See *Class Schedule* listing.  
*Major Program and Graduate Study.*—See pages 90 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Division of Biological Sciences, 150 Mrak Hall.

**Upper Division Courses**

**100A-100B. General Physiology. (3-3) I-II.**

Lecture—3 hours. Prerequisite: Biological Sciences 1; Chemistry 8B; Physics 2C. Chemical, mathematical, and physical characteristics of the life process common to living things, with particular reference to the cell.

Mr. Horowitz, Mr. Smith

**100L. General Physiology Laboratory. (1) II.**

Laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Laboratory in the physical and chemical processes of cells and tissues.

**101. Functions of Organ Systems. (4) III.**

Lecture—4 hours. Prerequisite: Biological Sciences 1. Physiology of organ systems; concepts of integrative and homeostatic mechanisms, especially in adaptation, growth, and reproduction. Messrs. Burger, Colvin, Lorenz, Mrs. Woolley

**101L. Organ Function Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently). Selected experiments to illustrate functional characteristics of organ systems discussed in course 101.

Mr. Wagman

**102. Physiology of Growth. (3) III.**

Lecture—3 hours. Prerequisite: course 101, 101L; or equivalent. Biological, physical, and chemical aspects of the growth of cells, organisms, and populations. Mr. Smith

**103. Physiology of Animal Cells. (3) III.**

Lecture—3 hours. Prerequisite: course 100B or Zoology 121B. Organization of metazoan systems at the cellular level. Life cycles of cells; regulation and development of specialized cell functions. Mr. B. W. Wilson

**107. Avian Physiology. (3) III.**

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. Physiology of the va-

rious systems of birds with emphasis on digestion, respiration, excretion, and the nervous system. Mr. Ogasawara

**107L. Avian Physiology Laboratory. (2) III.**

Laboratory—6 hours. Prerequisite: course 107 (may be taken concurrently); and consent of instructor. Selected problems in the physiology of birds. Mr. Ogasawara

**108. Biodynamics. (4) III.**

Lecture—4 hours. Prerequisite: course 110B; Mathematics 16B; Physics 2C. Rates and dynamics of physiological processes.

Mr. Horowitz

**110A-110B. Mammalian Physiology. (3-3) I-II.**

Lecture—3 hours. Prerequisite: Biological Sciences 1 and Chemistry 8B or consent of instructor. The physiology of the neuromuscular, central nervous, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems of mammals.

Messrs. Horowitz, Burger, Mendel, Boda

**111A-111B. Mammalian Physiology Laboratory. (2-2) I-II.**

Discussion—1 hour; laboratory—3 hours including independent carrel instruction. Prerequisite: course 110A-110B (may be taken concurrently). Selected experiments in depth on the neural, cardiovascular, respiratory, renal, and endocrine systems. Emphasis on modern conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

Mr. Burger, Mr. Mendel

**\*120A. Comparative Physiology. (3) I.**

Lecture—3 hours. Prerequisite: course 101 or 110A. Comparisons of physiological functions in the animal kingdom: neurophysiological mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels. Mrs. Woolley

**120B. Comparative Physiology. (3) II.**

Lecture—3 hours. Prerequisite: courses 101 and 101L. Comparisons of physiological functions in the animal kingdom: respiration and circulation. Mr. Smith, Mr. Rhode

**120C. Comparative Physiology. (3) III.**

Lecture—3 hours. Prerequisite: courses 101

\* Not to be given, 1972-1973.

and 101L. Comparisons of physiological functions in the animal kingdom: digestion and excretion. ———, Mr. Boda

**120D. Comparative Physiology. (3) I.**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: humoral integrative mechanisms. Mr. Lorenz

**121. Physiology of Reproduction. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B. The physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals. Mr. Cupps

**121L. Physiology of Reproduction Laboratory.**

(1) III.

Laboratory—3 hours. Recommended: course 121. Experiments on the reproductive systems of domestic animals including male and female gametes. Mr. Cupps

**130. Physiology of the Endocrine Glands. (5) III.**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 110B. Control of endocrine secretion and the physiological effects of the hormones. Mr. Moberg

**148. Principles of Environmental Physiology. (3) II.**

Lecture—3 hours. Prerequisite: course 101 or 110B (may be taken concurrently). Intensive treatment of basic aspects of environmental physiology; introduction to physiological control mechanisms; special emphasis on adaptation to the environment. Mr. Evans

**149. Environmental Physiology of Domestic Animals. (3) III.**

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. The influences of environmental factors on physiological processes related to domestic animals. Mr. W. O. Wilson

**190. Proseminar in Physiology. (3) II.**

Seminar—3 hours. Prerequisite: upper division standing. Relationships between form and function of living systems from the molecular to the organismal levels, with emphasis upon animal systems. Mr. B. W. Wilson

**197T. Tutoring in Physiology. (4) III.**

Lecture—4 hours; tutorial—1 hour. Prerequisite: course 110B with grade of B or better and consent of instructor. Intensive review of systemic physiology through leading a weekly tutorial session with a small group of students taking course 101. (Students will attend all course lectures plus a weekly discussion session with the course 101 instructors.)

The Staff (Mr. Boda in charge)

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Boda in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III. The Staff (Mr. Boda in charge)

**Graduate Courses**

**200A. Advanced General Physiology. (3) I.**

Lecture—3 hours. Prerequisite: course 100B or Zoology 120, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physicochemical bases of living systems with emphasis on recent investigations in membrane physiology. Offered in even-numbered years.

Mr. Deamer

**\*200B. Advanced General Physiology. (3) II.**

Lecture—3 hours. Prerequisite: course 100B or Zoology 120, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physicochemical bases of living systems with emphasis on recent investigations in cellular dynamics. Offered in odd-numbered years. Mr. B. W. Wilson

**200L. Advanced General Physiology Laboratory.**

(4) I.

Discussion—2 hours; laboratory—10 hours. Prerequisite: course 100B or Zoology 120, Biochemistry 101B or consent of instructor. The design, performance and interpretation of experiments in cellular and general physiology. Emphasis on growth, division, differentiation, permeability, conduction and other physiological phenomena. Experimental materials include free-living and somatic animal cells and animal tissues. Mr. B. W. Wilson, Mr. Goldner

**210A-210B. Advanced Systemic Physiology. (4-4)**

I-II.

Lecture—3 hours; one paper per week, independent self-study of course 110A-110B. Prerequisite: course 110B or consent of instructor. Advanced consideration of the physiology of the neuromuscular, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems. Messrs. Boda, Burger, Horowitz, Mendel

**211. Advanced Systemic Physiology Laboratory.**

(5) III.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 110B. Advanced treatment of systemic physiology, with special emphasis on current developments; laboratory exercises illustrating modern physiological concepts and procedures. Mr. Horowitz

**214. Neurophysiology. (4) II.**

Lecture—4 hours. Prerequisite: courses 110B, 111B; course 210B recommended. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity. Offered in odd-numbered years. Mr. Wagman

\* Not to be given, 1972-73.

**215. Neurophysiology Laboratory. (6) II.**

Discussion—2 hours; laboratory—12 hours. Prerequisite: course 214 (may be taken concurrently). Offered in odd-numbered years.

Mr. Wagman

**216. Neurophysiology Literature. (2) III.**

Discussion—2 hours. Prerequisite: course 214. Critical reading and group discussion of current and classic original papers in neurophysiology.

Mr. Wagman

**220. General and Comparative Physiology of Reproduction. (3) I.**

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B; Genetics 100B. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects. Mr. Ogasawara, Mr. Cupps

**225. Physiology of Lactation. (3) III.**

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B. The physiology and biochemistry of milk formation, with special reference to the metabolic pathways leading to the synthesis of milk in various species of mammals. Offered in even-numbered years. Mr. Baldwin

**\*231. Selected Topics in Neuroendocrinology. (2) II.**

Lecture—1 hour; discussion—1 hour. Pre-

requisite: course 130; or consent of instructor. Neural endocrine interactions; neuro-secretion; neural regulation of endocrine systems; hormonal modifications of neural development and activity. May be repeated once for credit. Offered in even-numbered years. Mrs. Woolley

**\*242. Physiological Rhythmicity. (1) I.**

Lecture—1 hour. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; tidal, lunar, and annual periods; periodic desynchronization. Mr. Winget

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Boda in charge)

**291. Seminar in General Physiology. (1) III.**

Seminar—1 hour. Discussion of selected topics concerning the physical and chemical processes of cells and tissues. The Staff (Mr. Boda in charge)

**298. Group Study. (1-5) I, II, III.**

The Staff (Mr. Boda in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Boda in charge)

**PLANT PATHOLOGY**

*Related Undergraduate Majors and Graduate Study.*—See pages 76, 91 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Upper Division Courses****120. Introduction to Plant Pathology. (4) I, III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2; Bacteriology 2 recommended. The nature, cause, and control of plant diseases. I. Mr. Campbell; III. Mr. English

**125. Diagnosis and Control of Plant Diseases. (4) III.**

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises. Mr. Nyland

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Grogan in charge)

**Graduate Courses****206A-206B. Diseases of Crop Plants. (5-4)****III—(Extra Session—Summer).**

Lecture—3-1 hours; laboratory—6-9 hours. Prerequisite: course 120; Botany 119. A clinical study of plant diseases with emphasis on etiology, epidemiology, diagnosis, and control. (Deferred grading only, pending completion of sequence.) The Staff (Mr. Ogawa in charge)

**208. Ecology of Plant Pathogens and Epidemiology of Plant Disease. (3) I.**

Lecture—3 hours. Prerequisite: course 120 or equivalent. Interaction between higher plants, plant pathogens, and the environment which is important in the occurrence and severity of plant disease. Emphasis is placed on the population dynamics and ecology of plant pathogens in the aerial and soil environment. Mr. Duniway

**210A-210B. Physiology and Biochemistry Plant Pathogens and Diseases. (3-3) I-II.**

Lecture—3 hours. Prerequisite: Biochemistry 101B or equivalent. A study of the fundamental concepts and current information on the

\* Not to be given, 1972-73.

physiology and biochemistry of plant pathogens and host-parasite relationships.

I. Mr. DeVay; II. Mr. Kosuge

**212. Physiology of Plant Pathogens Laboratory. (4) II.**

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biochemistry 101L or equivalent. Advanced laboratory methods and techniques applicable to the study of physiology and biochemistry of plant pathogens and host-parasite interaction.

Mr. DeVay, Mr. Kosuge

**215. Genetics of Plant Pathogens. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 120; Genetics 100B; Botany 119. Study of fundamental concepts, research techniques and current information on the genetics of plant pathogenic microorganisms; origin and determination of physiologic specialization, host resistance and virulence in the pathogen as related to the host-parasite interaction. Special emphasis on the fungi.

Mr. Webster

**224. Pathogenic Fungi. (5) III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 119. Morphology and taxonomy of plant pathogenic fungi.

Mr. Butler

**226. Plant Virology. (5) II.**

Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses; pathological cytology and anatomy; application of equipment and techniques used in research.

Mr. Shalla, Mr. Shepherd

**228. Bacterial Plant Diseases. (5) III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 120; Bacteriology 2 or equivalent; general biochemistry recommended. Study of plant diseases caused by bacteria. Funda-

mentals on the mechanisms of disease development and the biology of plant bacteria.

Mr. Kado

**230. Advanced Plant Virology. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 226; Biochemistry 101B, 101L. Advanced study for research specialists in plant virology with emphasis on the physical-chemical nature of virus components and their role in the biology of viruses.

Mr. Shepherd

**235. Advanced Plant Pathology. (4) I.**

Lecture—3 hours; discussion—3 hours. Prerequisite: consent of instructor. A study of the factors influencing pathogenicity and of the reaction of host plants to disease.

Mr. Grogan

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. (Satisfactory/Unsatisfactory grading only.)

I. Mr. Webster;

II. Mr. Webster; III. Mr. Grogan

**291. Seminar in Host-Parasite Physiology. (1) I, II.**

Seminar—1 hour. Prerequisite: course 120. (Satisfactory/Unsatisfactory grading only.)

I. Mr. Kosuge; II. Mr. Kado

**292. Seminar in Plant Virology. (1) II, III.**

Seminar—1 hour. Prerequisite: course 226. Review and evaluation of current literature and research in virology. (Satisfactory/Unsatisfactory grading only.)

II. Mr. Shalla; III. Mr. Campbell

**295. Seminar in Mycology. (1) I, III.**

Seminar—1 hour. Review and evaluation of current literature and research in mycology. (Same course as Botany 295. Satisfactory/Unsatisfactory grading only.)

I. Mr. Butler; III. Mr. Wells

**298. Special Group Study. (1-4) I, II, III.**

The Staff (Mr. Grogan in charge)

**299. Research. (1-9) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Grogan in charge)

**PLANT PHYSIOLOGY (A Graduate Group)**

Roger J. Romani, Ph.D., *Chairman of the Group*

Group Office, 2039 Wickson Hall

**Graduate Courses**

**298. Group Study. (1-5) I, II, III.**

Prerequisite: graduate standing. Organized

group study and discussion of topics relevant to the professional field of Plant Physiology.

The Staff (Mr. Romani in charge)

**299. Research. (1-6) I, II, III.**

Prerequisite: graduate standing.

The Staff (Mr. Romani in charge)

**PLANT SCIENCE**

*Major Advisers.*—See *Class Schedule* listing.

*Major Program.*—See page 91.

Questions pertaining to the following courses

should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses****1. Plants and Man. (3) I, II.**

Lecture—3 hours. Plants as a basic resource for food, fiber, shelter, and recreation; their use and effect on man, past, present, and future.

Mr. Howard

**2. Production of Cultivated Plants. (4) I, III.**

Lecture—1 hour; discussion—1 hour; laboratory—3 hours; V.A.S.T.—2½ hours.

Principles of plant production, improvement, propagation, harvesting, preserving, processing and marketing. This course will proceed by the Video-Audio-Self-Tutorial method with students making use of the learning facilities at their own convenience.

Mr. Flocker, Mr. Lider

**\*49. A Field Study of Agricultural Methods.**

(2) I, III.

Lecture—1 hour; five alternate Saturday field trips—8 hours each. Inspection of various agricultural operations, such as rice culture, vegetable production, nursery production, grape production, almond production, forest production, etc. (Passed/Not Passed grading only.)

Mr. Flocker, Mr. Lider

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Flocker in charge)

**Upper Division Courses****101. Ecology of Cultivated Plants. (3) II.**

Lecture—3 hours. Prerequisite: course 2 or consent of instructor. Plant population dynamics in cultivated ecosystems; the response of plant communities to light, temperature, soil, water, and air-pollution. Mr. Loomis, Mr. Rains

**101D. Ecology of Cultivated Plants. Discussion. (1) II.**

Discussion—1 hour. Prerequisite: course 101 (must be taken concurrently). Discussion of the subject matter of course 101.

Mr. Loomis, Mr. Rains

**102. Physiology of Cultivated Plants. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. The plant as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruiting of cultivated plants.

Mr. Sachs, Mr. Rappaport

**109. Principles of Plant Propagation. (3) III.**

Lecture—2 hours; laboratory—3 hours. Pre-

requisite: course 2 or Botany 2; or consent of instructor. Principles and practices of propagating horticultural plants with emphasis on anatomical and physiological relationships. Mr. Hartmann

**112. Postharvest Physiology and Handling of Horticultural Commodities. (3) I.**

Lecture—3 hours. Prerequisite: Botany 111B or consent of instructor. Course 112L is recommended to be taken concurrently. Physiological processes related to the maturation and senescence of fruits and vegetables; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres.

Messrs. Claypool, Morris, Nelson

**112L. Postharvest Physiology and Handling Laboratory. (2) I.**

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112. One or more field trips to observe commercial practices.

Messrs. Claypool, Morris, Nelson

**113. Plant Breeding. (3) II.**

Lecture—3 hours. Prerequisite: Genetics 100B. The principles of plant breeding.

Mr. Knowles, Mr. Hansche

**120. Introduction to Weed Science. (2) II.**

Lecture—2 hours. Prerequisite: Botany 2; Chemistry 8B. A general course covering the principles underlying the control of weeds.

Mr. Ashton

**Graduate Course****216. Principles of Plant Nutrition. (5) III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 111A or 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.

Mr. Epstein

**Related Courses:** Agronomy and Range Science, Environmental Horticulture, Plant Pathology, Pomology, Vegetable Crops, Viticulture and Enology.

**POLITICAL SCIENCE**

Edmond Costantini, Ph.D., *Chairman of the Department*

Department Office, 228 Voorhies Hall

**Professors:**

<sup>1</sup>Richard W. Gable, Ph.D.

Alexander J. Groth, Ph.D.

Charles M. Hardin, Ph.D.

\* Not to be given, 1972-73.

<sup>1</sup>Absent on leave, 1972-73.

Clyde E. Jacobs, Ph.D.

Lloyd D. Musolf, Ph.D.

John R. Owens, Ph.D.

Donald S. Rothchild, Ph.D.

Paul E. Zinner, Ph.D.

**Associate Professors:**

Edmond Costantini, Ph.D.  
 Joyce K. Kallgren, Ph.D.  
 Alvin D. Sokolow, Ph.D.  
 Larry L. Wade, Ph.D.  
 \*Marvin Zetterbaum, Ph.D.

**Assistant Professors:**

\*Kenneth I. Hanf, Ph.D.  
 Alan M. Jones, Jr., Ph.D.  
 Robert J. Lieber, Ph.D.  
 William H. Moseley, Ph.D.  
 Larry I. Peterman, Ph.D.  
 Randolph M. Siverson, Ph.D.  
 William S. Tuohy, Ph.D.  
 Geoffrey A. Wandesforde-Smith, Ph.D.

**Assistant Professor:**

Judith V. May, M.A. (*Acting*)

**Lecturers:**

Shahrough Akhavi, Ph.D.  
 Adaljiza S. Riddell, M.A.

**Departmental Major Advisers.**—Consult Departmental Office.

**Graduate Adviser.**—Mr. Hanf.

*The American History and Institutions Requirement* may be satisfied by any one of the following courses: 5, 5D, 100, 101, 102, 103, 104, 105, 106, 109A, 109B, 113, 128, 129, 160, 163. (See also page 33.)

**The Major Program**

**Lower Division Courses.**—Required: choose three from courses 2 or 2D, 3 or 3D, 4 or 4D, 5 or 5D, and two from History 4A, 4B, 4C.

**Upper Division Courses.**—Required: 36 units in Political Science with a minimum of two courses in each of three fields, which must be selected from at least two of the following groups.

Group A. Political theory (courses 110–119).

Group B. American government (courses 100–109B); political parties (courses 160–169); public law (courses 150–159); public administration (courses 180–189).

Group C. Comparative government (courses 140–149, 170–179); international relations (courses 120–139).

Political Science students *must* maintain at least a grade C average in the major.

**Graduate Study.**—The Department offers programs of graduate study leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion is available in the department office.

**Teaching Major.**—Requirements for the teaching major are the same as for the departmental major.

**Teaching Minor.**—Thirty units of political science to be selected in consultation with the subject representative.

**Subject Representative:** Mr. Jones

**Lower Division Courses****2. Introduction to Comparative Politics. (4) I, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 2D. 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.

Mr. Groth

**2D. Seminar in Comparative Politics. (4) II.**

Seminar—2 hours; seminar sections or student-faculty conferences—2 hours. Prerequisite: open to lower-division students with consent of instructor; not open to students having credit for course 2. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Individual or team research projects will be required and constitute a major part of the course.

The Staff

**3. International Relations. (4) II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 3D. Rise and development of the Western State systems; problems of nationalism and imperialism, particularly in connection with the peace settlement following World War II.

Mr. Lieber, Mr. Siverson

**3D. Seminar in International Relations. (4) I.**

Seminar—2 hours; seminar sections or student-faculty conferences—2 hours. Prerequisite: open to lower-division students with consent of instructor; not open to students having credit for course 3. Selected problems in International Relations. Individual or team research projects will be required.

The Staff

**4. Basic Concepts in Political Theory. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 4D. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers.

Mr. Peterman, Mr. Zetterbaum

**4D. Seminar in Basic Concepts of Political Theory.**

(4) III.

Seminar—2 hours; seminar sections or student-faculty conferences—2 hours. Prerequisite: open to lower-division students with consent of instructor; not open to students having credit

\*Absent on leave, fall quarter 1972.

for course 4. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of major political philosophers. Individual or group research projects will be required.

Mr. Peterman, Mr. Zetterbaum

### 5. Contemporary Problems of the American Political System. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 5D. In depth treatment of selected problems and issues of American politics, governmental institutions, and policies. The Staff

### 5D. Seminar in Contemporary Problems of the American Political Systems. (4) III.

Seminar—2 hours; seminar sections or student-faculty conferences—2 hours. Prerequisite: open to lower-division students with consent of instructor; not open to students having credit for course 5. In depth treatment of selected problems and issues of American politics, governmental institutions, and policies. Individual or group research projects will be required.

The Staff

### 98. Directed Group Study. (1-5) I, II, III.

Directed group study for lower division students in research problems in political science.

The Staff (Mr. Gable in charge)

#### Upper Division Courses

### 100. Local Government and Politics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 (or 1A) or consent of instructor. The politics and government of local communities in the United States, including cities, counties, and special districts. The expression and resolution of political conflict in communities, local government structure and functions, municipal reform, and community power structures.

Mr. Sokolow

### 101. Local Government and Politics: Urban Problems. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. The politics and government of urban communities in the United States. Special attention to the problems of metropolitan and regional areas.

Mrs. May

### 102. Local Politics and Government: Politics and Urban Poverty. (4) III.

Lecture—4 hours. Explores the attributes of low-resource politics, with emphasis upon the position of blacks and ethnic minorities in northern urban areas. Special attention paid to the interaction between social science theory and social policy in bringing about social change in various policy areas.

Mrs. May

### 103. Comparative State Government and Politics.

#### (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students who have credit in course 104. The comparative study of the government and politics of American states, including their constitutional frameworks, their participation in the federal system, the dynamics of governmental institutions, and the behavior of parties and interest groups.

Mr. Sokolow

### 104. California State and Local Government. (4) II.

Lecture-discussion—4 hours. California's constitution, party system, legislature, executive agencies, administration, courts, major public programs and problems, state-local relations, county, city, school and special district governments.

### 105. The Legislative Process. (4) I.

Lecture—3 hours; discussion—1 hour. An analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies.

Mr. Owens

### 106. The Presidency. (4) II.

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.

Mr. Hardin

### 107. Environmental Politics and Administration.

#### (4) III.

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.

Mr. Wandesforde-Smith

### 108. Policy and Politics in Agriculture and Water.

#### (4) I.

Lecture—3 hours; discussion—1 hour. Agricultural and water policies and their political implications, with chief emphasis upon the United States and with special attention to water policies in California.

Mr. Hardin

### 109A. Public Policy and the Governmental Process.

#### (4) II.

Lecture—3 hours; term paper. Prerequisite: course 5 (or 1A or 1B) or consent of instructor. An examination of the processes of formulating public policy. Methods of policy making by executive, legislative, judicial, interest groups,



and parties with special emphasis upon socio-psychological approaches. Mr. Wade

**109B. Public Policy and the Governmental Process. (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 5 (or 1A or 1B), 109A, or consent of instructor. An examination of the processes of formulating public policy. Methods of policy making through collective decision-making exchange, competition, bargaining, coalition-formation and the provision of public goods, resource transfers and social change. Mr. Wade

**110. Contemporary Political Science. (4) II.**

Lecture-discussion—4 hours. History, nature, and methodology of the discipline; the problems, schools of thought, and trends within the field at present. Offered in even-numbered years.

**111. Systematic Political Science. (4) III.**

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. Mr. Siverson

**\*112. Contemporary Democratic Theory. (4) II.**

Lecture—3 hours; discussion—1 hour. The 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. Mr. Zetterbaum

**113. American Political Thought. (4) III.**

Lecture—4 hours. Origins and nature of American political thought. The principles of American thought as they emerge from the founding period to the present. Offered in odd-numbered years. Mr. Peterman

**\*115. Medieval Political Thought. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 118A. Offered in even-numbered years. Mr. Peterman

**116. Foundations of Political Thought: A Study in Depth of a Major Political Philosopher. (4) II.**

Lecture-discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

Mr. Peterman, Mr. Zetterbaum

**117A. Marxism. (4) I.**

Lecture-discussion—4 hours. Historical background and context of Marxism. Exploration of Marx's writing toward understanding his significance in the nineteenth century and his relevance today. Offered in odd-numbered years.

**\*117B. Contemporary Marxism. (4) II.**

Lecture-discussion—4 hours. Marxism after Marx to the present, with reference to Engels, Kautsky, Bernstein, Lenin, and contemporary

figures and movements. Special attention to Marxism in America. Communism and democratic socialism as legacies of Marx related to contemporary problems. To be offered in even-numbered years.

**118A. History of Political Theory. (4) I.**

Lecture—3 hours. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas. Mr. Peterman

**118B. History of Political Theory. (4) II.**

Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke.

Mr. Zetterbaum

**118C. History of Political Theory. (4) III.**

Lecture—3 hours; research assignment. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre.

Mr. Zetterbaum

**\*119. Modern Political Thought. (4) III.**

Lecture-discussion—4 hours. The search for community from Marx to the present. Communism, fascism, capitalism, socialism, irrationalism, immorality, and existentialism as responses to the decline of liberalism and the nature of modern problems. Offered in odd-numbered years.

**\*122. International Law. (4) III.**

Lecture—4 hours. Selected topics in international law: territory, sovereign immunity, responsibility, the peaceful settlement or non-settlement of international disputes. Mr. Jacobs

**123. Theories of International Politics. (4) II.**

Lecture—4 hours. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxist-Leninist theory, systems theory, and decision-making analysis.

Mr. Lieber

**\*124. International Organization. (4) I.**

Lecture—3 hours; discussion—1 hour. The preservation of world peace through collective security arrangements. Analysis of the conditions under which international organizations can or cannot preserve peace, through examination of the record of the United Nations, League of Nations, and more restricted security organizations.

Mr. Jones

**125. National Security Policy. (4) II.**

Lecture—3 hours; research assignment. The development of American military policy since 1945. An analysis of the policy of deterrence and the assumptions upon which it is based.

\* Not to be given, 1972-73.



The effects of nuclear weapons upon the conduct of war, alliance systems, and the international system. The prospects of security and stability through arms control. Mr. Siverson

**126. Arms Control and Disarmament. (4) III.**

Lecture—3 hours; discussion—1 hour. Recommended: course 3. Examination of the proposals, problems, and achievements of various efforts to limit the magnitude, type, possession and use of major weapons systems in the period since World War II. Mr. Jones

**128. Recent American Foreign Policy. (4) I.**

Lecture—3 hours; discussion—1 hour. Development of American foreign policy in the twentieth century, with emphasis on the transformation of policy during and after World War II. Examination of the internal and international factors influencing policy adoption, retention, and change. Mr. Jones

**129. Conduct of American Foreign Policy. (4) II.**

Lecture—3 hours; discussion—1 hour. Examinations of roles of individuals and organizations, in the process of U. S. foreign-policy formulation since World War II, relying extensively on case studies and memoirs to illuminate the nature of intra-governmental debate on policy. Mr. Jones

**131. Soviet Foreign Policy. (4) III.**

Lecture—3 hours; discussion—1 hour. The conduct of Soviet foreign relations in contemporary world affairs; ideology and power as mainsprings of policy; foreign policy as an instrument of revolution; the role of diplomacy, economic aid and nuclear armaments. Offered in odd-numbered years. Mr. Zinner

**\*132. The Role of the United States in the Far East. (4) I.**

Lecture—4 hours. Recommended: course 3. A survey of the role the United States has played in the Far East through an examination of such topics as America's participation in Asiatic westernization, United States Far Eastern policy, Oriental attitudes toward the United States. An evaluation of present problems. To be offered in odd-numbered years. Mrs. Kallgren

**134. International Relations in Africa. (4) III.**

Lecture—3 hours; discussion—1 hour. Inter-African state relations, pan-Africanism, regional integration, policies toward South Africa, and relations between African and major non-African powers. Mr. Rothchild

**137. Nationalism and Imperialism. (4) III.**

Lecture—4 hours. Recommended: course 3. The theory of nation building illustrated by Western and non-Western experience. Offered in even-numbered years. Mrs. Kallgren

\* Not to be given, 1972-73.

**\*139. International Relations in Western Europe. (4) III.**

Lecture—4 hours. Study of the emerging unity in Western Europe and its implications for the North Atlantic area. Offered in even-numbered years. Mr. Lieber

**\*140A. Comparative Politics: Ideology, Institutions and Political Process in the Modern State. (4) I.**

Lecture—3 hours. Prerequisite: consent of instructor. Ideological orientations of democratic, socialist, communist, fascist, and other states as related to their institutions and political processes. Mr. Groth

**\*140B. Comparative Politics: Political Systems and Public Policies. (4) II.**

Seminar—3 hours; special assignments. Prerequisite: course 140A or consent of instructor. Critical evaluation of the linkage between the framework and process of policy-making on the one hand, and the actual results of this process on the other; a comparative, cross-national perspective will be employed. Mr. Groth

**141. Communist Political Systems. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 2D 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. Mr. Zinner

**142. Revolution and Political Change. (4) III.**

Lecture—4 hours. The attributes, problems, means, and impact of political change through evolution and revolution in the twentieth century. Emphasis upon movements and systems representative of communism, fascism, and nationalism. Mr. Groth

**143. Latin American Politics. (4) I.**

Lecture—4 hours. Prerequisite: course 2 or 2D and a basic economics course, or consent of instructor. Survey of political processes in Latin America, with special attention to basic political problems, and major socio-political groups in three nations: Argentina, Brazil and Mexico (a fourth country may be added). Mr. Tuohy

**144. British Government and Politics. (4) II.**

Lecture—3 hours; discussion—1 hour. The British political system, party and pressure group politics, political culture, evolution of the British Commonwealth. Offered in odd-numbered years. Mr. Lieber

**145. Government and Politics in Emergent Nations. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 2D. Conceptual study of

problems of political organization and procedure in the context of rapid change engendered by social revolution in "emergent countries" and liberation from colonial oppression. Offered in even-numbered years. Mr. Zinner

**146A. African Governments and Politics. (4) I.**

Lecture—4 hours. An analysis of political systems in Africa south of the Sahara.

Mr. Rothchild

**146B. African Governments and Politics. (4) II.**

Lecture—4 hours. A continuation of course 146A.

Mr. Rothchild

**\*147A. Western European Governments: France and Italy. (4) I.**

Lecture—4 hours. The evolution and contemporary nature of French and Italian political institutions.

Mr. Groth

**\*147B. Western European Government: Germany. (4) II.**

Lecture—4 hours. Comparative study of the politics and institutions of constitutional and totalitarian government in Germany since 1930. Current problems of a divided Germany.

Mr. Hanf

**148A. Government and Politics in East Asia. (4) I.**

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea. Emphasis upon such topics as nationalism, political modernization, and ideology up to World War II.

Mrs. Kallgren

**148B. Government and Politics in East Asia. (4) II.**

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea since World War II, with emphasis upon political modernization, ideology, and nationalism.

Mrs. Kallgren

**149. International Communism. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 or 2D, or 3 or 3D, or consent of instructor. The international communist movement: ideology, organization, strategy. Relations among communist parties; problems of leadership and social composition; the Sino-Soviet conflict and its effects on revolutionary struggle. Offered in even-numbered years.

Mr. Zinner

**\*150. Jurisprudence. (4) II.**

Lecture—4 hours. An analysis of the nature and functions of law. Particular attention will be directed to law as an instrument of social control and the relationship between law and morality. Offered in even-numbered years.

**\*151. Civil Rights and the Constitution. (4) III.**

Lecture—4 hours. Prerequisite: course 5 or 5D (or 1A) or consent of instructor. The constitutional rights and political possibilities of

minority groups. Citizenship in the American federal system. Offered in even-numbered years.

**152. The Politics of Justice. (4) I.**

Lecture—3 hours; discussion—1 hour. Criminal and civil justice in America with emphasis upon such problems as legal representation for the poor, control of law enforcement processes, and problems in imprisonment and rehabilitation.

Mr. Moseley

**156. Administrative Law. (4) I.**

Lecture—1 hour; discussion—3 hours. The political-legal factors in the decision-making processes of administrative legislation, adjudication and discretion; legal controls as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action.

Mr. Musolf

**157A. American Constitutional Law. (4) II.**

Lecture—1 hour; discussion—3 hours. Prerequisite: courses 5 or 5D; or consent of instructor. Judicial review, jurisdiction of the federal courts, interstate and foreign commerce, and taxation.

Mr. Jacobs

**157B. American Constitutional Law. (4) III.**

Lecture—1 hour; discussion—3 hours. Prerequisite: course 157A. The Bill of Rights of the Federal Constitution. Students, either individually or in teams of two members, prepare a written argument in a hypothetical case raising current constitutional issues. In lieu of a standard final examination, an oral defense of his written argument is presented by each student.

Mr. Jacobs

**\*158. American Legal Thought and Institutions. (4) III.**

Lecture—4 hours. Prerequisite: course 5 or 5D (or 1A or 1B), or consent of instructor. Topics in the development of American legal thought and institutions: reception of the common law; church-state controversies; the role of judge and jury; federalism and individual rights; natural law and economic regulation; law and the frontier. Offered in odd-numbered years.

**159. Judicial Behavior. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or 5D (or 1A) or consent of instructor. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision-making. Relationships among courts and other decision-making bodies. Offered in even-numbered years.

**160. American Political Parties. (4) II.**

Lecture—3 hours; discussion—1 hour. An analysis of the structure and operations of the party system in the United States; party functions and organizations, nomination processes,

\* Not to be given, 1972-73.

campaigns and elections, party trends and reforms. Mr. Owens

**161. Comparative Political Parties. (4) III.**

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.

Mr. Hardin

**162. Elections and Voting Behavior. (4) I.**

Lecture—3 hours; discussion—1 hour. Recommended: course 5. An analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group determinants of voting.

Mr. Owens

**163. Group Politics. (4) II.**

Lecture—3 hours; discussion—1 hour. Groups, institutions, and individuals, especially in American politics. Historical and analytical treatment of group theories as applied to interest groups (especially labor, business, agriculture, science, military); to racial, ethnic, and sectional groups; to parties, public and legislative groups, bureaucracies.

Mr. Hardin

**164. Public Opinion. (4) I.**

Lecture—3 hours; discussion—1 hour. The nature of public opinion in America, as it is "supposed to be" and as it is. The distribution of opinions among different publics. Apathy, extremism, and conformity. How children learn about politics.

Mr. Costantini

**165. Mass Media and Politics. (4) II.**

Lecture—3 hours; discussion—1 hour. The organization of and decision making within the media; media audiences and the effect of the media on attitudes and behavior; the relationship of the government to the media (censorship, secrecy, freedom of the press, government regulation); the media in election campaigns.

Mr. Costantini

**167. The Black Man in American Politics. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior, senior or graduate status. A critical review of the role of the black man in American politics; the rise of the black politician in the South; his role in the civil rights revolution; campaign techniques in the urban ghetto.

**168. Chicano Politics. (4) I.**

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 political environment.

Mrs. Riddell

**169. Special Studies in Politics. (4) I, II, III.**

Seminar—4 hours. Prerequisite: consent of

instructor and upper division standing. An intensive examination of one or more special problems appropriate to American politics. The Staff

**170. Comparative Interethnic Relations. (4) II.**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Seminar on interethnic relations which compares and contrasts interactions between racial, linguistic, cultural, religious or regional groups. Intergroup cleavages and conflicts as well as processes and institutions fostering interaction are analyzed in comparative perspective.

Mr. Rothchild

**171. Politics Through the Novel. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or its equivalent or consent of instructor. A comparative analysis of the use of literature as a means of sociopolitical expression, perception, and portrayal of purposes in political action. European literature, especially British, French and Italian, from the Napoleonic to the present time.

Mr. Moseley

**\*172. Politics and Processes of Foreign Aid. (4) I.**

Lecture—3 hours; discussion—1 hour. Comparative analysis of multilateral and bilateral assistance to developing nations; perspectives of donor and recipients; politics, types, and instruments of aid.

Mr. Gable

**174. Political Thinking and Consciousness. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. How and why people think about phenomena as political, and what society does in order to shape that thinking and make "good citizens." The emphasis is on how social conditions influence political thinking and behavior; cases will be taken from the politics of minority groups, American youth, radical groups, attempts at achieving cultural revolutions.

Mr. Tuohy

**\*175. Government and the Economy. (4) I.**

Lecture—3 hours; discussion—1 hour. The legal and political environment of economic controls; types and techniques of regulating and assisting various sectors of the economy; policy alternatives and administrative processes; the search for the public interest.

Mr. Gable

**176. Political Development in Modernizing Societies. (4) III.**

Lecture—1 hour; discussion—3 hours. Nature and sequence of political development; its economic and social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration. Mr. Gable

**178. Community Politics: Power and Influence.**

(4) I.

Lecture—4 hours. Prerequisite: courses 5,

\* Not to be given, 1972-73.

5D, or 2, or consent of instructor. Consideration of political power in local communities; emphasis on empirical bases for making judgments on the nature and location of such power, as well as ideological assumptions reflected in the literature. Offered in even-numbered years.

Mr. Riddell

**\*180. Bureaucracy in Modern Society. (4) I.**

Lecture—3 hours; special assignments. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy.

Mrs. May, Mr. Hanf

**181. The American Administrative System. (4) I.**

Lecture—3 hours; research assignment. Introduction to the development and organization of administrative institutions in the American federal system; focus on design and reorganization, and the relationship of structure to performance, at the national, subnational, and local levels.

The Staff

**182. Administrative Decision Making and Public Policy. (4) II.**

Lecture—3 hours; special assignments. Approaches to and models of administrative decision making; techniques of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administrative reform.

Mrs. May

**183. Administrative Behavior. (4) II.**

Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about behavior in organizations.

Mr. Musolf

**\*185A. Comparative Administration: Developing Nations. (4) II.**

Lecture—2 hours; discussion—2 hours. Theories and models of comparison; the setting of administrative systems; structure and functioning of administrative systems in newly developing nations; role of bureaucracy in social development and nation-building; foreign assistance to administrative development. Mr. Gable

**\*185B. Comparative Administration: Developed Nations. (4) III.**

Lecture—3 hours; research assignment. Analysis of the role of public bureaucracy in Communist and non-Communist political systems.

Mr. Hanf

**\*186. Urban Administration. (4) III.**

Lecture—3 hours; discussion—1 hour. Role of the professional administrator in the urban political and social environment; application of

modern management concepts to urban governmental organizations; and examination of persistent and emerging problems and issues.

**187. Administrative Theory. (4) III.**

Lecture—3 hours; discussion—1 hour. A historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision making, bureaucracy, authority and power, communication and control; an examination of the role of government bureaucracies in the total society.

Mr. Hanf

**190. Internship in Public Affairs. (1-4) I, II, III.**

Prerequisite: consent of instructor. Supervised internship and study in political, governmental, or related organizations. May be repeated once for credit. (Passed/Not Passed grading only.)

Mr. Sokolov

**192A-192B. International Relations. (4-4) II-III.**

Seminar—4 hours. Prerequisite: consent of instructor. Selected problems of international relations evaluated in an interdisciplinary context. Readings, discussion, papers. Required of all international relations majors in their senior year.

The Staff (Mr. Zinner in charge)

**194H. Special Study for Honors Students.**

(1-5) I, II, III.

Prerequisite: honors status. A program of research, culminating in the writing of a senior honors thesis, under the direction of a faculty adviser.

Mr. Jones

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses**

**202. American State and Local Government. (4) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: courses 100, 101, 103 or consent of instructor. The analysis of American state and local government and politics. Special emphasis on community power structure, federalism, state legislatures, and state administration.

Mr. Wandesforde-Smith

**\*203. Urban Politics. (4) III.**

Seminar—4 hours. Investigate changes in the relationship between political and socioeconomic structures and policy outcomes in urban and metropolitan areas using historical as well as contemporary source materials. Develop propositions, models and theories accounting for these changes in the past, present, and future.

Mrs. May

\* Not to be given, 1972-73.

**\*213. Problems of Classical and Medieval Political Thought. (4) III.**

Seminar—3 hours. Prerequisite: consent of instructor. Concentrated study of the political thought of selected political thinkers of classical and medieval periods. Mr. Peterman

**215. Basic Problems of Political Theory. (4) II.**

Lecture—3 hours. Prerequisite: 4 units of political theory or consent of instructor. An examination of the fundamental assumptions underlying various approaches to an understanding of politics, emphasizing the scientific or value-free school, the historicist school, and the contributions of analytic philosophy. Offered in even-numbered years. Mr. Zetterbaum

**\*218. Political Theory. (4) I.**

Seminar—3 hours. Mr. Zetterbaum

**223. International Relations. (4) I.**

Seminar—3 hours. Mr. Lieber

**\*224. International Organization. (4) I.**

Seminar—3 hours. \_\_\_\_\_

**\*225. The International System. (4) II.**

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 generation and analysis. Mr. Siverson

**\*230. American Foreign Policy. (4) I.**

Seminar—3 hours. Mr. Jones

**\*240. Democracy and Dictatorship. (4) III.**

Lecture—3 hours. Prerequisite: one upper division course in comparative government, or consent of instructor. Analytical study of differences and similarities in the political process under democratic and dictatorial government. Offered in odd-numbered years. Mr. Zinner

**\*241A. Communist Political Systems. (4) I.**

Seminar—3 hours. Prerequisite: course 141 or equivalent and consent of instructor. Systematic analysis of selected topics dealing with the political process of Communist political systems. Mr. Zinner

**\*241B. Communist Political Systems. (4) II.**

Seminar—3 hours. Prerequisite: course 141 or equivalent and consent of instructor. Systematic analysis of selected topics dealing with the political process of Communist political systems. Mr. Zinner

**242. Seminar in Comparative Politics. (4) II.**

Seminar—3 hours. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics. The Staff

**\*246. Government in Africa. (4) II.**

Seminar—3 hours. Mr. Rothchild

**247A. Western European Governments. (4) II.**

Seminar—3 hours. Contemporary problems, with emphasis on France and Italy. Mr. Groth

**\*247B. Western European Governments. (4) III.**

Seminar—3 hours. Prerequisite: consent of instructor. Contemporary problems, with emphasis on Germany. The Staff

**\*248. The Far East. (4) III.**

Seminar—3 hours. Selected contemporary problems of government and international relations in the Far East. Mrs. Kallgren

**260. Political Parties. (4) I.**

Seminar—3 hours. Mr. Hardin

**\*261. Political Behavior. (4) III.**

Seminar—3 hours. Mr. Owens

**264. Seminar in Public Opinion. (4) III.**

Seminar—3 hours. Mr. Costantini

**266. The American Political System. (4) I.**

Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics. Mr. Wade

**\*267. Environmental Public Policy. (4) III.**

Seminar—3 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature. Mr. Wandesforde-Smith

**\*270. National and Regional Integration. (4) I.**

Lecture—3 hours. Prerequisite: one upper division course in comparative government or international relations, or consent of instructor. An examination of the means and motives of regional integration as well as the problems involved in operating and maintaining federations. Classical federal experience and experiments in developing countries will be considered. Mr. Rothchild

**\*272. Latin American Politics. (4) III.**

Seminar—3 hours. Prerequisite: consent of instructor. Intensive study of topic chosen each year by instructor. Normally students will focus on specific country (e.g., Chile in 1971), although other possible foci include land reform and politics, or the U. S. in Latin America. Students conduct research projects to their interests. Mr. Tuohy

**282. Concepts and Problems in Public Administration. (4) II.**

Discussion—3 hours. The nature of adminis-

\* Not to be given, 1972-73.

trative processes in modern society; analysis of complex organizations; contemporary management practices and processes; and means of controlling bureaucracy. Offered in even-numbered years. Mr. Gable

**\*286. Administrative Values. (4) III.**

Seminar—3 hours. An examination of American administrative values. Offered in odd-numbered years. Mr. Musolf

**\*291. Seminar in American Constitutional Law. (4) III.**

Seminar—3 hours. Prerequisite: course 157B or consent of instructor. Mr. Jacobs

**296. Selected Problems in State and Local Government. (4) II.**

Seminar—3 hours. Prerequisite: course 202 or consent of instructor. Selected topics in state and local government and politics. Mrs. May, Mr. Sokolow

**POMOLOGY**

*Related Undergraduate Major.*—See page 91.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Course**

**3. Citrus and Other Subtropical Fruits. (3) III.**

Lecture—3 hours. The production of the subtropical fruits including avocados, dates, olives, and citrus with special emphasis on citrus. A study of the fundamental information relating to orchard management as applied to these fruits. Mr. Catlin

**Upper Division Courses**

**100A. Principles of Pomology. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Origin, history, distribution, and adaptation of fruit and nut plants; their structure and function in relation to environment and cultural practices. Mr. Kester

**100B. Principles of Pomology. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Development of the vegetative structure of fruit and nut plants; the physiological responses to environment and cultural modification. Mr. Crane

**100C. Principles of Pomology. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Flowering and fruiting; the nature and development of buds, flowers, and fruits in relation to the culture of fruit and nut plants and to their environment. Mr. Griggs

**297. Internships in Political Science. (2) I, II, III.**

Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc., including participants in the State and Local Government Internship Program. Deals with the application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit. The Staff

**298. Group Study. (1-4) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Chairman in charge)

**299. Research. (1-12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Chairman in charge)

**299D. Directed Reading. (1-6) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Chairman in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Bringhurst in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.  
The Staff (Mr. Bringhurst in charge)

**Graduate Courses**

**201. Biochemistry and Physiology of Fruits. (3) III.**

Lecture—3 hours. Prerequisite: Biochemistry 101B; Botany 111B; or consent of instructor. Biochemical and physiological phenomena of growth, maturation, ripening, and senescence of fruit. (Open to qualified undergraduates.) Mr. Maxie

**210. Fruit Morphology. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. The development of flower, fruit, and seed structures of representative fruit types. Miss Bradley

**216. Physiology of Fruit Plants. (4) II.**

Lecture—4 hours. Prerequisite: Botany 111B or consent of instructor. Physiological processes in the growth and development of fruit plants; metabolic relationships; influence of environment and culture. The Staff (Mr. Uru in charge)

**290. Seminar. (1) I, II, III.**

Seminar—1 hour.  
The Staff (Mr. Catlin in charge)

**298. Group Study. (1-5) I, II, III.**

The Staff (Mr. Bringhurst in charge)

**299. Research. (1-9) I, II, III, (Summer).**

The Staff (Mr. Bringhurst in charge)

Related Courses: see Plant Science 112, 112C.

**PORTUGUESE—See Spanish****PSYCHIATRY—See Medicine****PSYCHOLOGY**

Robert Sommer, Ph.D., *Chairman of the Department*  
Department Office, 149 Young Hall

*Professors:*

William F. Dukes, Ph.D.  
Joseph Lyons, Ph.D.  
William A. Mason, Ph.D.  
Robert Sommer, Ph.D.

*Associate Professors:*

Jarvis R. Bastian, Ph.D.  
<sup>1</sup>Stanley Coopersmith, Ph.D.  
Dale F. Lott, Ph.D.  
Gary D. Mitchell, Ph.D.  
Thomas Natsoulas, Ph.D.  
<sup>2</sup><sup>3</sup>Theodore E. Parks, Ph.D.  
Charles T. Tart, Ph.D.  
Edward D. Turner, Ph.D.

*Assistant Professors:*

Alan C. Elms, Ph.D.  
Albert A. Harrison, Ph.D.  
Kenneth R. Henry, Ph.D.  
Carl C. Jorgensen, Ph.D. (*Psychology and Sociology*)  
Neal A. Kroll, Ph.D.  
Robert M. Murphey, Ph.D.  
Karen E. Paige, Ph.D.

◇ ◇ ◇

*Assistant Professor:*

Donald H. Owings, B.A. (*Acting*)

*Lecturers:*

Michael H. Kellicutt, M.A.  
Rosalie Lynn, Ph.D.  
Herbert N. Weissman, Ph.D.

*Departmental Major Advisers.*—Mr. Bastian, Mr. Coopersmith, Mr. Elms, Mr. Harrison, Mr. Henry, Mr. Jorgensen, Mr. Kellicutt, Mr. Kroll, Mr. Lott, Mr. Lyons, Mr. Mason, Mr. Mitchell, Mr. Murphey, Mr. Natsoulas, Mr. Owings, Ms. Paige, Mr. Parks, Mr. Sommer, Mr. Tart, Mr. Turner.

*The Major Program**All Majors*

Lower Division Courses.—Required: Psychology 1A, 1B, 1C.

Upper Division Courses.—Required: 36 units of advanced work in psychology (courses numbered above 99).

*Bachelor of Arts Degree*

Lower Division Courses.—Required: Mathematics 13 (must be taken prior to the junior year unless departmental permission obtained) and mathematics 15, either Biological Sciences 1 or a combination of Biological Sciences 10 and one course from the following: Anthropology 1, Physiology 10, Genetics 10.

Upper Division Courses.—Required: Two courses from one of the following groups and three courses from the other:

(Group A) Psychology 108, 130, 131, 134, 150.

(Group B) Psychology 112, 145, 147A, 168.

Before graduation, the student must complete one course in sociology or cultural anthropology and one course in philosophy. These may be taken at any time during the four years and may be either lower or upper division courses.

*Bachelor of Science Degree*

Lower Division Courses.—Required: Mathematics 13 (must be taken prior to the junior year unless departmental permission obtained) and Mathematics 15, 16A, 16B; Chemistry 1A, 1B; Biological Sciences 1; Physiology 2, 2L; Physics 2A, 2B, 2C.

Upper Division Courses.—Required: Genetics 100A; Zoology 105; Psychology 108, 150; any two of the following: Psychology 112, 145, 147A, 168.

Before graduation, the student must complete 8 units of philosophy and 8 units of sociology and/or cultural anthropology. These may be taken at any time during the four years and may be either lower or upper division courses.

*Honors and Honors Program* (see page 148).—The honors program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

*Teaching Major.*—Requirements for the teaching major are the same as for the departmental major.

*Teaching Minor.*—Any thirty units in psychology.

*Subject Representative:* Mr. Turner.

<sup>1</sup> Absent on leave, 1972–73.

<sup>2</sup> Absent on leave, fall quarter 1972.

<sup>3</sup> Absent on leave, winter quarter 1973.



## Lower Division Courses

**1A. Introduction to Psychology: General Processes.** (5) I, II, III.

Lecture—5 hours. The experimental psychology of general behavioral and mental processes treated in order of increasing complexity. Major topics include emotion, conditioning, perception, attention, human learning, memory, language and cognition. The Staff

**1B. Introduction to Psychology: Biological Bases of Behavior.** (5) I, II, III.

Lecture—5 hours. Prerequisite: course 1A. An analysis of behavior in terms of its evolutionary, genetic, and physiological determinants. The Staff

**1C. Introduction to Psychology: Personality and Social Psychology.** (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. The normal and abnormal personality. The influence of social factors on the individual. The Staff

**‡10. General Psychology.** (4) I, II, III.

Lecture—4 hours. Survey of the basic principles of psychology and their empirical foundations. For students who do not plan to major in psychology. The Staff

**98. Directed Group Study.** (1-5) I, II, III.

By prior arrangement with individual instructor. The Staff (Chairman in charge)

**99. Special Study for Lower Division Students.** (1-5) I, II, III.

By prior arrangement with individual instructor. The Staff (Chairman in charge)

## Upper Division Courses

**‡103. Advanced Quantitative Description of Behavior.** (5) I, II, III.

Lecture—5 hours. Prerequisite: Mathematics 13 and 15, or consent of instructor. Summary, inference, and prediction from psychological data, with emphasis on the theoretical aspects. Messrs. Kellicutt, Turner, Kroll

**107. Psychometric Methods.** (4) III.

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. General principles of psychological measurement; psychophysical methods; scale, and correlational techniques in psychological measurement; reliability, validity. Mr. Moore, Mr. Turner

**‡108. Physiological Psychology.** (5) I, II, III.

Lecture—5 hours. Prerequisite: course 1B; or course 1A and upper division standing in a biological science. An analysis of some of the contributions of neuroanatomy, neurophysiology,

and neurochemistry to a mechanistic understanding of human and animal behavior. A reductionistic approach within a behavioristic framework. Mr. Henry

**112. Developmental Psychology.** (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction. This course not recommended for students who have taken Human Development 131. Mr. Coopersmith, Mr. Mitchell

**120. History of Psychology.** (4) III.

Lecture—4 hours. Prerequisite: course 1A and upper division standing. The historical development of psychological theories and research. Mr. Bastian

**129. Sensory Processes.** (5) I.

Lecture—5 hours. Prerequisite: course 1B; upper division standing in psychology; or consent of instructor. The sensory capabilities of man and animals. Behavioral evidence for sensory capacity and relationships to the structure and function of the sense organs. Mr. Henry

**130. Human Learning and Memory.** (5) I, II, III.

Lecture—5 hours. Prerequisite: course 1A and Mathematics 13; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data. Mr. Kroll, Mr. Parks

**131. Perception.** (4) I, II, III.

Lecture—3 hours; independent library work. Prerequisite: course 1A. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events. Mr. Natsoulas, Mr. Turner

**132. Language and Cognition.** (4) I.

Lecture—4 hours. Prerequisite: course 1A and 6 units of upper division work in psychology. Psychological examination of linguistic actions, their development and role in human conduct; analysis of their contribution to perception and thought. Mr. Bastian

**†134. Animal Learning and Motivation.** (5) I, III.

Lecture—5 hours. Prerequisite: courses 1A, 1B, and Mathematics 13, or consent of instructor. An examination of several theories of animal conditioning and their consequences for current motivational microtheories. Mr. Kellicutt

**‡135. Psychology of Consciousness.** (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data. Mr. Natsoulas

† Not to be given, fall quarter 1972.

‡ Not to be given, winter quarter 1973.

§ Not to be given, spring quarter 1973.



**5137. Altered States of Consciousness. (4) I, II, III.**

Lecture—4 hours. Prerequisite: courses 1A or 10. Characteristics, uses, and abuses of altered states of consciousness from experiential behavioral, physiological, and methodological perspectives. Topics typically include sleep, borderline states, dreams, meditation, hypnosis, autohypnosis, marijuana intoxication, psychedelic drugs and mystical experiences. Mr. Tart

**145. Social Psychology. (5) I, II, III.**

Lecture—4 hours; term paper. Prerequisite: course 1A. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status. Messrs. Harrison, Elms, Moore, Turner

**147A. Personality Theory and Assessment.**

(5) I, II, III.

Lecture—4 hours; independent library work. Prerequisite: course 1A and 6 units upper division work in psychology. A systematic consideration of contemporary theories of personality.

Mr. Elms, Ms. Paige

**147B. Personality Theory and Assessment. (4) II.**

Lecture—4 hours. Prerequisite: course 3 or equivalent; course 147A. An exploration and evaluation of the principal methods in personality assessment and research. Mr. Harrison

**148. Interpersonal Relations. (4) II.**

Lecture—4 hours. Prerequisite: 16 hours of social science or equivalent and consent of instructor. Study of interpersonal relationships from both a theoretical-experimental and experiential viewpoint. Social psychological theory, case studies and a small group laboratory within the class provide the basis for class discussion. Limited enrollment. Mr. Jorgensen

**149. Psychology of Sex Differences. (4) II.**

Lecture—4 hours. Prerequisite: upper division standing and enrollment in one of the following: course 108, 145 or 147A. Extensive review of theory and research related to the origin of sex differences in human behavior. The role of physiology, child socialization, and cultural institutions in determining sex differences in personality, cognitive abilities, motivations, and social status. Ms. Paige

**150. Comparative Psychology. (5) I, II, III.**

Lecture—4 hours; term paper. Prerequisite: course 1B or appropriate biological training. Perspectives in animal behavior: zoological, physiological, psychological. Functional behavior categories: feeding, reproduction, communication, learning. Behavioral theory as derived from psychological and ethological contexts.

Messrs. Mason, Lott, Owings

**165. Introduction to Clinical Psychology.**

(4) I, II, III.

Lecture—4 hours. Prerequisite: courses 1C, 168, and either 112 or 145. Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. A survey based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.

Ms. Lynn, Mr. Lyons, Mr. Weissman

**168. Abnormal Psychology. (4) I, II, III.**

Lecture—4 hours. Prerequisite: course 1A. A descriptive and functional account of behavioral disorders, with primary considerations given to neurotic and psychotic behavior.

Messrs. Weissman, Murphey, Sommer

**170. Environmental Awareness. (4) III.**

Lecture—3 hours; discussion—1 hour. Interactions of people with manmade environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology. (Same course as Environmental Studies 170.) Mr. Sommer

**\*171. Humanistic Psychology. (4) II, III.**

Lecture—4 hours. Prerequisite: course 165 or equivalent and consent of instructor. A survey, including lectures and demonstrations of humanistic, existential, or "third-force" movements in contemporary psychology. Theory, data, and techniques in the work of Maslow, Rogers, and others who emphasize creativity and self-actualization. Mr. Tart

**180A-K. Experimental Psychology. (4) I, II, III.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division psychology courses and consent of instructor. Laboratory investigation of selected problems. Content area will rotate among major fields of psychology from quarter to quarter. (180A. General Methodology; 180B. Physiological; 180C. Developmental; 180D. Sensory Processes; 180E. Learning; 180F. Perception; 180G. Psycholinguistics; 180H. Motivation; 180I. Social; 180J. Personality; 180K. Comparative.) May be repeated for credit when different topic studied. The Staff

**194H. Special Study for Honors Students.**

(1-5) I, II, III.

Prerequisite: 20 units in psychology and honors status. Independent investigation of an empirical problem. The Staff

\* Not to be given, 1972-73.

‡ Not to be given, spring quarter 1973.

**196. Advanced General Psychology. (4) II, III.**

Lecture—4 hours. Prerequisite: 18 units upper division work in psychology. Exploration of the present status of systematic psychology. An integrative treatment of the major areas, problems, and methodologies.

Mr. Dukes, Mr. Murphey

**198. Directed Group Study. (1-5) I, II, III.**

By prior arrangement with individual instructor. Directed small group study on psychological topics of special interest and relevance to instructor and students.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

By prior arrangement with individual instructor. The Staff (Chairman in charge)

**Graduate Courses****200. Current Research Topics in Psychology. (1) I.**

Seminar—1 hour. Prerequisite: consent of instructor. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (Satisfactory/Unsatisfactory grading only.) The Staff

**201. Research Preceptorship. (4) I, II, III.**

Laboratory-discussion—6-9 hours. Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grading only.) The Staff

**206. Statistical Analysis of Psychological Experiments. (4) III.**

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of data obtained with various experimental designs; analysis of data obtained with various experimental designs; analysis of variance and covariance, factorial and repeated measures, Latin square designs, and tests of trends.

Mr. Turner, Mr. Kroll

**207. Statistical Inference from Psychological Experiments. (4) III.**

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. The relationships between statistical models and inferences about empirical processes, with an emphasis on distribution-free models. Mr. Turner, Mr. Kroll

**\*208. Physiological Psychology. (4) II.**

Seminar—4 hours. Prerequisite: graduate standing in psychology and 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.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor.

The original behavioral repertoire of the child and its subsequent development.

Mr. Coopersmith

**\*230. Learning. (4) I.**

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.

Mr. Parks, Mr. Kroll

**\*231. Perception. (4) II.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. An analysis of the role of perception in experience and its effects on behavior.

Mr. Natsoulas

**\*234. Motivation. (4) II.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The origin and function of basic motivational systems as they influence behavior.

**245. Social Psychology. (4) III.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

Mr. Harrison

**\*247. Personality. (4) III.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

Mr. Coopersmith, Mr. Lyons

**250. Comparative Psychology. (4) II.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

Mr. Lott, Mr. Mason

**\*251. Genetic Correlates of Behavior. (4) I.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic determination of animal and human behavior.

Mr. Murphey

**\*252. Seminar in Psychobiology. (4) I, II, III.**

Seminar—4 hours. The Staff

**\*255. Comparative and Physiological Psychology of Reproductive Behavior. (4) III.**

Seminar—4 hours. Biological bases of reproductive behavior; neural, hormonal, and environmental controls.

**264. Psycholinguistics. (4) III.**

Seminar—4 hours. Mr. Bastian

**\*272. Experimental Study of Personality.**

(4) I, III.

Seminar—4 hours.

Mr. Coopersmith, Mr. Lyons

\* Not to be given, 1972-73.

**273. Environment and Behavior. (4) I.**

Seminar—4 hours. The social psychology of the environment. Research into the use of space and its design implications. Mr. Sommer

**§290. Seminar. (4) I, II, III.**

Seminar—4 hours. Prerequisite: consent of instructor. A seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students. The Staff

**298. Group Study. (1-4) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff

**RANGE MANAGEMENT**

*Major Advisers.*—See *Class Schedule* listing under *Range Science*.

*Major Program and Graduate Study.*—See pages 92 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Course****1. Introduction to Range Management. (4) II.**

Lecture—3 hours; discussion—1 hour. Basic principles of range management and their relationships to the management of wildlands for livestock production, wildlife, water, recreation, and timber. Mr. Laude

**Upper Division Courses****100. Range Plants. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. Systematic relationships and identification of range grasses; legumes, forbs, and shrubs; their distribution, environmental requirements, and use. One Saturday field trip. Mr. Crampton

**103. Grassland Inventory, Analysis and Planning. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or consent of instructor. Sampling grasslands and other vegetational types to determine species composition, forage production and utilization, carrying capacity, and changes in the plant community. Range inventory analysis and planning range use. Offered in odd-numbered years. Mr. Raguse

**105. Field Course. (2) III.**

Lecture—10 hours total; laboratory—30 hours total. Prerequisite: consent of instructor.

**299. Research. (2-9) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)  
The Staff

**Professional Course****\*390. The Teaching of Psychology. (4) III.**

Seminar—4 hours; practical experience in teaching. The 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. The Staff

Field studies of range conditions and methods of utilization in various parts of the state. To be given between winter and spring quarters. Considered a spring course for preenrollment. Mr. Love

**\*133. Grassland Ecology. (3) II.**

Lecture—3 hours. Prerequisite: course in plant ecology or consent of instructor. Structure, function and environment of North American grasslands, with emphasis on the California annual type. Concepts and problems in measuring primary and secondary productivity. Principles of grassland management, including vegetation improvement, utilization by animals and recreational and aesthetic values. Offered in even-numbered years. Mr. Raguse

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Knowles in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Prerequisite: senior standing and consent of instructor. The Staff (Mr. Knowles in charge)

**Graduate Courses****290. Seminar. (1-2) I, II, III.**

Seminar—1-2 hours.  
The Staff (Mr. Knowles in charge)

**299. Research. (1-9) I, II, III.**

The Staff (Mr. Knowles in charge)

**Related Courses:** Agronomy and Range Science 112, 112L; Animal Science 118A; Soil Science 105; Wildlife and Fisheries Biology 135, 151.

\* Not to be given, 1972-73.

§ Not to be given, spring quarter 1973.

## RELIGIOUS STUDIES

Paul A. Castelfranco, Ph.D., S.T.B., *Chairman of the Committee*  
 Committee Office, 154 Robbins Hall

### Committee in Charge:

Paul A. Castelfranco, Ph.D., S.T.B. (*Botany*)

Glen W. Erickson, Ph.D. (*Physics*)

Manfred P. Fleischer, Ph.D. (*History*)

Neal W. Gilbert, Ph.D. (*Philosophy*)

Thomas A. Hanzo, Ph.D. (*English*)

Marian B. Ury, Ph.D. (*Oriental Languages*)

*Major Adviser.*—Mr. Castelfranco.

This major which can lead to the Degree of Bachelor of Arts is designed to give the student an understanding of religion in its manifold complexity. The study of religion must consider a vast number of elements in particular: (1) the message of the great historical religions; (2) the thought of the main theological and philosophical spokesmen for these traditions; (3) the contribution of great literary authors having religious significance; (4) the approach of the social sciences to the study of religious phenomena; (5) the history of religious thought and institutions and the political and social history of those periods in which religious questions have played a prominent role; (6) the expression of religious beliefs through music and the arts.

### The Major Program

**Lower Division Courses.**—Required: History 4A–4B, 9A; Philosophy 20A; Religious Studies 20. Recommended: American Studies 1B; Anthropology 2; Philosophy 6; Classics 10, 41. A reading knowledge of a foreign language is *highly recommended*.

**Upper Division Courses.**—Required: Religious Studies 190, 194. In addition, each student must select a consistent program of courses approved by the committee in charge. The pro-

gram must include not fewer than 36 units of courses dealing with various aspects of religious study. At least one course must have a theological, philosophical or literary orientation; one course must be historical; one course must exemplify the approach of the social sciences to religious phenomena. A senior thesis is required.

Recommended upper division courses from other departments: Anthropology 124 (comparative religion); Greek 101 (Plato); English 171 (English Bible as literature); History 131B (early modern European history, 1500 to 1650); Italian 139A (Italian literature in English: early Italian literature and Dante Alighieri); Oriental Languages 170 (Chinese and Japanese Buddhism); Philosophy 105, 161, 162, 178 (philosophy of religion, Plato, Aristotle, Kierkegaard); Russian 140, 141 (Dostoevsky, Tolstoy).

### Lower Division Course

#### 20. Introduction to Religious Studies. (2) I, III.

Seminar—2 hours. Reading and discussion of basic texts from at least two major religious traditions. Mr. Castelfranco, Mr. Gilbert

### Upper Division Courses

#### 190. Senior Colloquium. (2) I.

Seminar—2 hours. Prerequisite: open only to seniors in Religious Studies. Discussion of central issues of religion. The Staff

#### 194. Proseminar. (4–6) I, II, III.

Supervised research—12–18 hours. Prerequisite: open only to seniors majoring in Religious Studies. Preparation of senior thesis on topic selected by the student with approval of Religious Studies curriculum committee.

The Staff (Chairman of Committee on Religious Studies in charge)

## RESOURCE SCIENCES

*Related Undergraduate Major.*—See page 93.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Lower Division Courses

#### 2. Concepts in Forestry. (2) II.

Lecture—2 hours. An introduction to the concepts of forestry as illustrated by current issues in the western United States. Mr. Delwiche

#### 10. California and the West. (2) III.

Lecture—2 hours. Recommended as an introductory course for lower division students. How population, agricultural, and industrial

centers and their conflicts in environmental pollution and overcrowding develop in relation to the West's physical features. Weekly guest lectures in geology, physical geography, water, and the atmospheric, plant, and animal sciences.

Mr. Walker

#### 10L. Aerial Study of California and the West. (1) III.

Laboratory—1 hour. Prerequisite: course 10 (must be taken concurrently). Aerial study of the natural resources of California and adjacent states. Flight route includes the Sierra, Cascade, and Coast ranges; observation of major forest, valley, and river systems and their relationship to man's living, working, and leisure. (Flight fee approximately \$50.) Mr. Walker

98. **Directed Group Study. (1-5) I, II, III.**  
The Staff (Mr. Whittig in charge)
99. **Special Study for Undergraduates. (1-5) I, II, III.**  
The Staff (Mr. Whittig in charge)

**Upper Division Courses**

100. **Concepts in Renewable Natural Resources. (3) I.**  
Lecture—3 hours. Prerequisite: junior standing or consent of instructor. Survey of renewable natural resources, interrelationships of climate, air, soil, water, plants, animals and their impact on society. Role of man in their management, preservation, and improvement for man's environment, his recreation, and the production of food and fiber. Mr. Snyder

- 100L. **Discussion of Resource Concepts. (1) I.**  
Discussion—1 hour. Prerequisite: course 100 (may be taken concurrently). Discussion of current problems and concepts in renewable natural resources, development, and conservation. An in-depth consideration of the topics surveyed in course 100. (Passed/Not Passed grading only.) Mr. Snyder

101. **Agriculture and Wildlife. (3) II.**  
Lecture—3 hours; one Saturday field trip. Prerequisite: upper division standing or consent of instructor. A 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. Mr. Love

110. **Wildflowers of the Central Valley of California. (2) III.**  
Lecture—2 hours. A study of the resident plants in and about the Central Valley of California, growth forms, plant communities, identification and systematic relationships, field collections, land use and overall influence on wildflower habitats. Mr. Crampton

190. **Proseminar in Renewable Natural Resources. (1) I, II, III.**  
Seminar—1 hour. Prerequisite: senior standing in Resource Sciences. Selected topics in renewable natural resources. The Staff (Mr. Whittig in charge)

198. **Directed Group Study. (1-5) I, II, III.**  
The Staff (Mr. Whittig in charge)

**Related Courses:** Agricultural Economics 147, 148, 176, 283; Atmospheric Science 20; Environmental Planning and Management 1; Environmental Studies 10, 12, 100; Geography 3, 5, 161; Range Management 1, 105; Soil Science 88, 105; Soil and Water Science 1, 2; Water Science 10; Wildlife and Fisheries Biology 2, 151.

**RHETORIC**

Gerald P. Mohrmann, Ph.D., *Chairman of the Department*  
Department Office, 207 North Hall

**Professor:**

James J. Murphy, Ph.D.

**Associate Professors:**

Gerald P. Mohrmann, Ph.D.  
Ralph S. Pomeroy, Ph.D.

**Assistant Professors:**

Stuart J. Kaplan, Ph.D.  
F. Eugene Scott, M.A.  
Harry W. Sharp, Jr., Ph.D.



**Lecturers:**

Michael C. Leff, M.A.  
John L. Vohs, M.A.

**The Major Program**

**Departmental Advisers.**—Mr. Kaplan, Mr. Leff, Mr. Mohrmann, Mr. Murphy, Mr. Pomeroy, Mr. Scott, Mr. Sharp, and Mr. Vohs.

**Lower Division Courses.**—Required are courses 1 and 3.

**Upper Division Courses.**—Thirty-six units in rhetoric, including: (1) courses 110, 120 as early as possible in the major; (2) at least one additional course from each of the following series: 110, 120 or 160, and 150; (3) course 190 in the senior year.

**Required courses outside the Department of Rhetoric.**—A coherent program of twelve quarter units selected in consultation with the departmental adviser from appropriate courses outside the Department of Rhetoric. This program will ordinarily be chosen from a designated set of courses related to one of the four course series in the Department of Rhetoric (Series 110, 120, 150, or 160).

The Department will certify completion of a major program only on the basis of at least a C average in the upper division courses taken in the Department.

**Teaching Major.**—Same as major.

**Teaching Minor.**—Thirty quarter units, including Rhetoric 1, 3, 41, and eighteen upper division units including either course 110 or 120.

**Optional Minor.**—Twenty or more quarter units, at least one course from four of the following sets:

- a. Lower division (Rhetoric 1, 3, 41).
- b. History of rhetorical theory (Rhetoric 110, 111, 112, 113).
- c. Rhetorical criticism (Rhetoric 120, 121A, 121B, 121C).
- d. Rhetorical theory (Rhetoric 150, 151, 152, 153, 155, 156).
- e. Rhetorical analysis (Rhetoric 160, 161, 162).

**Graduate Study.**—The Department of Rhetoric offers programs of study and research leading to the M.A. degree in Rhetoric. Detailed information may be obtained from the Graduate Adviser, Department of Rhetoric.

#### Lower Division Courses

##### 1. Introduction to Public Speaking. (4) I, II, III.

Lecture—4 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address. The Staff

##### 2. Oral Interpretation. (4) I, II, III.

Lecture—4 hours. Theory and practice in the oral reading of literature. The Staff

##### 3. Group Communication. (4) I, II, III.

Lecture—4 hours. Prerequisite: consent of instructor or course 1. Study of the rhetorical process in informal situations. Topics include interaction, leadership techniques, and decision making in groups. Regular participation in discussions. (Passed/Not Passed grading only.) The Staff

##### 41. Introduction to Advocacy. (4) I, II.

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. Provision for practice in intercollegiate debate. Mr. Sharp

##### 42. Rhetoric in the News Media. (4) II.

Lecture—2 hours; discussion—2 hours. Study of rhetorical concepts and processes influencing the news function of television, radio, newspapers, and mass circulation periodicals. Discussions, lectures, and group projects on problems of media bias, objective reporting, feature writing, and editorial responsibility. Critical analysis of journalistic styles. Mr. Pomeroy

##### 98. Directed Group Study. (1–4) I, II, III.

Lecture—1 hour; discussion—1 hour.  
The Staff (Chairman in charge)

##### 99. Special Study for Undergraduates.

(1–5) I, II, III.

Prerequisite: consent of instructor.  
The Staff (Chairman in charge)

#### Upper Division Courses

##### 110. Classical Rhetorical Theory. (4) I.

Lecture—4 hours. Origins of Greek and Roman rhetorical theory, with emphasis upon the contributions of Isocrates, Plato, Aristotle, Cicero, and Quintilian. Mr. Leff

##### 111. Medieval and Renaissance Rhetorical Theory. (4) II.

Lecture—4 hours. Development of the European rhetorical tradition to 1700 through the contributions of such writers as Augustine, Alcuin, Wilson, and other Ciceronians, with attention to the anti-Ciceronian reaction represented by Ramus, Francis Bacon, and Fenelon. Mr. Leff

##### 112. Early Modern Rhetorical Theory. (4) II.

Lecture—4 hours. English and continental theories of rhetoric to 1900, with reference to developments in psychology, philosophy, and belles-lettres. Emphasis upon the works of Ward, Priestley, Campbell, Blair, and Whately. Mr. Pomeroy

##### 113. Contemporary Rhetorical Theory. (4) III.

Lecture—4 hours. Current approaches to rhetorical theory, from the James-Winans theory of attention to the Hovland, Janis, Kelley studies of persuasion. Mr. Kaplan, Mr. Sharp

##### 120. Rhetorical Criticism. (4) I.

Lecture—4 hours. A survey of critical methods and their use in the interpretation of rhetorical discourse. Mr. Mohrmann

##### 121A. History of Public Address to 1500. (4) II.

Lecture—4 hours. Study of major rhetorical practitioners and movements from ancient Greece to the Renaissance. Special emphasis on the development of oratorical prose in the Attic Orators, Cicero, and the Christian preachers. Mr. Leff

##### 121B. History of Public Address from 1500 to 1800. (4) III.

Lecture—4 hours. Study of major rhetorical practitioners and movements in the Early Modern period. Special attention to England, France, and America, including: preaching during the Reformation, parliamentary debate during the English Civil War, and rhetoric of the American and French Revolutions.

##### 121C. History of Public Address from 1800 to the Present. (4) II.

Lecture—4 hours. Study of major rhetorical practitioners and movements in the nineteenth and twentieth centuries. Special attention to rhetoric in the shaping and transmitting of cultural values and institutions, including the rise of popular agitation and of the mass media. Mr. Scott

**150. Modes of Discourse. (4) I.**

Lecture—4 hours. Examination of elements of the communication process, including sources, messages, media, and receivers. Study of the role of these elements as they are influenced by various communicative situations. Mr. Vohs

**151. Methods of Advocacy. (4) I.**

Lecture—4 hours. Study of problems inherent in securing acceptance of ideas; consideration of logical and nonlogical means of persuasion.

Mr. Pomeroy

**153. Empirical Studies in Rhetoric. (4) II.**

Lecture—4 hours. Prerequisite: consent of instructor. Consideration of contributions derived from sociometric and psychometric approaches to analysis of rhetorical process.

Mr. Vohs

**154. Forensics Laboratory. (1) I, II, III.**

Laboratory—2 hours. Prerequisite: consent of instructor. Practice in the principles of forensics, including argumentation and debate. Intercollegiate and tournament forensics. May be repeated for credit up to a total of six units.

Mr. Sharp

**155. Mass Communication. (4) II.**

Lecture—4 hours. Study of the processes and effects of mass communication, especially television. Comparison of roles of various popular media. Consideration of media theories, functions, and constraints.

Mr. Kaplan

**156. Group Communication Processes. (4) III.**

Lecture—4 hours. Examination of current theories of group formation, goals, structure, and leadership, as they relate to communication processes.

Mr. Vohs

**160. The Persuasive Campaigns. (4) I.**

Lecture—4 hours; class project. Study of selected political and nonpolitical campaigns, illustrating prolonged organized efforts to change, maintain, or deter designated behaviors in a given audience through the use of a variety of media and influences.

Mr. Sharp

**161. The Rhetoric of Formal Argument. (4) I.**

Lecture—4 hours. Study of selected examples, illustrating the characteristics and functions of rhetoric in situations placing formal or technical constraints upon argument. Special attention to legal pleading, scientific argument, and philosophical disputation.

Mr. Lef

**\*162. Deliberative Rhetoric. (4) III.**

Lecture—4 hours. Study of selected examples, illustrating major trends, characteristics, and functions of rhetoric in policy-making situations, with emphasis upon speaking in legislative assemblies. Examples drawn from various historical periods and deliberative groups.

**190. Senior Proseminar. (4) II, III.**

Lecture—2 hours; seminar—2 hours. Prerequisite: required of majors with senior standing. Individual research on a rhetorical topic approved by a committee of the faculty.

The Staff (Chairman in charge)

**192. Internship in Rhetoric. (3-5) I, II, III.**

Laboratory—3-5 hours. Prerequisite: 12 upper division units in rhetoric and consent of instructor. Work-research projects at off-campus sites under departmental supervision. (Passed/Not passed grading only.)

Mr. Sharp

**197T. Tutoring in Rhetoric. (2-4) I, II, III.**

Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in rhetoric and consent of Department Chairman. Tutoring in undergraduate rhetoric courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to six units.

The Staff (Chairman in charge)

**198. Directed Group Study. (1-4) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Chairman in charge)

**Graduate Courses**

*Seniors may take graduate courses with consent of instructor.*

**200. Research in Oral Discourse. (4) I.**

Lecture—4 hours. Survey of traditional and current approaches to the study of human communication; special attention to bibliography and methodology, with sample research projects.

Mr. Sharp

**210. The Evolution of Rhetorical Concepts. (3) II.**

Lecture—3 hours. Prerequisite: course 110 or consent of instructor. Analysis of a selected concept such as ethos, proof, structure, audience, or delivery. Topic selected will be traced through tradition to contemporary approaches.

Mr. Murphy

**211. Study of a Major Rhetorician. (3) III.**

Lecture—3 hours. Intensive study of a major theorist such as Aristotle, Cicero, Whately, or Toulmin, with emphasis upon cultural and intellectual environment.

Mr. Lef

**220. Case Studies in Public Controversy. (3) II.**

Lecture—3 hours. Prerequisite: one course from course 120 series or consent of instructor. Analysis of origins, development, and promulgation of conflicting views in public controversies such as slavery and temperance movement.

Mr. Scott

\* Not to be given, 1972-73.



**250. Rhetoric of Non-Oratorical Works. (3) III.**

Lecture—3 hours. Prerequisite: course 150 or consent of instructor. Study of rhetorical aspects of communications other than the public speech. Examination of rhetorical concepts in relation to news media, advertising, literature, with attention to nonverbal communication.

Mr. Pomeroy

**RUSSIAN**

Department Office, 416 Sproul Hall

**Professor:**

Valerie A. Tumins, Ph.D.

**Assistant Professors:**

George Genereux, Ph.D.

Jiri Marvan, Ph.D.

Rodney L. Patterson, Ph.D.

◇ ◇ ◇

**Lecturer:**

Anita Charters—Rogozinskaya, B.Sc.Ag.

Departmental Major Adviser.—Mr. Patterson.

Graduate Adviser.—Miss Tumins.

**The Major Program**

The requirements are Russian 1 through 6 (or the equivalent); Russian 40, 41, 42; and a minimum of 36 units of upper division course work including Russian 101A, 101B, 101C, 102 or 103, and 190.

**Honors and Honors Program** (see page 148).—The honors program comprises at least one quarter of study under course 194H, which will include a research paper.

**The Master of Arts Degree**

The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser.

**Teaching Major.**—Requirements for the teaching major are the same as those for the departmental major with the addition of course 300.

**Teaching Minor.**—Six quarter courses in the lower division or their equivalents. Usually these will consist of Russian 1, 2, 3, 4, 5, 6. A total of 20 upper division units is required, including courses 101A, 101B, 101C.

**Subject Representative:** Mr. Patterson.

**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. (6) I.**

Recitation—5 hours; language laboratory—1 hour.

Mr. Patterson

\* Not to be given, 1972-73.

\* Absent on leave, spring quarter 1973.

**298. Group Study. (3) I, II, III.**

Lecture—3 hours.

The Staff (Chairman in charge)

**299. Individual Study. (1-12) I, II, III.**

The Staff (Chairman in charge)

**2. Elementary Russian. (6) II.**

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 1.

Mr. Genereux

**2X. Intensive Elementary Russian. (16) II.**

Recitation—15 hours; laboratory—1 hour; supplementary laboratory and group practice. Prerequisite: course 1. An intensive course using contemporary materials, stressing modern spoken Russian, and covering grammar fundamentals.

Mrs. Charters

**3. Elementary Russian. (6) III.**

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 2.

Mr. Patterson

**4. Intermediate Russian. (6) I.**

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 3. Grammar review based on a selected literary text and conversational practice with everyday topics and situations.

Mrs. Charters

**\*4X. Intensive Intermediate Russian. (16) I.**

Recitation—15 hours; laboratory—1 hour. Prerequisite: course 3 or placement in course 4. An intensive course emphasizing spoken Russian. Contemporary linguistic and literary materials will be used to increase the student's conversational skills and to broaden his knowledge of Russian grammar.

Mrs. Charters

**5. Intermediate Russian. (6) II.**

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 4. Composition, grammar review, and conversation on literary texts and everyday topics and situations.

Mr. Patterson

**6. Intermediate Russian. (6) III.**

Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 5. Composition, grammar review, and conversation on literary texts and everyday topics and situations.

Mrs. Charters

**30. Great Russian Writers. (3) I.**

Lecture—3 hours. Knowledge of Russian not required. An introduction to the important prose and dramatic works of such writers as Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov, Sholokhov, and Pasternak. Offered in even-numbered years.

Miss Tumins

**40. Survey of Russian Literature to 1800. (4) II.**

Lecture—3 hours. Knowledge of Russian not required. An introduction to the philosophic, historic, and stylistic elements of Russian literature from the earliest period up to Russian Sentimentalism with a discussion of the major writings and major literary figures. Offered in odd-numbered years. Miss Tumins

**41. Survey of Russian Literature: Nineteenth Century. (4) I.**

Lecture—3 hours. Knowledge of Russian not required. An introduction to the dominant literary trends, the major literary figures and landmarks of Russian prose and poetry from the period of Sentimentalism through Romanticism and Realism to the beginnings of Modernism. Offered in odd-numbered years. Mr. Patterson

**42. Survey of Russian Literature: Twentieth Century. (4) III.**

Lecture—3 hours. Knowledge of Russian not required. An introduction to major literary trends such as Symbolism, Acmeism, Futurism, Neorealism, and Socialist Realism. Readings from representative writers such as Gorky, Bely, Pasternak, Solzhenitsyn, and Tertz. Offered in even-numbered years. Mr. Patterson

**99. Special Study for Undergraduates. (1-5) I, II, III.**

Mr. Patterson

**Upper Division Courses****101A. Advanced Grammar and Reading. (4) I.**

Recitation—3 hours. Prerequisite: course 6. The study of advanced grammar with reading and discussion of literary and cultural texts.

Mrs. Charters

**101B. Advanced Grammar and Reading. (4) II.**

Recitation—3 hours. Prerequisite: course 6. The study of advanced grammar with reading and discussion of literary and cultural texts.

Miss Tumins

**101C. Advanced Grammar and Reading. (4) III.**

Recitation—3 hours. Prerequisite: course 6. The study of advanced grammar with reading and discussion of literary and cultural texts.

Mrs. Charters

**102. Russian Composition. (4) I.**

Recitation—3 hours. Prerequisite: course 6. Offered in even-numbered years. Mrs. Charters

**103. Literary Translation. (4) II.**

Discussion—3 hours. Prerequisite: course 6. Translation of Russian literary texts into stylistically equivalent idiomatic English. Offered in odd-numbered years. Mr. Genereux

**105. Advanced Russian Conversation. (4) III.**

Conversation—3 hours. Prerequisite: course 6. Intensive conversational practice and discussion based on current events and contemporary texts. Mrs. Charters

**121. The Nineteenth-Century Russian Novel. (4) II.**

Lecture—3 hours. Knowledge of Russian not required. The origin and development of the novelistic tradition beginning with Pushkin, Lermontov, Gogol, and continuing with such writers as Goncharov, Turgenev, and Saltykov (excluding Tolstoy and Dostoevsky). Offered in even-numbered years. Mr. Genereux

**123. The Twentieth-Century Russian Novel. (4) II.**

Lecture—3 hours. Knowledge of Russian not required. The examination of various trends including Critical Realism, Symbolism, Neorealism, and Socialist Realism in the development of the novel. Readings from such writers as Gorky, Zamiatin, Sholokhov, and Pasternak. Offered in odd-numbered years. Mr. Patterson

**125. Russian Drama to 1917. (4) III.**

Lecture—3 hours. Prerequisite: course 6. The rise and development of Russian drama. Reading and analysis of Fonvizin and nineteenth-century dramatic works by authors such as Griboedov, Pushkin, Ostrovsky, A. K. Tolstoy, Leo Tolstoy, Chekhov, and Gorky. Offered in odd-numbered years. Miss Tumins

**127. The Golden Age of Russian Poetry. (4) III.**

Lecture—3 hours. Prerequisite: course 101A. A study of Russian versification, the historical background to the Golden Age, and readings from Derzhavin, Batiushkov, Gnedich, Pushkin, Delvig, Baratynsky, Lermontov, and other poets of the first half of the nineteenth century. Offered in even-numbered years. Mr. Patterson

**128. Modern Russian Poets. (4) III.**

Lecture—3 hours. Knowledge of Russian not required; Russian majors fulfill readings in Russian. Readings in translation of modern poetry belonging to various "schools" (e.g., Symbolism, Acmeism, Futurism) including such poets as Blok, Esenin, Akhmatova, Maiakovsky, Pasternak, and Evtushenko. Offered in odd-numbered years. Mr. Patterson

**140. Dostoevsky. (4) I.**

Lecture—3 hours. Knowledge of Russian not required. Reading and analysis of Dostoevsky's principal works such as *Crime and Punishment*, *The Idiot*, *The Brothers Karamazov*, and *The Diary*. Study of social and political views as reflected in Dostoevsky's works. Offered in even-numbered years. Miss Tumins

**141. Tolstoy. (4) I.**

Lecture—3 hours. Knowledge of Russian not required. A 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.

Mr. Patterson

**150. Russian Culture. (4) III.**

Discussion—3 hours; term paper. Knowledge of Russian not required. Brief introduction of the beginnings up to the nineteenth century. Study of Russian culture in the nineteenth and twentieth centuries: Russian art, music, philosophy, church, traditions, and daily life.

Miss Tumins

**185. Intercultural Literary Colloquium. (4) II.**

Lecture—2 hours; discussion—1 hour; readings in English or Russian; term paper. Interdepartmental inquiry into such European and American themes as the anti-hero, guilt and judgment, escape, and utopia. Specific topics to be chosen by instructors. (To be given jointly with English 185 and German 185.)

Mr. Patterson

**190. Senior Proseminar. (4) III.**

Group conference and assigned reading in preparation for graduate study. Miss Tumins

**192. Research Essay. (2) I, II, III.**

Prerequisite: concurrent enrollment or previous completion of a course in Russian literature. 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.

The Staff

**192A-E. Intercultural Literary Colloquium: Modern Literary Movements and Styles. (4) I.**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: reading knowledge of one foreign language or consent of instructor. Studies in popular taste, messianic vision, and elitist polarities. Content will alternate among the following segments: A. Romanticism; B. Symbolist Poetry and Poetics; C. Naturalism and Expressionism; D. Utopianism and Authoritarian Structures; E. Quests of Mystery and Science Fiction. May be repeated for credit in different subject area. (Same course as Comparative Literature, French, and German 192A-E.)

Miss Izokaitis, Mr. Menges, Mr. Patterson

**194H. Special Study for Honors Students.**

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses****200. Old Church Slavic. (4) I.**

Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavic.

\* Not to be given, 1972-73.

**201. Comparative Slavic Linguistics. (4) II.**

Lecture—3 hours; reading projects. Prerequisite: course 200. An introduction to comparative Slavic linguistics based on the contrastive analysis of Old Church Slavic with Old Russian.

**202. Descriptive Russian Grammar. (4) II.**

Lecture—3 hours. An introduction to modern Russian phonology and morphology.

**204. Historical Russian Grammar. (4) III.**

Lecture—3 hours; reading projects. The evolution of the Russian phonological and grammatical systems from the eleventh to the eighteenth centuries.

**210. Style and Syntax. (4) I.**

Discussion—3 hours; reading projects. An examination of stylistic differences between spoken and written Russian.

Miss Tumins

**\*220. Old Russian Literature. (4) III.**

Seminar—3 hours. Prerequisite: course 201. Advanced study of intellectual movements and literary styles of works such as "The Song of Igor's Campaign," "Zadonshchina," Epifany's "Lives," Ivan IV's cycle of epistles. May be repeated for credit.

Miss Tumins

**221. Eighteenth-Century Russian Literature. (4) III.**

Seminar—3 hours. Advanced study of literary movements and styles in prose or poetry. The works of writers such as Kantemir, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit.

Miss Tumins

**222. Nineteenth-Century Russian Literature. (4) I.**

Seminar—3 hours. Advanced study in literary movements such as Romanticism, Naturalism, and Realism, or of a major writer such as Pushkin, Gogol, Dostoevsky, or Tolstoy. May be repeated for credit.

Mr. Shane, Miss Tumins, Mr. Patterson

**223. Early Twentieth-Century Russian Literature.**

(4) I.

Seminar—3 hours. Reading and analysis of the achievements selected from the literary renaissance beginning with the Russian Symbolists and continued by such diverse groups as the Acmeists, the Futurists and the Serapion Brotherhood. May be repeated for credit.

Mr. Patterson

**\*224. Soviet Russian Literature. (4) III.**

Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of extraordinary literary merit or of unusual importance in the development of genres, schools, styles, techniques, and various formal elements. May be repeated for credit.

Mr. Genreux

**298. Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1-9) I, II, III.**

The Staff (Chairman in charge)

**Professional Course**

**300. The Teaching of Russian. (3) (Summer)**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.  
The Staff

**RUSSIAN LITERATURE AND HISTORY**

\*Valerie A. Tumins, Ph.D., *Chairman of the Committee*

C. Bickford O'Brien, Ph.D., *Acting Chairman of the Committee*

Department Office, 156 Voorhies Hall

**Committee in Charge:**

Alexander J. Groth, Ph.D. (*Political Science*)

C. Bickford O'Brien, Ph.D. (*History*)

Rodney L. Patterson, Ph.D. (*Russian*)

\*Valerie A. Tumins, Ph.D. (*Russian*)

This major is designed to give the student a better understanding of Russia through the study of its history and literature, two fields closely linked in its intellectual development.

This combined major is planned in such a way that the student will be prepared for graduate studies in either field—Russian History, Russian Literature or in a similar combined program. In either case the knowledge of Russian is a prerequisite.

Required courses for the joint Bachelor of Arts degree in Russian Language, Literature and History:

**History**

a) History 4A—4B—4C (History of Western Civilization).

b) A minimum of 12 units from the following courses: History 102F (Proseminar in Russian History), 137A (Russian History:

Kievan and Muscovite Russia), 137B (Russian History: The Empire to 1856), 137C (Russian History: The Empire, 1856—1917), 137D (Russian History: Soviet Russia).

c) A minimum of 8 units in another field of history (preferably Europe or East Asia).

**Russian**

a) Russian 1—2—3 (Elementary Russian), 4—5—6 (Intermediate Russian), 40 (Survey of Russian Literature to 1800), 41 (Survey of Russian Literature: Nineteenth Century), 42 (Survey of Russian Literature: Twentieth Century).

b) A minimum of 12 units from the following courses: Russian 101A—101B—101C (Advanced Grammar and Reading), 102 (Russian Composition), 103 (Russian Literary Translation).

c) A minimum of 8 units from the following courses: Russian 121 (The Russian Novel: Pushkin to Turgenev), 123 (The Russian Novel: Saltykov to Pasternak), 125 (Russian Drama to 1917), 127 (The Golden Age of Russian Poetry), 128 (Modern Russian Poets), 140 (Dostoevsky), 141 (Tolstoy).

**SOCIOLOGY**

Leon H. Mayhew, Ph.D., *Chairman of the Department*

Department Office, 308 Voorhies Hall

**Professors:**

Bennett M. Berger, Ph.D.

Travis Hirschi, Ph.D.

Edwin M. Lemert, Ph.D.

Leon H. Mayhew, Ph.D.

Julius Roth, Ph.D.

**Associate Professors:**

Bruce Hackett, Ph.D.

\*John Lofland, Ph.D.

John F. Scott, Ph.D.

**Assistant Professors:**

Ruth Dixon, Ph.D.

Carl C. Jorgensen, Ph.D. (*Sociology and Psychology*)

Arthur Lipow, Ph.D.

Lyn Lofland, Ph.D.

James McEvoy, Ph.D.

Lenore Weitzman, Ph.D.

◇ ◇ ◇

**Assistant Professor:**

Barbara Reskin, M.A. (*Acting*)

**Lecturer:**

Isao Fujimoto, M.A. (*Sociology and Applied Behavioral Sciences*)

*Departmental Major Advisers.*—(a) Undergraduate: The Staff (b) Graduate: The Staff.

\*Absent on leave, fall quarter 1972.

\*Absent on leave, spring quarter 1973.

**The Major Program**

**Lower Division Courses.**—Required: Sociology 1, 46A, 46B or their equivalent; 8 units selected from Anthropology 2, Economics 1A, 1B, and Psychology 1A, 1B and 1C. Recommended: Anthropology 1 and Philosophy 12A, 12B, 20A–20B–20C.

**Upper Division Courses.**—Required: 36 units of Sociology including 165A and 165B. Recommended: Anthropology 102, 118, 119A, 119B, 124, 128A; History 101, 102; Philosophy 107C, 151, 156A; Political Science 150, 161; Psychology 145; Mathematics 105A, 105B.

**Pre-Social Welfare Students**

**Lower Division Courses.**—Required: Sociology 1, 3, 46A, 46B or their equivalent, and Psychology 1A, 1B and 1C. Recommended: Anthropology 2, Economics 1A, 1B, Philosophy 12A–12B, Political Science 1A, 1B.

**Upper Division Courses.**—Required: Sociology 120, 165A or 165B, 185, and Psychology 112, 147A, 147B, 165, 168; 8 additional units selected from Sociology 130, 131, 140, 150, 152, 170; Psychology 145. Recommended: Anthropology 118, 119A, 119B, 128A; Economics 116, 130A, 130B, 150, 151, 152; Human Development 136, 140, 141; Political Science 100, 104, 180.

**Graduate Study.**—The Department offers a program of study 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.

**Teaching Major.**—Requirements for the teaching major are the same as for the departmental degree plus Sociology 122 or 124, 130 and 140.

**Teaching Minor.**—Thirty units of sociology taken in consultation with the subject representative.

**Subject Representative:** Mr. J. Roth.

**Lower Division Courses****1. Introduction to Sociology. (5) I, II, III.**

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.

**3. Social Problems. (4) I, III.**

Lecture—3 hours; discussion—1 hour. A general sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

**7. Seminar in Sociological Analysis. (4) I, II, III.**

Seminar—3 hours; to be arranged—1 hour. Research 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. The Staff

**8. General Sociology. (5) I, II, III.**

Lecture—4 hours; to be arranged—1 hour. Analysis of sociological research and concepts emphasizing application of the basic concepts of social organization, culture, socialization, stratification in relation to specific selected problems of analysis. May be repeated for credit with consent of instructor. Limited enrollment.

The Staff

**9A–9B–9C. Seminar in Sociological Analysis.**

(2–2–2) I–II–III.

Seminar—2 hours. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. Course must be completed within one academic year. May be repeated for credit with consent of instructor. Limited enrollment. (Deferred grading only, pending completion of sequence.) The Staff

**12. Introduction to Sociological Theory. (4) III.**

Lecture—4 hours. An introduction to classic texts and problems in the tradition of sociological inquiry. Representative works of important figures, such as Marx, Comte, Weber, and Durkheim; the relevance of these materials for contemporary sociology.

**25. Sociology of Popular Culture. (4) II.**

Lecture—4 hours. The historical emergence of popular culture. "High" culture, "folk" culture and "mass" culture; the democratization of cultural values; the organization of popular tastes; characteristic art forms of popular culture: literature, music, the graphic arts. The social structure of audiences.

**30A–30B–30C. The Negro Experience in American Society. (4–4–4) I–II–III.**

Lecture—4 hours. A historical consideration of ideological and institutional forces affecting the social status of black people in America. Among the topics considered will be the African backgrounds, slavery, racism, the Civil War, "Jim Crow," black reconstruction, and recent protest movements.

**46A. Introduction to Social Research. (4) I.**

Lecture—4 hours. Prerequisite: 8 units of Sociology. Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling.

**46B. Introduction to Social Research. (4) II.**

Lecture—4 hours. Prerequisite: course 46A. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

**98. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.  
The Staff (Mr. Mayhew in charge)

**99. Special Study for Undergraduates. (1-5)**

I, II, III.

Prerequisite: consent of instructor.  
The Staff (Mr. Mayhew in charge)

**Upper Division Courses****101. Social Processes. (4) II.**

Lecture—3 hours; discussion—1 hour. An examination of the problems of determining what are the crucial variables in the social processes that relate man to the environment. Economic theory, human ecology and general systems theory are examined to evaluate their utility in isolating strategic social variables. (Same course as Environmental Studies 101.)

Mr. McEvoy

**104. Empirical Social Research and Social Theory.**

(4) III.

Lecture—4 hours. Prerequisite: upper division standing and 8 units of sociology, or consent of instructor. An examination of important works in sociology, in the light of the ways in which theory informs and shapes actual research operations, and the ways in which the results of empirical research mold social theory.

**105A-105B. Laboratory in Survey Research. (5-5)**

I-II.

Lecture—4 hours; laboratory—3 hours. Prerequisite: one course in sociological research methods or Mathematics 13 or 15 or 29. Study design, drawing a sample from the city of Sacramento, and analysis of the data collected. Provides an introduction to survey methods, nonexperimental research, and data collection and analysis. (Deferred grading only, pending completion of sequence.)

Mr. McEvoy

**106. Quantitative Methods of Research. (4) III.**

Lecture—4 hours. Prerequisite: course 46B. An intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures and mathematical models especially relevant to sociological analysis.

**107. Seminar in Sociological Analysis. (4) I, II, III.**

Seminar—3 hours; to be arranged—1 hour. Prerequisite: upper division standing and 9 units of sociology. 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.

The Staff

**108. Advanced General Sociology. (5) I, II, III.**

Lecture—4 hours; to be arranged—1 hour. Prerequisite: upper division standing and con-

sent of instructor. Analysis of sociological research and concepts emphasizing application of the basic concepts of social organization, culture, socialization, stratification in relation to specific selected problems of analysis. May be repeated for credit with consent of instructor. Limited enrollment.

The Staff

**109A-109B-109C. Seminar in Sociological Analysis.**

(2-2-2) I-II-III.

Seminar—2 hours. Prerequisite: upper division standing and 9 units of sociology. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. Course must be completed within one academic year. May be repeated for credit with consent of instructor. Limited enrollment. (Deferred grading only, pending completion of sequence.)

The Staff

**118. Political Sociology. (4) II.**

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. The 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 movements; analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

**119. Sociology of Military Institutions. (4) II.**

Lecture—4 hours. Prerequisite: course 1. The relationship of military institutions to the political, economic, and class structure of historic and contemporary societies. The impact of professionalism and bureaucratic organization. The application of social theory to the analysis of such phenomena as militarism, the *coup d'etat*, revolutionary war, etc.

**120. Deviation and Society. (5) I.**

Lecture—4 hours; term paper. Prerequisite: 8 units of sociology or consent of instructor. Theory and studies of deviation in relation to societal reaction, group processes and social roles. Stigma and incapacity; cosmetic defect. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativity and society.

Mr. Lemert

**122. Sociology of Adolescence. (4) III.**

Lecture—4 hours. Prerequisite: 8 units of sociology. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of "youth cultures." Generational succession as a cultural problem.

**123. American Society. (4) III.**

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. The institutional structure and social organization of the United States.

**124. Sociology of Education. (5) II.**

Lecture—4 hours; term paper. Prerequisite: four units of sociology or consent of instructor. 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. Mr. Scott

**125. Sociology of Intellectual Life. (4) I.**

Lecture—4 hours. Prerequisite: upper division standing and consent of instructor. Sociological analysis of the intelligentsia; types of intellectuals, theories concerning their social role; research on the social sources of intellectual work in politics, literature, art, and science; historical considerations of intellectual milieu; international comparisons of intellectuals.

Mr. Berger

**126. Social Interaction. (4) I.**

Lecture—4 hours. Everyday interaction in natural settings; ethnographic approaches to the understanding of social meanings, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis.

Ms. Lofland

**130. Race Relations and Minority Groups. (4) I, III.**

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. A study of contacts and interaction between racial and ethnic groups; sources and effects of prejudice and discrimination; programs for reducing intergroup tensions.

Mr. Lipov

**131. The Family. (5) I.**

Lecture—4 hours. Prerequisite: course 2. Social implications of primate reproductive physiology; the nuclear family; major familial roles; normative controls on sex and reproduction; inheritance groups; status ascription; the family and stratification; marital selection; relations between the family and industrial social change.

Mr. Scott

**132. The Sociology of Sex Roles. (4) II.**

Lecture—3 hours; discussion—1 hour. An analysis of biological, psychological, cultural and structural conditions underlying the status and roles of men and women in contemporary society, drawing on a historical and comparative perspective.

Ms. Reskin

**140. Social Stratification. (4) III.**

Lecture—4 hours. Prerequisite: course 1. Systems of social ranking; theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure.

Mr. Hackett

**141. Industrialization and Social Change. (4) II.**

Lecture—4 hours. Prerequisite: 4 units of sociology. 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. Comparative Institutions and Social Structures. (4) I.**

Lecture—4 hours. Prerequisite: 8 units of sociology. Selected comparisons of major political and social institutions in complex societies. Patterns of institutional persistence and change in past and present societies. Particular attention will be given to nonquantitative methodological problems of comparative studies.

**143. Urban Society. (4) I.**

Lecture—4 hours. Prerequisite: 8 units of sociology. Urbanization as a social process; comparison of urban, suburban, metropolitan and rural phenomena; types of cities; the subcultures of cities; the urban future.

Mr. Hackett

**144. Rural Society. (4) II.**

Lecture—4 hours. The characteristics of rural social systems in contrast to urban; the nature of peasant and folk societies; the impact of social change upon rural community life considered from the standpoint of regional differences in the United States and selected world areas.

Mr. Fujimoto

**145. Social Structure of the U.S.S.R. (4) II.**

Lecture—4 hours. A survey of the major institutions of Soviet society, including the family, education, work, health and welfare, the arts, ethnic and national groups.

**146. Sociology of Religion. (4) II.**

Lecture—4 hours. Prerequisite: 8 units of sociology or consent of instructor. The relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization (churches, sects, cults). Secularization in the modern world and the rise of secular ideologies.

**148. Collective Behavior. (4) III.**

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Analysis of the characteristics, causes and consequences of noninstitutionalized collective actions; fads, panics, expressive crowds, riots, social and revolutionary movements.

**150. Criminology. (4) III.**

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. The sociological analysis of criminal behavior in relation to social structure and the criminalization process.



**152. Juvenile Delinquency. (4) II.**

Lecture—4 hours. Prerequisite: 8 units of sociology or psychology. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control, with special attention given to the juvenile court. Mr. Lemert

**154. Sociology of Medicine. (4) I.**

Lecture—4 hours. Prerequisite: 4 units of sociology. An overview of sociological research in medicine and health care, with emphasis on the organizational and institutional aspects.

The Staff

**155. Sociology of Law. (4) III.**

Lecture—4 hours. Prerequisite: 8 units of social science. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform. Mr. Lemert

**159. Sociology of Occupations. (4) II.**

Lecture—4 hours. Prerequisite: 8 units of sociology or consent of instructor. The natural history of occupations; the institutional matrix of occupations; colleague and client relationships; occupational social controls; career lines, and occupational-related self-definitions; occupational politics. The Staff

**160. Work and Leisure. (4) II.**

Lecture—4 hours. Prerequisite: course 1. Historical and comparative analysis of problems associated with quality of work and quantity of leisure; impact of cultural and social change on occupational pattern and leisure activity. Mr. Berger

**165A. Sociological Theory. (4) I.**

Lecture—4 hours. Prerequisite: 8 units of sociology. A 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. Mr. Mayhew

**165B. Sociological Theory. (4) II.**

Lecture—4 hours. Prerequisite: 8 units of sociology. 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.

**170. Population. (4) I.**

Lecture—4 hours. Prerequisite: 8 units of social science or consent of instructor. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical

distribution; migration; socio-psychological factors affecting fertility. Mr. Scott

**173. Sociology through Literature. (4) II.**

Lecture—4 hours. Prerequisite: 4 units of sociology. 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. Mr. McEvoy

**175. Sociology of Communication. (4) II.**

Lecture—4 hours. Prerequisite: course 46A-46B. Studies of mass communications, media, and public opinion; theories of information flow, ideology, group and personal influence on opinion formation. The Staff

**176. Sociology of Knowledge. (4) III.**

Lecture—4 hours. A critical analysis of the social foundations of knowledge in society. The history, problems, and dilemmas in classical sociology of knowledge. Contemporary applications. Natural and social sciences as social systems. The sociology of personal knowledge in everyday life.

**180. Complex Social Organization. (4) II.**

Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Institutional analysis of administrative structures and voluntary associations; consideration of informal organization, ideologies, bureaucracy, decision making, and morale in selected areas of government, industry, religion, and education. Mr. Hackett

**185. Sociology of Social Welfare. (4) I.**

Lecture—4 hours. Prerequisite: course 3 and upper division standing. A sociological analysis of the evolution and current organization of welfare functions in modern societies.

**197T. Tutoring in Sociology. (1-4) I, II, III.**

Prerequisite: upper division standing in sociology and consent of Department Chairman. The Staff (Mr. Mayhew in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Mayhew in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

Prerequisite: open to seniors only.

The Staff (Mr. Mayhew in charge)

**Graduate Courses****205. Methodological Critique of Research. (4) III.**

Lecture and discussion—3 hours. Prerequisite: course 46C or consent of instructor. Methodological analysis and criticism of empirical research exemplifying different types of research design. Examination of surveys, experiments, historical and comparative studies, and studies using biographical and demographic data.

**207. Methods of Survey Analysis. (4) I.**

Lecture—3 hours. Principles and procedures in the analysis of survey data. Forms of multivariate relations; typologies; scaling; panel analysis; contextual analysis.

**219A–219B. Behavioral Political Sociology.**

(4–4) I–II.

Seminar—4 hours. Prerequisite: graduate status in sociology, political science or psychology. The development of behavioral and empirical political sociology; study of conflict, discontent, community politics, the international system, game theory and coalition formation. Empirically grounded theories. Mr. McEvoy

**220. Deviance, Law, and Social Control. (4) I.**

Seminar—3 hours. Prerequisite: course 120 or consent of instructor. Report and discussions of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects.

Mr. Lemert

**222. Sociology of Youth. (4) I.**

Seminar—3 hours. Adolescence as a social category which "juvenilizes" the young; its prolongation in industrial societies; adolescence and "identity"; age-graded subcultures and their relation to other minority subcultures; youth and popular culture.

Mr. Berger

**224. Sociology of Education. (4) II.**

Seminar—3 hours. Structural differentiation of and relationship among socializing agencies. Comparison of educational institutions among societies. Industrialization and secularization. Political control, education and occupational placement, professionalization of educators. Current trends and recent research.

Mr. Scott

**226. Sociological Social Psychology. (4) II.**

Lecture—2 hours; discussion—2 hours. Prerequisite: course 126 or consent of instructor. Advanced study of approaches to sociological social psychology with particular attention to symbolic interactionism and ethnomethodology.

The Staff

**230. Ethnic Race Relations. (4) III.**

Lecture—3 hours; paper. Advanced study of the determinants of ethnic groupings and their interrelationships. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research.

Mr. Jorgensen

**242. Comparative Method in Historical Sociology.**

(4) III.

Lecture and discussion—3 hours. Prerequisite: course 142 or consent of instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucratization, feudalism, and capitalism; the relevance of psychological and sociological theories to historical

interpretation; the verifiability of historically grounded hypotheses; the meaning of analogy, correspondence, and causality.

**243. Urban Society. (4) III.**

Seminar—3 hours; paper. Broad overview of the issues and concerns of the field of urban sociology. Special emphasis on the human experience of urban living in contemporary, cross-cultural or historical settings.

Ms. Lofland

**248. Social Movements. (4) II.**

Lecture-discussion—4 hours. Prerequisite: graduate standing, undergraduates with consent of instructor. Advanced study of selected aspects of social and revolutionary movements. Particular focus upon the relations between internal organization of movements; kinds and amounts of change sought; strategies and tactics adopted; and the structure of and impact on the larger society.

Ms. Lofland

**265. Sociological Theory. (4) II.**

Lecture and discussion—3 hours. Prerequisite: courses 165A, 165B; or consent of instructor. The emergence of sociological thinking as part of the history of ideas; the application of sociological analysis to sociological ideas. The French sociological tradition from Saint-Simon to Durkheim; the influence of Marxist thinking on subsequent sociological ideas.

**280. Organizations and Institutions. (4) II.**

Seminar—3 hours. Prerequisite: course 180 or consent of instructor. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative analysis of political, religious, educational, military and economic structure.

Mr. Hackett

**288. Research Preceptorship. (1–9) I, II, III.**

Prerequisite: consent of instructor.

The Staff

**290. Seminar. (4) I, II, III.**

Seminar—3 hours. (Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

**292A–292B–292C. Research as a Social Process.**

(4–4–4) I–II–III.

Seminar—3 hours. Prerequisite: consent of instructor. Through reading, research exercises, discussion, and field work projects developed and conducted by each student, the student will examine the work of social scientists as a process of sociological and psychological contingencies. (Satisfactory/Unsatisfactory grading only.)

Mr. J. Roth

**298. Group Study. (1–5) I, II, III.**

The Staff (Chairman in charge)

**299. Individual Study. (1–9) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Chairman in charge)

## SOIL SCIENCE

*Major Advisers.*—See *Class Schedule* listing.

*Major Program and Graduate Study.*—See pages 94 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Lower Division Course

#### 88. Land and Life. (2) I.

Lecture—2 hours. Earth as a life support system. Relationships between land and life crucial to man's increasing demands on land resources. Mr. Munns

### Upper Division Courses

#### 105. Field Studies of Soil Resources. (8)

(Extra Session—Summer)

On campus—1 week daily; study tour—daily 5 weeks. Recommended—course 88 or Soil and Water Science 2. *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.

Mr. Begg, Mr. Huntington

#### 109. Soil Fertility and Fertilizers. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 2 or consent of instructor. The forms and availability of plant nutrient elements in soils; effects of fertilizers and soil amendments on crop and soil characteristics; soil and plant tissue analyses as diagnostic aids. Mr. Reisenauer

#### 120A. Soil Genesis and Morphology. (2) II.

Lecture—2 hours. Prerequisite: Soil and Water Science 2; Geology 1 or 2. Basic principles of geomorphology; soil forming factors and processes as they influence the genesis and characteristics of soil properties. Mr. Begg

#### 120B. Soil Classification, Mapping, and Evaluation. (3) III.

Lecture—2 hours; laboratory or field—3 hours. Prerequisite: course 120A. Basic principles underlying various systems of soil classification and mapping; methods of evaluating and rating soils for land use. Mr. Huntington

#### \*122. Salt-Affected Soils. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor; a course in soil chemistry and either plant physiology or plant nutrition recommended. Soil problems in salt-prone arid zone climates; origin and encroachment of salts; chemical interactions with soil minerals under

alkaline situations; salinity control in relation to environmental quality; physiological characteristics of native and crop plant species governing salt tolerance and sensitivity. Offered in even-numbered years. Mr. Whittig, Mr. Rains

#### 198. Directed Group Study. (1-5) I, II, III.

Directed group study in soil science for advanced undergraduates.

The Staff (Mr. Rendig in charge)

#### 199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Rendig in charge)

### Graduate Courses

#### 207. Soil Physics. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 22C or consent of instructor; Soil and Water Science 101 recommended. Physical processes occurring in soils with emphasis on heat flow, diffusion of gases and solutes, the movement of soluble materials during leaching and irrigation, mechanics, and applications of physics and mathematics to soil systems. Offered in even-numbered years. Mr. Rolston

#### 208. Soil-Plant Interrelationships. (3) III.

Lecture—3 hours. Prerequisite: Botany 111B; Soil and Water Science 104; or consent of instructor. An advanced course on the effects of soil factors on plant development; the influence of soil conditions, processes, and reactions on metabolic reactions in plants; effects of plant root activity on the nature of the rhizosphere.

Mr. Rendig

#### 211. Soil Microbiology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B; Soil and Water Science 102. Soil microorganisms and their biochemical activities; plant residue decomposition; soil organic matter and its properties. Mr. Broadbent

#### 214. Soil Mineralogy. (5) I.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: a course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of mineral analysis methods, including X-ray, thermal and chemical for characterization of mineral systems, and in the study of properties of soils and weathering of minerals. Offered in even-numbered years. Mr. Whittig

#### 215. Physical Chemistry of Soils. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 107B or 110B, or consent of instructor. Physicochemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

Mr. Burau

\* Not to be given, 1972-73.

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisite: graduate standing in soil science, plant physiology, or related subjects. Topics of current interest in soil science, including research recently carried out by students, will be discussed. Each student will prepare and present reports to the seminar. (Satisfactory/Unsatisfactory grading only.)

Mr. Delwiche

**298. Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Rendig in charge)

**299. Research. (1-12) I, II, III.**

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Rendig in charge)

Related Courses: see Plant Science 216.

**SOIL AND WATER SCIENCE—See also Soil Science, Water Science**

**SOIL AND WATER SCIENCE**

Major Advisers.—See Class Schedule listing.

Major Program and Graduate Study.—See pages 94 and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**1. Soil, Water, and Air Resources. (3) I.**

Lecture—3 hours. Prerequisite: Biological Sciences 1 or consent of instructor. Interrelationships of man and environmental factors; utilization and development of renewable natural resources; characteristics of soil, water, and air and their relation to management and planning concepts. Open to non-majors. Mr. D. Henderson

**2. Soil, Water and Air Resources. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1 or consent of instructor. Development and properties of soils; sources and properties of water; properties of the atmosphere; technical aspects of management, development, and conservation of soil and water.

Mr. Munns

**Upper Division Courses**

**101. Physics of Soil and Water Systems. (5) I.**

Lecture—3 hours; discussion-laboratory—4 hours. Prerequisite: course 2; Physics 2B; Mathematics 16B; or consent of instructor. Factors affecting soil physical condition and irrigation; soil texture, structure, aeration, and strength. Principles of soil management; basic concepts of hydraulics, soil water storage and movement, infiltration, water potential, irrigation and drainage. Principles of irrigation practices.

Mr. Stout

**102. Soil and Water Chemistry. (5) II.**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 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.

Mr. Burau

**103. Water Quality, Salt Control, and Reclamation.**

(4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 102 or consent of instructor. Water quality, water analysis, salinity, salt and plant relations, reclamation of water and soil, infiltration problems, and soil amendments.

Mr. Biggar

**104. Soil-Water-Plant Relationships. (4) III.**

Lecture—4 hours. Prerequisite: courses 101, 102; Botany 2. Influence of soil properties—physical, chemical, and biological—and of soil water supply on plant growth; availability, uptake, and use of nutrients and water by plants; principles of soil structure, irrigation, and fertilizer management for crop production.

Mr. Hsiao

**130. The Soil System. (4) III.**

Lecture—3 hours; laboratory or field—3 hours. Prerequisite: course 2 or equivalent, Botany 2, Physics 2B, Chemistry 1B; or consent of instructor. Properties of the solid, aqueous, gaseous, and biotic soil components. Processes involving the soil as a medium for plant growth and as a part of the environment. The soil profile in relation to the terrain.

The Staff (Mr. Reisenauer and Mr. Brown)

**140. Principles of Water Science. (4) III.**

Lecture—3 hours; laboratory or field—3 hours. Prerequisite: course 2 or equivalent, Botany 2, Physics 2B, Chemistry 1B; or consent of instructor. Sources, distribution, and properties of water; water in the soil-plant-atmosphere system; reclamation of soil and water; the interrelationships between water quality, use, and management, including social, political, and economic considerations.

The Staff (Mr. Scott in charge)

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor.

The Staff (Mr. Rendig in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Rendig in charge)

**SPANISH**

Homero Castillo, Ph.D., *Chairman of the Department*  
Department Office, 622 Sproul Hall

*Professors:*

Donald G. Castanien, Ph.D.  
Homero Castillo, Ph.D.  
Antonio Sánchez-Romeralo, Ph.D.

*Associate Professors:*

Didier T. Jaén, Ph.D.  
Daniel S. Keller, Ph.D.

*Assistant Professors:*

Reed Anderson, Ph.D.  
M. Roberto Assardo, Ph.D.  
Carlota B. Cannon, Ph.D.  
Glenn E. Lipskey, M.A.  
Guillermo Rojas, Ph.D.  
Robert M. Scari, Ph.D.

◇ ◇ ◇

*Lecturers:*

Mariano González, Ph.D.  
Fabián A. Samaniego, M.A.

*The Major Program*

Lower Division Courses.—Required: Spanish 1, 2, 3, and 6, or their equivalents; 27A–27B–27C.

Upper Division Courses.—Required: 36 units of upper division courses including 101A–101B–101C or 102A–102B–102C, 180 or 181, one course in each of the following areas: literature of the Golden Age, nineteenth or twentieth-century Spanish literature, twentieth-century Spanish American literature.

The above requirements must be fulfilled through courses offered by this Department. With the consent of the Chairman, and upon the recommendation of the departmental adviser, exceptions may be allowed in special circumstances.

Students are urged to consult with a departmental adviser, especially in regards to work to be done or work previously done at other institutions.

Majors and prospective majors who participate in the Education Abroad Program must consult with a departmental adviser prior to enrollment in the program.

*The Master of Arts Degree*

The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or its equivalent. Candidates will be recommended for admission to graduate studies

in Spanish provided they meet the requirements of the Graduate Division and the Department of Spanish. Detailed information may be obtained by writing to the Chairman, Department of Spanish.

*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 Chairman of the Spanish Department.

*Teaching Major.*—Requirements for the teaching major are the same as for the departmental major.

*Teaching Minor.*—Spanish 1, 2, 3 and 6; 27A–27B–27C, or their equivalents. At least 16 units of upper division work, including Spanish 101A–101B or 102A–102B, 134 or 135; one course in twentieth-century Spanish-American or Spanish literature, or one of the following: Spanish 101C or 102C.

*Subject Representative:* Mr. Keller.

**Portuguese****Lower Division Courses****1. Elementary Portuguese. (4) I.**

Laboratory—2 hours; recitation—3 hours.  
Portuguese grammar, conversation, and reading.  
Mr. Assardo

**2. Elementary Portuguese. (4) II.**

Laboratory—2 hours; recitation—3 hours.  
Prerequisite: course 1. A continuation of course 1.  
Mr. Assardo

**3. Elementary Portuguese. (4) III.**

Laboratory—2 hours; recitation—3 hours.  
Prerequisite: course 2. A continuation of course 2.  
Mr. Assardo

**Upper Division Courses****104. Survey of Brazilian Literature: Prose Fiction.**

(4) I.

Lecture—3 hours; individual and group conferences. Prerequisite: course 3. Mr. Assardo

**105. Survey of Brazilian Literature: Poetry. (4) II.**

Lecture—3 hours; individual and group conferences. Prerequisite: course 3. Mr. Assardo

**106. Survey of Brazilian Literature: Drama and Essay. (4) III.**

Lecture—3 hours; individual and group conferences. Prerequisite: course 3. Mr. Assardo

## Spanish

*Departmental Major Advisers.*—Mr. Anderson, Mr. Assardo, Mr. Jaén, Mr. Keller, Mr. G. Rojas, Mr. Scari.

*Graduate Adviser.*—Mr. Castanien.

### Lower Division Courses

#### 1. Elementary Spanish. (6) I, II, III.

Laboratory—two ½-hour sessions; recitation—5 hours. The Staff

#### 2. Elementary Spanish. (6) I, II, III.

Laboratory—two ½-hour sessions; recitation—5 hours. Prerequisite: course 1. A continuation of course 1. The Staff

#### 3. Intermediate Spanish. (6) I, II, III.

Laboratory—two ½-hour sessions; recitation—5 hours. Prerequisite: course 2. A continuation of course 2. The Staff

#### 6. Intermediate Spanish: Conversation and Reading. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3. Spoken Spanish stressed through class discussion of a variety of selected readings. The Staff

#### \*11. Spanish for Native Speakers. (3) I.

Recitation—3 hours. Prerequisite: course 1 or equivalent with consent of instructor. Open for credit only to bilingual students who have completed a major part of their secondary education in an English-speaking high school. Mr. G. Rojas

#### \*12. Spanish for Native Speakers. (3) II.

Recitation—3 hours. Prerequisite: course 11; consent of instructor. Continuation of course 11. Open for credit only to bilingual students who have completed a major part of their secondary education in an English-speaking high school. (Completion of course 12 satisfies the language requirement.) Mr. G. Rojas

#### 27A–27B–27C. Introduction to the Forms of Hispanic Literature. (3–3–3) I–II–III; II–III–I; III–I–II.

Lecture—3 hours. Prerequisite: course 6 or 12. Introductory study of the forms of Spanish and Spanish-American prose and poetry; analysis of particular works. The Staff

#### 34. Mexico in Its Literature. (3) II.

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. Mr. G. Rojas

#### 35. Survey of Mexican Culture. (3) III.

Lecture—3 hours. Indian cultural patterns before the discovery of Mexico; development of Mexican civilization during the Spanish conquest, the national period, and the Revolution of 1910. Conducted in English. May not be counted as part of the major or minor in Spanish. Mr. G. Rojas

#### 50A. Hispanic Literary Heritage. (3) I.

Lecture—3 hours. Major works in Spanish literature, from the Medieval Epic to the Golden Age, presented in English translations. Lectures and discussions in English. May not be counted as part of the major or minor in Spanish. Mr. Anderson

#### 50B. Hispanic Literary Heritage. (3) II.

Lecture—3 hours. Major works in Spanish and Latin American literatures, from the nineteenth century to the present, presented in English translations. Lectures and discussions in English. May not be counted as part of the major or minor in Spanish. Mr. Scari

#### 98. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor and Department Chairman. The Staff (Chairman in charge)

### Upper Division Courses

#### 101A–101B–101C. Grammar and Composition.

(4–4–4) I–I–III; II–III–I; III–I–II.

Lecture—3 hours; instructor student conferences. Prerequisite: course 6. The Staff

#### 102A–102B–102C. Grammar and Composition for Native Speakers. (4–4–4) I–II–III.

Lecture—3 hours; conferences and reports. Prerequisite: open to students whose native language is Spanish or to those who are bilingual; consent of instructor. Mr. G. Rojas

#### 106. Literature of Colonial Spanish America. (4) I.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. A study of the most important authors and movements in the various regions of Spanish America to 1810. Mr. Castanien

#### 107. Spanish-American Literature of the Nineteenth Century. (4) II.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. The literary development of Spanish America between Independence and *Modernismo*. Mr. Jaén

#### 108A. Spanish-American Prose of the Twentieth Century. (4) III.

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Emphasis on the development of the novel. Offered in odd-numbered years. Mr. Assardo

\* Not to be given, 1972–73.

**108B. Spanish-American Prose of the Twentieth Century. (4) III.**

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Emphasis on the essay. Offered in even-numbered years. Mr. Jaén

**109. Spanish Drama of the Golden Age. (4) III.**

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Offered in even-numbered years. Mr. Sánchez-Romeralo

**111. Don Quijote. (4) II.**

Lecture—3 hours. Prerequisite: course 27C. Mr. Castanien

**114. Spanish Romantic Literature. (4) I.**

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Readings and lectures on romantic writers of the first half of the nineteenth century with emphasis on drama and poetry. Offered in even-numbered years. Mr. Scari

**115. Lyric Poetry of the Golden Age. (4) III.**

Lecture—3 hours. Prerequisite: course 27C. Offered in odd-numbered years. Mr. Sánchez-Romeralo

**119. Spanish Novel of the Nineteenth Century. (4) III.**

Lecture—3 hours. Prerequisite: course 27C. Offered in odd-numbered years. Mr. Scari

**120A. Twentieth-Century Spanish Prose. (4) I.**

Lecture—3 hours. Prerequisite: course 27C. Mr. Anderson

**120B. Twentieth-Century Spanish Drama. (4) III.**

Lecture—3 hours. Prerequisite: course 27C. Offered in odd-numbered years. Mr. Anderson

**120C. Twentieth-Century Spanish Poetry. (4) III.**

Lecture—3 hours. Prerequisite: course 27C. Offered in even-numbered years. Mr. Sánchez-Romeralo

**125A. Modernism: The Precursors. (4) I.**

Lecture—3 hours. Prerequisite: course 27C. Offered in even-numbered years. Mr. Castillo

**125B. Modernism: The Major Poets. (4) II.**

Lecture—3 hours. Prerequisite: course 27C. Offered in even-numbered years. Mr. Castillo

**127. Poetry of Post-Modernism and Vanguardism. (4) III.**

Lecture—3 hours; conferences. Prerequisite: course 27C. Offered in even-numbered years. Mr. Castillo

**128. Contemporary Spanish-American Short Story Writers. (4) II.**

Lecture—3 hours; conferences and reports. Prerequisite: course 27C. Literary trends in the development of the short story in Spanish Amer-

ica as seen in the representative works of major contemporary authors. Offered in even-numbered years. Mr. Castillo

**129. The Mexican Novel. (4) III.**

Lecture—3 hours; conferences and reports. Prerequisite: course 27C; consent of instructor. Major figures in the development of the Mexican novel. Offered in odd-numbered years. Mr. G. Rojas

**131A. Modern Spanish Syntax. (4) I.**

Lecture—3 hours. Prerequisite: course 101C or consent of instructor. Mr. Keller

**131B. Modern Spanish Syntax. (4) II.**

Lecture—3 hours. Prerequisite: course 101C or consent of instructor. Mr. Keller

**132. Introduction to Spanish Linguistics. (3) III.**

Lecture—3 hours. Prerequisite: course 101C. Principles of classical phonemics and morphemics together with more recent developments; descriptive analysis of modern Spanish sounds and forms. Theoretical and practical comparison with English and other Romance Languages. Mr. Lipskey

**134. Survey of Spanish Culture. (4) I.**

Lecture—3 hours. Prerequisite: course 27C. Mr. González

**135. Survey of Mexican Culture. (4) III.**

Lecture—3 hours; conferences and reports. Prerequisite: course 27C; consent of instructor. Offered in even-numbered years. Mr. G. Rojas

**138. Contemporary Spanish-American Drama. (4) II.**

Lecture—3 hours; conference and reports. Prerequisite: course 27C. Study of major authors, significant trends, as well as origins and development of the genre. Mr. Keller

**150. Masterpieces of Spanish Literature. (4) I.**

Lecture—3 hours. Reading, lectures, and discussion in English. May not be counted as part of the major in Spanish. Mr. Scari

**151. Study of a Major Writer. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 27C. May be repeated for credit with consent of instructor. The Staff

**175. Introduction to Literary Theory and Criticism. (4) II.**

Lecture—3 hours; conferences. Prerequisite: course 27C. Basic concepts for the analysis of literature with emphasis on Spanish literary and critical theory applied to Spanish literature. Mr. Jaén

**180. History of Spanish Literature. (4) III.**

Lecture—3 hours. Prerequisite: open only to majors in their senior year; consent of instructor. Mr. Scari



**181. History of Spanish-American Literature. (4) II.**

Lecture—3 hours; conferences and reports.  
Prerequisite: open only to majors with senior standing; consent of instructor. Mr. Keller

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor and Department Chairman.

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Chairman in charge)

**Graduate Courses****200. Techniques of Literary Scholarship. (4) III.**

Lecture—3 hours. The elements of bibliography and fundamental methods of literary research. Mr. Castanien

**210. Literary Criticism: Poetry. (4) I.**

Seminar—3 hours. Offered in odd-numbered years. Mr. Castillo

**230A. History of the Spanish Language. (4) I.**

Seminar—3 hours. Prerequisite: Latin I. Mr. Lipskey

**230B. History of the Spanish Language. (4) II.**

Seminar—3 hours. Prerequisite: Latin I. Mr. Lipskey

**231A. Spanish Literature of the Golden Age: Lyric Poetry. (4) I.**

Seminar—3 hours. Offered in even-numbered years. Mr. Sánchez-Romeralo

**231B. Spanish Literature of the Golden Age: The Drama. (4) II.**

Seminar—3 hours. Offered in odd-numbered years. Mr. Sánchez-Romeralo

**231C. Spanish Literature of the Golden Age: Prose Non-Fiction. (4) II.**

Seminar—3 hours. Offered in odd-numbered years. Mr. Castanien

**231D. Spanish Literature of the Golden Age: Prose Fiction. (4) II.**

Seminar—3 hours. Offered in even-numbered years. Mr. Castanien

**232. Cervantes. (4) III.**

Seminar—3 hours. The major works of Cervantes and of the principal Cervantine critics. Offered in odd-numbered years. Mr. Castanien

**234. Twentieth-Century Spanish Poetry. (4) I.**

Seminar—3 hours. Offered in even-numbered years. Mr. Sánchez-Romeralo

**235A. Twentieth-Century Spanish Prose. (4) I.**

Seminar—3 hours. Offered in odd-numbered years. Mr. Anderson

**235B. Twentieth-Century Spanish Prose. (4) II.**

Seminar—3 hours. Offered in even-numbered years. Mr. Anderson

**237. Spanish Romanticism. (4) I.**

Seminar—3 hours. Sources and development of Romanticism in Spain, particularly in poetry and drama. Offered in odd-numbered years.

Mr. Scari

**238A. Spanish-American Drama: 1880-1930. (4) III.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Keller

**238B. Spanish-American Drama: 1930 to Present.**

(4) III.

Seminar—3 hours. Offered in even-numbered years.

Mr. Keller

**239. Post-Romantic Spanish Literature of the Nineteenth Century. (4) II.**

Seminar—3 hours. Offered in even-numbered years.

Mr. Scari

**241A. Spanish-American Novel, 1900-1920. (4) I.**

Seminar—3 hours. Offered in even-numbered years.

Mr. Castillo

**241B. Spanish-American Novel, 1920-1940. (4) II.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Castillo

**242. New Trends in Spanish-American Fiction from 1940 to the Present. (4) III.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Castillo

**245. Darío and His Contemporaries. (4) II.**

Seminar—3 hours. Offered in even-numbered years.

Mr. Castillo

**247. New Directions in Spanish-American Poetry.**

(4) III.

Seminar—3 hours. Offered in even-numbered years.

Mr. Castillo

**248. The Spanish-American Essay. (4) II.**

Seminar—3 hours. Major Spanish-American essayists from Sarmiento to Octavio Paz. Offered in odd-numbered years.

Mr. Jaén

**251. Study of A Major Writer. (4) I, II, III.**

Seminar—3 hours. The development of one major writer and his intellectual and literary milieu. May be repeated for credit with consent of instructor.

The Staff

**299. Research. (2-5) I, II, III.**

The Staff (Chairman in charge)

**Professional Course****300. The Teaching of Spanish. (3) III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in Spanish.

Mr. Samaniego

## SUBJECT A

Program Office, 333 Voorhies

### Supervisor of Instruction:

Judson T. Monroe, Ph.D. (*Lecturer in English*)

## SWEDISH

Department Office, 416 Sproul Hall

### Lower Division Courses

#### 1. Elementary Swedish. (6) I.

Discussion—5 hours; language laboratory—two ½-hour sessions. Mr. Sammern-Frankenegg

#### Subject A. English Composition (no credit). I, II, III.

Lecture—2 hours; discussion—2 hours. Principles of composition, with special emphasis on precision and exactness of sentences. The Staff

#### 2. Elementary Swedish. (6) II.

Discussion—5 hours; language laboratory—two ½-hour sessions. Prerequisite: course 1. Mr. Sammern-Frankenegg

## TEXTILES AND CLOTHING

*Major Advisers.*—See *Class Schedule* listing.

*Major Program.*—See page 95.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

### Lower Division Courses

#### 6. Introduction to Textiles. (3) I.

Lecture—2 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. Miss Morris

#### 7. Clothing and the Individual. (2) I, III.

Lecture—2 hours. Prerequisite: Psychology 1A or 10. The relation of the self-concept and of the human form to elements of design as expressed through clothing. Miss Engel

#### 17A. Clothing Structure. (3) I, II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 6, 7 (may be taken concurrently). The principles of clothing design through the medium of drafting and flat pattern. Construction principles are applied. Miss Engel

#### 17B. Clothing Structure. (3) I, II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 17A. The principles of clothing design through the medium of draping in various textile fabrics.

#### 47. Field Study. (1) II.

Seminar—three 2-hour sessions; field trip—2 days. To observe commercial aspects of the design, production, development, distribution and maintenance of textiles and clothing. To be given between the winter and spring quarters. Considered a spring course for preenrollment. (Advance registration required.) Miss Engel

#### 98. Directed Group Study for Lower Division

Students. (1-5) I, II, III.

The Staff (Miss Morris in charge)

#### 99. Special Study for Lower Division Students.

(1-5) I, II, III.

The Staff (Miss Morris in charge)

### Upper Division Courses

#### 160. Textile Fibers and Finishes. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 6 and Chemistry 8B. Properties of textile fibers in relation to performance and end-use; dyeing and finishing of fabrics; textile maintenance. Mr. Needles

#### \*161. Textile Chemistry. (3) I.

Lecture—3 hours. Prerequisite: course 160. The theory of fiber structure; the relation between chemical structure and physical properties of fibers. The principles of the application of dyes and finishes to textiles. Mr. Zeronian

#### \*161L. Textile Chemistry Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 161 (may be taken concurrently). Laboratory methods and procedures employed in studying chemical and physical properties of textile fibers. Mr. Zeronian

#### 162. Textile Fabrics. (3) II.

Lecture—3 hours. Prerequisite: course 6. The properties of fabrics as related to serviceability, comfort, and appearance. Miss Morris

#### 162L. Textile Fabrics Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 162 (may be taken concurrently). Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance. Miss Morris

\* Not to be given, 1972-73.

† Absent on leave, 1972-73.

**170. Experimental Problems in Clothing Structure.**  
(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 6 and 17B; Design 170B. Design and construction of body coverings utilizing technological innovations in fabrics and new techniques such as fusing and molding.

The Staff (Miss Engel in charge)

**172. Clothing and Society.** (3) II.

Lecture—3 hours. Prerequisite: Economics 1A; Psychology 1A or 10; and a course in sociology or cultural anthropology. The relation of clothing and textiles to social, psychological and economic patterns of families and cultures.

Miss Engel

**197. Introduction to Research in Textiles and Clothing.** (4) II.

Lecture—1 hour; laboratory—9 hours. Prerequisite: Textiles major of senior standing. Senior thesis on independent problems.

The Staff (Mr. Needles in charge)

**198. Directed Group Study.** (1-5) I, II, III.

The Staff (Miss Morris in charge)

**199. Special Study for Advanced Undergraduates.**  
(1-5) I, II, III.

The Staff (Miss Morris in charge)

**Graduate Courses****292. Seminar in Textiles.** (2) I, II, III.

Seminar—2 hours. Selected topics related to the chemical and physical properties of fibers and fabrics. The Staff (Miss Morris in charge)

**298. Group Study.** (1-5) I, II, III.

The Staff (Miss Morris in charge)

**299. Research.** (1-12) I, II, III.

The Staff (Miss Morris in charge)

**Related Courses:** see Consumer Science and Design.

**VEGETABLE CROPS**

*Related Undergraduate Majors and Graduate Study.*—See pages 76, 91, and 172.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Upper Division Courses****100. Principles of Vegetable Crops.** (3) I.

Lecture—3 hours. Prerequisite: Plant Science 1 and 2 or consent of instructor. The vegetable industry. Fundamentals of vegetable crop production, handling, processing and utilization. Demonstrations will supplement the lecture.

Mr. Lorenz

**101. Major Vegetable Crops.** (4) II.

Lecture—4 hours. Prerequisite: Plant Science 1 and 2 or consent of instructor. Adaptation, growth habits and methods of culture and handling of the principal vegetable crops. The application of experimental evidence to production problems is stressed.

Mr. Harrington

**105. Systematic Olericulture.** (2) I.

Laboratory—6 hours. Prerequisite: Botany 2. Origin, history, types, classification, nomenclature, and adaptation of the more important American vegetable varieties; minor vegetable crops; trends in development of new varieties.

Mr. Smith

**118. Seed Physiology and Production.** (3) II.

Lecture—3 hours. Prerequisite: Botany 111B. Physiological factors affecting induction of seedling, seed development, viability and longevity of seed. Principles of seed production. One or more field trips.

Mr. Harrington

**150. Vegetables as World Food Crops.** (3) II.

Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. A technical course concerned with historical and current aspects of production and use of vegetables as human food; ecology, economics, geography, human cultural patterns, dietary preferences, nutritional values, and use of microclimates related to commercial and subsistence production.

Mr. Yamaguchi

**197. Field Study of Vegetable Industry.** (1) III.

Lecture—1 hour; field study—56 hours. Prerequisite: consent of instructor. A 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. (Passed/Not Passed grading only.)

Mr. Flocker

**198. Directed Group Study.** (1-5) I, II, III.

The Staff (Mr. Lyons in charge)

**199. Special Study for Advanced Undergraduates.**  
(1-5) I, II, III. The Staff (Mr. Lyons in charge)**Graduate Courses****\*212. Postharvest Physiology of Vegetables.** (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Comparative physiology of harvested vegetables representing diverse plant structures; emphasis on experimental studies of maturation, compositional and morphological changes, senescence, and physio-

\* Not to be given, 1972-73.

logical disorders; lecture stresses species responses and requirements; laboratory stresses concepts and research procedures. Offered in even-numbered years. Mr. Morris, Mr. Pratt

#### 220. Vegetable Genetics and Improvement. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B; course 105 and Plant Science 113 recommended. Breeding systems of vegetable species as affected by self-incompatibility, flower structure, pollen vectors, and other reproductive factors. Problems of chromosome number and structure, heterosis, pest resistance, and species hybrids peculiar to vegetable improvement. Mr. Rick

#### 221. Vegetable Physiology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 111B and consent of instructor. Physiological and environmental principles involved in the production of vegetable crop species. Mr. Pratt, Mr. Rappaport

#### 290. Seminar. (1) I, II, III.

Discussion—1 hour. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Spurr in charge)

#### 291. Seminar in Postharvest Physiology. (1) I, II, III.

Discussion—1 hour. Prerequisite: consent of instructor. An intensive study of selected topics in the field of postharvest physiology of fruits and vegetables. This seminar will be conducted jointly with Pomology 291. (Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Pratt in charge)

#### 298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Current concepts, techniques, and procedures applicable to research and to the production of vegetables.

The Staff (Mr. Yamaguchi in charge)

#### 299. Research. (1-9) I, II, III.

(Satisfactory/Unsatisfactory grading only.)

The Staff (Mr. Lorenz in charge)

Related Courses: see Plant Science 112, 112L.

## VETERINARY MEDICINE, School of—See page 5 for course listings

### VETERINARY MICROBIOLOGY

Ernst L. Biberstein, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 2004 Haring Hall

#### Professors:

Norman F. Baker, D.V.M., Ph.D.  
Ernst L. Biberstein, D.V.M., Ph.D.  
Hugh S. Cameron, D.V.M., Ph.D., LL.D.  
(*Emeritus*)  
James R. Douglas, Ph.D.  
Michel M. J. Lavoipierre, M.B., Ch.B.  
Delbert G. McKercher, D.V.M., Ph.D.  
John W. Osebold, D.V.M., Ph.D.  
Clyde Stormont, Jr., Ph.D.

#### Associate Professor:

Yuan C. Zee, D.V.M., Ph.D.

#### Assistant Professors:

JaRue S. Manning, Ph.D.  
Audria Matheson, Ph.D.  
Jerold H. Theis, D.V.M., Ph.D.

◇ ◇ ◇

#### Adjunct Professors:

Margaret E. Meyer, Ph.D.  
Moshe Shifrine, Ph.D.

#### Assistant Adjunct Professor:

Niels C. Pedersen, D.V.M., Ph.D.

#### Lecturer:

Edmond C. Loomis, Ph.D.

#### Upper Division Courses

#### 111. Immunogenetic and Electrophoretic Techniques. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 107 (may be taken concurrently) or consent of instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins and enzymes of domestic animals. Mr. Stormont

#### 120. Principles and Techniques of Bacteriology. (2) I.

Lecture—3 hours; laboratory—6 hours (completed in 4 weeks). Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The structure and internal organization of microorganisms, nutrition, cultivation and physiology of bacteria, effects of chemical and physical agents on growth and death of bacteria and mechanisms of antibiotic sensitivity and resistance. Miss Matheson

#### 121. Immunity and Serology. (3) I.

Lecture—3 hours; laboratory—6 hours (completed in 6 weeks). Prerequisite: course 120 or consent of instructor. The principles of immunity and serology. Mr. Osebold, Mr. Stormont

**122. Bacterial and Mycotic Pathogens of Domestic Animals. (4) II.**

Lecture—4 hours; laboratory—8 hours (completed in 5½ weeks). Prerequisite: course 121 or consent of instructor. The biology of infectious animal diseases caused by bacteria and fungi.

Mr. Biberstein, Mr. Osebold

**123. Viral Pathogens of Animals. (3) II.**

Lecture—4 hours; laboratory—8 hours (completed in 4½ weeks). Prerequisite: course 122 or consent of instructor. The biology of infectious diseases caused by viruses. Virus-host relationship with emphasis on pathogenesis, immunity and diagnosis.

Mr. Zee

**124. Veterinary Protozoology. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The protozoan parasites of domestic animals with emphasis on biology, life history, identification, and control.

Mr. Theis

**125. Veterinary Helminthology and Entomology. (5) III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The helminth and arthropod parasites of domestic animals with emphasis on biology, life history, identification, and control.

Messrs. Baker, Douglas, Lavoipierre

**126. Fundamentals of Immunology. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: an introductory course in microbiology; Biochemistry 101A–101B or the equivalent. The immune response and defenses of the host against infection: antibodies, antibody-antigen reactions, hypersensitivity, the immune response and its relationship to disease processes.

Miss Matheson

**127. Medical Microbiology. (5) I.**

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; a working knowledge in fundamental immunology. Principles of infection and resistance; microbial pathogenicity; the bacterial and mycotic pathogens of man, with emphasis on pathogenic mechanisms and ecological aspects of infectious disease.

Mr. Biberstein, Miss Meyer

**128. Biology of Animal Viruses. (3) I.**

Lecture—3 hours. Prerequisite: Biochemistry 101A or the equivalent. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of virus infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses. Mr. Zee, Mr. Manning

**129. Perspectives in Microbiological Research. (2) I.**

Lecture—1 hour; discussion—1 hour. Prerequisite: senior or graduate standing, or consent of instructor. Students contemplating careers in research will become familiar with experimental methods of investigation and with trends of current research within various fields of endeavor open to microbiologists. Students will prepare analyses of research papers in current journals.

Miss Meyer

**130. Animal Virology Laboratory. (4) II.**

Discussion—2 hours; laboratory—6 hours. Prerequisite: course 128 or consent of instructor. Introduction to laboratory procedures employed in the study of animal viruses. Emphasis is placed on propagation, assay, isolation, and identification of animal viruses including viral pathogenesis and serology.

Mr. Zee, Mr. Manning

**199. Special Study for Advanced Undergraduates.**

(1–5) I, II, III.

The Staff (Mr. Biberstein in charge)

**Graduate Courses**

**270. Advanced Immunology. (6) III.**

Lecture—3 hours; laboratory—9 hours. Prerequisite: courses 120–123 or 127 or consent of instructor. Dynamics of infection and resistance: antibody production and manifestations of antigen-antibody reactions, immuno-chemistry, hypersensitivity. Immunological considerations of the groups of disease agents. Offered in even-numbered years.

Mr. Osebold,  
Miss Matheson, Mr. Shifrine

**\*290. Seminar. (1) I, II, III.**

Seminar—1 hour.

The Staff (Mr. Biberstein in charge)

**291. Seminar in Immunology. (1) I, II, III.**

Seminar—1 hour. A discussion of the current topics in immunology.

Mr. Shifrine

**292. Seminar in Animal Virology. (1) I, II, III.**

Seminar—1 hour. A discussion of the current topics in animal virology.

Mr. Zee, Mr. Manning

**293. Seminar in Infectious Diseases. (1) I, II, III.**

Seminar—1 hour. A discussion of the current topics in infectious diseases in man and animals.

Mr. Biberstein

**294. Seminar in Parasitology. (1) I, II, III.**

Seminar—1 hour. A discussion of the current topics in parasitology and entomology.

Mr. Baker

\* Not to be given, 1972–73.

**295A-295B-295C. Clinical Microbiology. (1-1-1)  
I-II-III.**

Discussion—5 hours total; laboratory—6 hours total. Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of laboratory methods to the diagnosis and treatment of infectious animal diseases. (Satisfactory/Unsatisfactory grading only.)  
Messrs. Baker, Mc Kercher, Biberstein

**296. Microbiological Diagnosis. (2-5) I, II, III.**

Laboratory—6-15. Prerequisite: consent of

instructor; concurrent enrollment in course 293 recommended. Identification of microbial pathogens in clinical and pathological specimens. Casework in Veterinary Medical Teaching Hospital diagnostic laboratory. Mr. Biberstein

**298. Group Study. (1-5) I, II, III.**

The Staff (Mr. Biberstein in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Biberstein in charge)

**VITICULTURE AND ENOLOGY**

*Related Undergraduate Majors.*—See pages 83 and 91.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Courses**

**3. Introduction to Wine Making. (3) I, II, III.**

Lecture—3 hours. An introduction to wine technology, including history, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas. Mr. Singleton, Mr. Amerine

**98. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Berg in charge)

**99. Special Study for Undergraduates. (1-5) I, II, III.**

The Staff (Mr. Berg in charge)

**Upper Division Courses**

**105. Systematic Viticulture Including Fruit**

**Maturation and Handling. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Plant Science 2 or consent of instructor. Botanical classification of the grape—the principal varieties, rootstocks, and species; environmental factors affecting maturity and quality of the fruit for raisins, wine and table grapes; raisin making; costs and returns.

Mr. Nelson, Mr. Lider

**116A. General Viticulture. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or consent of instructor. Principles underlying pruning, training, grafting, and propagation of vines; environmental and economic factors affecting choice of vineyard type and location; establishment of vineyards. Mr. Cook

**116B. General Viticulture. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116A. Economics and scientific principles of recommended vineyard management practices including irrigation, mineral and

carbohydrate nutrition, flower development and fruit set, virus and fungal diseases, and insect control. Mr. Cook

**123. Analysis of Musts and Wines. (2) I.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: Chemistry 5; Food Science and Technology 103 recommended. The principles and practice of wine analysis.

Mr. Amerine, Mr. Ough

**124. Wine Production. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8B. Recommended: Chemistry 10, 107B; Food Science and Technology 107A, 107B, Plant Science 2; and courses 3 and 123. The principles and practice of making the various standard types of wines, with special reference to the grape varieties used and the method of vinification required for each. Mr. Webb

**125. Wine Types and Sensory Evaluation. (3) II.**

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Chemistry 8B. Recommended: Food Science and Technology 107A, 107B; and courses 3, 123, and 124. Major types of wines and the factors influencing their quality; principles of sensory evaluation. Mr. Amerine

**126. Wine Processing. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8B. Recommended: Chemistry 10, 107B; Plant Science 2 and courses 3, 123, 124, and 125. Principles and theory of nonbacterial disorders: metal, tartrate, protein, color, oxidation and their control by clarification, refrigeration, filtration and ion exchange. Mr. Berg

**\*140. Distillation Principles and Brandy  
Technology. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5, 8B. Recommended: Chemistry 107B; Food Science and Technology 110A. Principles of distillation including en-

\* Not to be given, 1972-73.

gineering aspects and problems with emphasis upon the alcohol-water system and distillation of wines; brandy types, sensory and chemical analysis and production factors. Offered in odd-numbered years. Mr. Guymon

**190. Proseminar in Viticulture. (1) I.**

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussions of recent advances in viticulture. Mr. Olmo

**191. Proseminar in Enology. (1) I, II, III.**

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussion of recent advances in enology.

Messrs. Amerine, Berg, Webb

**198. Directed Group Study. (1-5) I, II, III.**

Prerequisite: consent of instructor. The Staff (Mr. Berg in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

The Staff (Mr. Berg in charge)

**Graduate Courses**

**208. Plant Hormones and Regulators. (3) I.**

Lecture—3 hours. Prerequisite: Botany 111B; Chemistry 8B; or consent of instructor. Open to qualified upper division students. History, occurrence, extraction, measurement, chemical nature, developmental and physiological effects, role, and theories of action of plant hormones and growth regulators; methods of application of growth regulators and factors altering effectiveness; application in the control of plant and fruit responses. Mr. Weaver, Mr. Addicott

**208L. Plant Hormones and Regulators Laboratory. (2) I.**

Laboratory—6 hours. Prerequisite: course

208 (may be taken concurrently) or consent of instructor. Experiments in plant hormones and regulators using various bioassay methods for auxins, gibberellins, and kinins; preparation and testing of gibberellic acid; extraction and identification of naturally occurring plant hormones. Mr. Weaver

**217. Microbiology of Wine Production. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Biochemistry 101A; Chemistry 5, 8B. Recommended: course 3 or 124, 125, 126, and an upper division course in Bacteriology. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines. Mr. Kunkee

**219. Plant Phenolics. (3) III.**

Lecture—3 hours. Prerequisite: Biochemistry 101B or equivalent and consent of instructor. Flavonoids and other natural phenolic substances of plants; their chemistry, natural occurrence, biochemistry, relation to animal diets, and relation to properties of foods and other products. Mr. Singleton

**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Prerequisite: consent of instructor. Mr. Webb

**298. Group Study. (1-5) I, II, III.**

(Satisfactory/Unsatisfactory grading only.) The Staff (Mr. Berg in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Berg in charge)

**Related Courses:** see Food Science and Technology; Plant Science 112, 112L.

**WATER SCIENCE—See also Soil and Water Science, Soil Science**

**WATER SCIENCE**

*Related Undergraduate Major.*—See page 94.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Course**

**10. Water and Man. (3) III.**

Lecture—3 hours. Water as a factor in civilization and man's environment. Water supply and utilization problems of agricultural, domestic, industrial, and other water users in developed and developing nations. A cultural and technical course providing an introduction to water science and engineering. Mr. Hagan

**Upper Division Courses**

**106. Principles of Soil Water Movement. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 101 (may be taken concurrently or with consent of instructor). An introduction to basic mechanisms of soil water movement with emphasis on infiltration, evaporation, and redistribution within the soil profile. Laboratory measurements of the forces involved in soil water movement.

**110A. Irrigation Principles and Practices. (3) II.**

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricultural students. Principles for relating water, soil, plant and atmospheric conditions to irriga-



tion planning and practices. Selecting lands for irrigation, water-soil-plant relations, irrigation requirements for principal crops, irrigation scheduling for maximum efficiency.

Mr. Henderson

#### 110B. Irrigation Principles and Practices. (3) II.

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricultural students. Farm irrigation distribution systems, water measurement, farm water supply including wells and pumping plants, land preparation for irrigation, water application, and drainage requirements.

Mr. Henderson

#### 116. Processes of Water and Soil Pollution. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Physical, chemical and biological processes, natural and man-made, that cause pollution of water and soil; nature of pollutants, persistence, and control.

Mr. Biggar

#### 120. Ecology of Polluted Waters. (3) II.

Lecture—3 hours. Prerequisite: Biological Sciences 1 and junior standing. The causes and nature of various types of pollution and their effects upon the aquatic biota. Particular emphasis on biological effects of toxic compounds, inorganic compounds, suspended matter, organic matter, salts and heated water on aquatic life.

Mr. Knight

#### 122. Ecological Studies of Streams and Ponds.

(2) I, II, III.

Lecture—1 hour; group and independent research projects. Prerequisite: upper division standing. Analysis of water quality and pollution to field problems resulting from multiple use and effects of man's activities on streams and ponds with emphasis on Putah Creek and Pond. Multidisciplinary student teams will design and conduct projects leading to alternative approaches.

Mr. Knight, Mr. Biggar

#### 124. Man, Waste and Water Quality. (2) II, III.

Discussion sessions; nine field trips. Tour designed to acquaint students with selected water and waste treatment facilities as well as research and pilot projects involved in new approaches in water treatment and renovation.

Mr. Knight

#### 132. Physics of Water Flow. (3) III.

Lecture—3 hours. Prerequisite: elementary calculus, physics. A unified view of the physical phenomena associated with flowing water; laboratory experiments, and field observations as well as elementary computations. Flows and currents in pipes, rivers, oceans, underground, and in the atmosphere.

Mr. Strelkoff

#### 140. Farm Drainage Systems. (2) III.

Lecture—2 hours. Prerequisite: Soil and Wa-

ter Science 101. Drainage principles and methods including investigation of drainage problems, types of drainage systems and layout of farm drains, and drainage requirements for land reclamation and irrigated agriculture.

Mr. Luthin

#### 141. Hydrology. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor. Principles of hydrologic analysis including consideration of precipitation, stream flow and ground water phenomena.

Mr. Burgy

#### 150. Water Law and Water Institutions. (3) I.

Lecture—3 hours. Introductory course in water law and institutions. Current problems. Basic principles, with utilization of case-study method. Water rights: kind, acquisition, adjudication, administration and loss. Water organizations and enterprises: kinds, organization, financing, public regulation. Acreage limitation. Water pollution.

Mr. Malakoff

#### 160. Water Application Systems. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: senior standing in Soil and Water Science or Civil Engineering, or consent of instructor. Design construction and operation of water-application systems (with emphasis on farm irrigation methods) and appurtenant structures. Preparation of land for irrigation. Problem solving and field and laboratory exercises.

Mr. Pruitt

#### 170. Irrigation and Drainage Management in the Field. (6) (Extra Session—Summer).

Lecture—86 hours total; laboratory and field trips—66 hours total. Prerequisite: senior standing in soil and water science or engineering, or consent of instructor. Discussions, laboratory and field exercises, including assessment of soil and water resources; irrigation methods; soil-plant-water relations; water quality and salinity; drainage; irrigation scheduling; and production economics in irrigated agriculture.

The Staff (Mr. Luthin in charge)

#### 198. Directed Group Study. (1–5) I, II, III, (Summer)

The Staff (Mr. Luthin in charge)

#### 199. Special Study for Advanced Undergraduates. (1–5) I, II, III, (Summer)

Prerequisite: senior standing.

The Staff (Mr. Luthin in charge)

#### Graduate Courses

#### 200. Water-Soil-Plant Relationships in Irrigation Programming. (3) III.

Lecture—3 hours. Prerequisite: Soil and Water Science 104 or consent of instructor. Selected topics including prediction of crop

responses to irrigation, evapotranspiration and water requirements, production functions, strategy for using limited water supplies, and irrigation planning and operations for optimizing water use and crop production under conditions of developed and developing nations. Mr. Hagan

**201. Water in Physiology and Biochemistry of Plants. (3) II.**

Lecture—3 hours. Prerequisite: Botany 111; Chemistry 5. Recommended: Biochemistry 101B; Botany 205A and a course in physical chemistry. Solute-water interactions; water and the structure of biological macromolecules; cell-water relations; physiology and biophysics of water uptake, transport and dissipation by plants; physiology and biochemistry of stomata; water stress and plant metabolism. Mr. Hsiao

**202. Evapotranspiration. (2) II.**

Lecture—2 hours. Prerequisite: Atmospheric Sciences 20 and 20L, or Agricultural Engineering 107, or consent of instructor. Radiation and energy balances of water, soil and vegetative surfaces and the effects of wind, temperature, humidity thereon. Lysimeter and other measurement techniques. Prediction of evapotranspiration from aerodynamic, energy balance, and empirical approaches. Mr. Pruitt

**215. Advanced Topics in Water Chemistry. (3) II.**

Lecture—3 hours. Prerequisite: Soil and Water Science 102; Chemistry 110C and Soil and

Water Science 103 recommended. An advanced course in water chemistry emphasizing principles governing interactions of ionic constituents in water with soils and plants. Topics include electro-kinetic properties of clays, diffusion mechanisms, hydrodynamic dispersion during leaching, and irreversible thermodynamics in soil-salt systems. Mr. Biggar

**250. Physics of Soil Water Movement. (3) I.**

Lecture—3 hours. Prerequisite: Mathematics 22C or consent of instructor; course 106 recommended. The physics of fluid flow through porous media; miscible and immiscible displacement theories; theory of capillary pressure and pore size distribution with emphasis on unsaturated flow problems; physical aspects of permeability, porosity, specific surface and pore structure. Offered in even-numbered years. Mr. Nielsen

**290. Seminar. (1) II.**

Seminar—1 hour. Prerequisite: graduate standing. To critically review relevant water quality problems and review recent water quality research and literature. Mr. Knight

**298. Group Study. (1-5) I, II, III (Summer).**

The Staff (Mr. Luthin in charge)

**299. Research. (1-12) I, II, III (Summer).**

(Satisfactory/Unsatisfactory grading only.)  
The Staff (Mr. Luthin in charge)

**WILDLIFE AND FISHERIES BIOLOGY**

*Major Advisers.*—See *Class Schedule* listing.

*Major Program.*—See page 96.

Questions pertaining to the following courses should be directed to the instructor or the Dean's Office, College of Agricultural and Environmental Sciences, 228 Mrak Hall.

**Lower Division Course**

**2. Wildlife Biology. (4) III.**

Lecture—4 hours. Prerequisite: Biological Sciences 1. Principles underlying the biology and effective management and conservation of fish, waterfowl, small mammals, upland game species. Included are effects of man-related activities on wild game species and the biological, social, economical, and political considerations involved. \_\_\_\_\_, Mr. Schwab

**Upper Division Courses**

**101. Field Studies in Wildlife and Fisheries**

**Management. (5) (Extra Session—Summer)**

Lecture—2 hours; laboratory—24 hours. Prerequisite: course 2. An intensive five-week field study of the biology and management of wildlife resources. Emphasis is placed on individual

field investigation which affords the student the opportunity to implement the knowledge gained in other courses relating to the biology and management of wildlife and fisheries.

\_\_\_\_\_, Mr. Raveling, Mr. Schwab

**108. Comparative Nutrition of Wildlife and Fish.**

**(4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B. The principles of nutrition and their application to feeding problems related to wild animals (ruminants and non-ruminants), birds and fish in their natural habitats and in captivity. Mr. Weir

**110A. Biology and Management of Wild Mammals.**

**(3) I.**

Lecture—3 hours. Prerequisite: upper division courses in mammalogy, ecology, and physiology, or consent of instructor. Integrated introduction to the biology, ecology, and management of nondomestic mammals. Emphasis is on the natural history, anatomical and physiological adaptations of the species to its environment, species interactions, and economic considerations of selected mammalian groups. Mr. Schwab

**110B. Principles of Fish Management. (3) II.**

Lecture—3 hours. Prerequisite: course 2; Zoology 2; or consent of instructor. History of fish management; properties of fish populations and their environment; principles of fish population control; fish husbandry methods; fish resource economics and aesthetics. Primary emphasis upon fish of inland waters.

**110C. Biology and Management of Waterfowl and Upland Game Birds. (3) III.**

Lecture—3 hours; one or more field trips (weekend) optional. Prerequisite: course 2 or consent of instructor. Phylogeny, geographical distribution, migration, reproduction, population dynamics, behavior, and physiological-ecology of waterfowl and upland game birds. Primary emphasis upon exploited species with reference to their interactions with man and man-induced environmental changes. Mr. Raveling

**130. Biology of Fish. (5) I.**

Lecture—4 hours; laboratory—3 hours. Prerequisite: upper division courses in genetics, nutrition, and physiology or consent of instructor. Introductory morphology, phylogeny, physiology, growth, reproduction, behavior, adaptation, and energy relations of fish with special emphasis on *Salmonid* species.

**131. Genetics of Animal Adaptation. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B (may be taken concurrently). Genetic principles applied to natural populations; species as plastic elements subject to genetic change through environmental influences and interaction with other species; the role of adaptation in population ecology and development. (Same course as Genetics 131.)

Mr. Gall, Mr. Laben

**135. Ecology and Management of Large Mammals. (3) III.**

Lecture—3 hours. Prerequisite: course 110A or consent of instructor. Emphasis on ecology and management principles of North American ungulates with other selected examples. Includes population dynamics, reproduction, parasites, diseases, and management problems.

Mr. Longhurst

**135L. Laboratory in Ecology and Management of Large Mammals. (1) III.**

Laboratory—3 hours. Prerequisite: course

135 (to be taken concurrently). Laboratory and field trips to complement course 135.

Mr. Longhurst

**151. Wildlife Ecology. (3) II.**

Lecture—3 hours. Recommended: course 2. Consideration of the ecology of wildlife species in man-disturbed environments, including ecological aspects of wild vertebrates in relation to reforestation, range management, and pollution; the relationship of wildlife to recreation and wildlands; and resource conservation in the human ecosystem.

Mr. Howard

**152. Principles of Vertebrate Control. (3) III.**

Lecture—3 hours. Prerequisite: course 2; course 151 recommended. The philosophical, historical, ecological, behavioral, and economical basis for regulating population levels of species of terrestrial vertebrates found throughout the world.

Mr. Howard

**190. Proseminar in Wildlife and Fisheries Biology.**

(1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in Wildlife and Fisheries Biology or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. (Passed/Not Passed grading only.)

The Staff (Mr. Boda in charge)

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Mr. Boda in charge)

**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff (Mr. Boda in charge)

**Graduate Courses****298. Group Study. (1-5) I, II, III.**

Lectures and/or discussions—1-5 hours.

The Staff (Mr. Boda in charge)

**299. Research. (1-12) I, II, III.**

The Staff (Mr. Boda in charge)

**Related Courses:** see Avian Sciences 13, 13L, 150; Entomology 104, 116; Environmental Studies 140, 144; Resource Sciences 101; Zoology 116, 125, 133A-133B, 136, 137.

**WORK-LEARN****Upper Division Course****192. Internship. (1-15) I, II, III.**

Laboratory—3-40 hours. Prerequisite: consent of instructor. Work-learn experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sci-

ences. Internships supervised by a member of the faculty. Student transcripts show the field in which an internship is taken (Passed/Not Passed grading only.)

College of Agricultural and Environmental Sciences Faculty

## ZOOLOGY

Ronald J. Baskin, Ph.D., *Chairman of the Department*

Everett W. Jameson, Jr., Ph.D., *Vice-Chairman of the Department*

Department Office, 2320 Storer Hall

### Professors:

Ronald J. Baskin, Ph.D. (*Zoology and Physiology*)

Milton Hildebrand, Ph.D. (*Zoology and Applied Behavioral Sciences*)

Everett W. Jameson, Jr., Ph.D.

Milton A. Miller, Ph.D.

<sup>1</sup>Lauren E. Rosenberg, Ph.D.

Robert L. Rudd, Ph.D.

George W. Salt, Ph.D.

Herman T. Spieth, Ph.D.

Tracy I. Storer, Ph.D., LL.D. (*Emeritus*)

Kenneth E. F. Watt, Ph.D., LL.D.

### Associate Professors:

David W. Deamer, Ph.D.

Stephen L. Wolfe, Ph.D.

### Assistant Professors:

Peter B. Armstrong, Ph.D.

John H. Crowe, Ph.D.

Robert D. Grey, Ph.D.

William M. Hamner, III, Ph.D.

Ann E. Kammer, Ph.D.

Arthur M. Shapiro, Ph.D.

◇ ◇ ◇

### Professors:

Norman F. Baker, D.V.M., Ph.D.

(*Veterinary Microbiology*)

James R. Douglas, Ph.D. (*Veterinary Microbiology*)

### Bachelor of Arts Major Program

Lower Division Courses.—Required: Biological Sciences 1; Zoology 2; Chemistry 1A-1B and 8A-8B (or Chemistry 128A-128B-128C), Chemistry 1A-1B (or 4A-4B-4C) and 8A-8B (or 128A-128B-128C); Physics 2A-2B-2C; Mathematics 13 or 16A-16B. Recommended: Botany 2; Bacteriology 2; Chemistry 1C.

Upper Division Courses.—Required: Genetics 100A-100B; Zoology 148 or Genetics 103; an additional 27 units of advanced biological science which must include at least one course (or course sequence, if specified) from two of the following core areas: (a) Morphology—Zoology 100, 105, 106, 107, 110, 112; (b) Cell Biology-Physiology, with laboratory—Zoology 120, 121A, 121B (121L with any one of these three), 142-142L, 160, Physiology 110A-110B-111A-111B (all four courses); (c) Ecology—Zoology 114, 116, 125, 133A, 133B, 136, 137. Of this

<sup>1</sup>Absent on leave, 1972-73.

27-unit requirement, at least 15 units must be taken in the Zoology Department, and not more than 5 units in the 190 series may be counted. Recommended: Biochemistry 101A, 101B.

### Bachelor of Science Major Program

Lower Division Courses.—Required: Biological Sciences 1; Zoology 2; and Botany 2 or Bacteriology 2; Chemistry 1A-1B-1C (or 4A-4B-4C) and 8A-8B (or Chemistry 128A-128B-128C); Physics 2A-2B-2C; Mathematics 13 and 16A-16B. Recommended: Chemistry 5; Mathematics 16C.

Upper Division Courses.—Required: Biochemistry 101A-101B; Genetics 100A-100B; Zoology 148 or Genetics 103; an additional 30 units of advanced biological science which must include at least one course (or course sequence, if specified) from each of the following core areas: (a) Morphology—Zoology 100, 105, 106, 107, 110, 112; (b) Cell Biology-Physiology with laboratory—Zoology 120, 121A, 121B (121L with any one of these three), 142-142L, 160, Physiology 110A-110B-111A-111B (all four courses); (c) Ecology: Zoology 114, 116, 125, 133A, 133B, 136, 137. Of this 30-unit requirement, at least 15 units must be taken in the Zoology Department, and not more than 5 units in the 190 series may be counted.

The Bachelor of Science program may be adopted by students in either the College of Letters and Science or the College of Agricultural and Environmental Sciences.

*Graduate Study.*—The Department of Zoology offers programs of study and research leading to the M.A. and Ph.D. degrees. For detailed information regarding graduate study write to the Graduate Adviser, Department of Zoology.

*Teaching Major.*—Requirements for students planning to be primary or secondary teachers, with a major in zoology, are the same as for the Bachelor of Arts degree in zoology.

*Teaching Minor.*—Required: 30 units in biological sciences, including Biological Sciences 1, Zoology 2, and 18 units of upper division courses in zoology or closely related fields chosen in consultation with the subject representative. Recommended: an upper division course in invertebrate zoology and an upper division course in each of as many other areas of zoology as possible (e.g., cell biology, physiology, ecology, genetics, morphology, evolution).

Students who plan to be teachers should consult the Department of Education in regard to further preparation for certification.

## Physiology

### Lower Division Courses

#### 2. Introductory Physiology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1. The physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion.

#### 2L. Introductory Physiology Laboratory. (3) I.

Laboratory—6 hours. Prerequisite: course 2, completed or in progress. One credit for reading and report writing done outside the laboratory

#### 10. Elementary Physiology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open for credit to students who have had Biological Sciences 1. An introductory course in physiology for nonscience majors.

Mr. Deamer

## Zoology

### Lower Division Courses

#### 2. General Zoology. (6) I, II, III.

Lecture—3 hours; discussion—1 hour; laboratory—6 hours. A survey of the diversity of animal life and the basic principles of adaptation, evolution, and integration in animals.

I. Mr. Miller; II. Mr. Shapiro; III. Mr. Jameson

#### 33. Seminar in Vertebrate Zoology. (2) III.

Seminar—1½ hours; 2–4 field trips. Prerequisite: A strong interest in vertebrate biology. Open to freshmen and sophomores only. Introduction to some of the basic aspects of the biology of wild vertebrates. Limited enrollment. (Passed/Not Passed grading only.)

Mr. Jameson

#### 99. Special Study for Lower Division Students.

(1–5) I, II, III.

Directed study of a specific topic selected by the student and the instructor.

The Staff (Chairman in charge)

### Upper Division Courses

#### 100. Embryology. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1; Zoology 2 recommended. The events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates.

I. Mr. Grey; II. ———; III. Mr. Armstrong

#### 105. Phylogenetic Analysis of Vertebrate Structure. (5) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. The structure of the classes

and subclasses of vertebrates is described and interpreted in terms of phylogeny.

Mr. Hildebrand

#### 106. Functional Analysis of Vertebrate Structure. (4) III.

Lecture—2 hours; laboratory-demonstration—4 hours; project report. Prerequisite: course 2. Mechanical principles are used to interpret the structures associated with supporting the body, running, digging, climbing, swimming, and feeding.

Mr. Hildebrand

#### 107. Microanatomy. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. The finer structure and activities of organs, tissues, and cells of vertebrates, with emphasis on those of mammals.

Mr. Rosenberg

#### 110. Protozoology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1. Structure, life history, and ecology of the groups of protozoa with emphasis on relationships to biological problems.

Mr. Rosenberg

#### 112. Invertebrate Zoology. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Comparative anatomy, classification, and phylogeny of the invertebrate metazoa.

Mr. Miller

#### \*114. Invertebrate Physiological Ecology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112. Physiology, behavior, and ecology of the invertebrate metazoa. Field trips.

#### 115. Problems in Marine Biology. (15) III.

Prerequisite: course 112 or equivalent and consent of instructor. Full-time study at Bodega Marine Laboratory. Lectures, laboratory, field work and directed study in selected topics, stressing experience in original research. Limited enrollment.

Mr. Miller

#### 116. Principles of Animal Resource Management. (5) I.

Lecture—3 hours; laboratory—3 hours; special projects. Prerequisite: Biological Sciences 1; Mathematics 13 and 16A. Population dynamics and management of marine, freshwater, and terrestrial animal resources; analysis and solution of problems in maximization of animal resource production.

Mr. Watt

#### 120. Introduction to Cell Biology. (4) I.

Lecture—3 hours; extensive reading; research report. Prerequisite: Biochemistry 101A, 101B. The physicochemical aspects of cellular organization and function.

Mr. Baskin

\* Not to be given, 1972–73.

**121A. Cell Biology. (4) II.**

Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B. Structure and function of living systems at the molecular and subcellular level, including molecular organization of membranes, models of membrane structure, photosynthesis and respiration. Mr. Deamer

**121B. Cell Biology. (4) III.**

Lecture—4 hours. Prerequisite: course 121A. Structure and function of living systems at the molecular and subcellular level, concentrating on synthetic mechanisms in the nucleus and cytoplasm, including cell division. A continuation of 121A. Mr. Wolfe

**121L. Cell Biology Laboratory. (2) III.**

Laboratory—6 hours. Recommended: course 121A and/or 121B. Exercises illustrating the principles of cell biology; emphasis on individual research employing one or more advanced techniques. Mr. Deamer, Mr. Wolfe

**125. Animal Ecology. (3) II.**

Lecture—3 hours. Prerequisite: course 2 and one course in biological science having at least part of the studies conducted in the field (e.g., courses 112, 133A, 133B, 136, 137, Botany 108 or Botany 117). Theory of relationships between animals and their environments. Mr. Salt

**133A. Taxonomy and Field Biology of Amphibians and Reptiles. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Biology, adaptive morphology, and environmental distribution of amphibians and reptiles. Mr. Jameson

**133B. Taxonomy and Field Biology of Fishes. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Biology, adaptive morphology, and environmental distribution of fishes. Mr. Jameson

**136. Mammalogy. (5) III.**

Lecture—2 hours; laboratory—6 hours; weekend field trips. Prerequisite: course 125 or consent of instructor. Systematics, ecology and life history of mammals with emphasis on Western North America. Offered in even-numbered years. Limited enrollment. Mr. Rudd

**137. Ornithology. (5) III.**

Lecture—2 hours; laboratory—6 hours; weekend field trips. Prerequisite: course 125 or consent of instructor. Systematics, ecology and life history of birds with emphasis on Western North America. Offered in odd-numbered years. Limited enrollment. Mr. Rudd

**142. Invertebrate Physiology. (3) I.**

Lecture—3 hours; extensive reading and research report. Prerequisite: course 112, Chem-

istry 1A, 1B, Physics 2B; Biochemistry 101A, 101B recommended. Comparative physiology of invertebrate organ systems. Mr. Crowe

**142L. Invertebrate Physiology Laboratory. (2) I.**

Laboratory—6 hours; independent study and research report. Prerequisite: course 142 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Mr. Crowe

**147. Zoogeography. (4) II.**

Lecture—3 hours. Prerequisite: course 2 or Entomology 1. Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals. Mr. Jameson

**148. Animal Phylogeny and Evolution. (5) I.**

Lecture—5 hours. Prerequisite: course 2 or Entomology 1. Recommended: course 147 and Genetics 100B. The origins and relationships of the major groups of animals, with emphasis on the analysis of variation and the mechanics of evolutionary change. Mr. Rudd

**155. Animal Social Systems. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Behavioral structure, organization, function and evolution of animal societies. Mr. Spieth

**160. Invertebrate Neurophysiology. (5) III.**

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: an upper division course in physiology or physicochemical biology or invertebrate zoology. Comparisons of the nervous systems of invertebrates with emphasis on nervous processes related to behavior.

**197. Senior Colloquium in Zoology. (2) III.**

Lecture-discussion—2 hours. Prerequisite: senior standing. The consideration of innovation and synthesis in broad areas of zoology. (Passed /Not Passed grading only.) The Staff

**197T. Tutoring in Zoology. (1-5) I, II, III.**

Discussion—1-2 hours. Prerequisite: major in zoology; consent of instructor. Experience in teaching zoology under guidance of staff. The Staff (Chairman in charge)

**198. Directed Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**199. Special Study for Advanced Undergraduates. (1-5) I, II, III.**

Directed study of a specific topic selected by the student and the instructor. The Staff (Chairman in charge)

**Graduate Courses**

**201A. Ecological Theory. (3) I.**

Lecture—2 hours; discussion—1 hour. Pre-

requisite: a course in ecology. The course will focus on the ecologic community as a unit. The major generalizations concerning structure and functioning of the community will be examined together with the generalizations relating both structure and function to the abiotic environment and its fluctuations. (Same course as Botany, Ecology and Geology 201A.)

The Staff (Mr. Salt and Mr. Major in charge)

#### 201B. Analysis of A Selected Ecosystem. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 201A or consent of instructor. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by specialists from several fields. May be repeated for credit. (Same course as Botany, Ecology and Geology 201B.)

The Staff (Mr. G. L. Webster in charge)

#### 201C. The Changing Biosphere. (3) III.

Lecture—2 hours; 1 assigned problem. Prerequisite: courses 201A, 201B; or consent of instructor. Course deals with changing gas balance and weather in the biosphere and effects on plants and animals, the effects of structural, chemical and physical changes on living systems, changes in species diversity, effects of human population increase, and related topics. (Same course as Botany, Ecology and Geology 201C.)

The Staff (Mr. Myrup in charge)

#### 202. Biomathematics. (6) II.

Lecture—4 hours; laboratory—6 hours. Prerequisite: two courses in calculus; three courses in statistics. Mathematical aspects of physiology, ecology, and epidemiology; development and testing of models, mathematical description of biological systems; measurement, analysis, simulation and optimization in biology.

Mr. Watt

#### 222. Mathematical Models of Ecosystems. (4) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Mathematics 16B or 21B; Mathematics 105B or 231C; course 116 or 125. Use of mathematical models and computer simulation to discover effect of varying behavioral, physiological, population, and community parameters on energy flux in ecosystems. Offered in odd-numbered years.

Mr. Watt

#### 223. Seminar in Fisheries Management. (4) III.

Seminar—4 hours. Prerequisite: course 116; Mathematics 16B, 105B. Analysis of fish population problems, including review of recent research. Offered in even-numbered years.

Mr. Watt

#### \*224. Developmental Biology. (5) I.

Lecture—1 hour; discussion—1 hour; laboratory—6 hours; 1 weekend laboratory trip. Pre-

\* Not to be given, 1972-73.

requisite: course 100 and consent of instructor; Biochemistry 101 recommended. Introduction to research in development. Observations and experiments involving a variety of developing systems and experimental methods, with critical interpretation of the results. Open to qualified undergraduates. The first weekend of the quarter is spent at Bodega Marine Laboratory.

#### 225A. Advanced Developmental Biology: Morphogenesis. (4) II.

Lecture—4 hours. Prerequisite: course 100. Development of form and structure; morphogenetic movement, differential growth, pattern formation; interaction of cells and tissues during development.

Mr. Armstrong

#### 225B. Advanced Developmental Biology: Cell Differentiation. (5) III.

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 100, Biochemistry 101B; Genetics 104 recommended. Current concepts of cell differentiation, principally in animal systems. Topics include properties of major differentiated cell types, and principal mechanisms of control.

Mr. Grey

#### 228. Experimental Animal Ecology. (3) III.

Lecture—2 hours; 3 weekend field trips, 2 written critiques. Prerequisite: course in animal ecology; selected undergraduates may be admitted with consent of instructor. 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.

Mr. Salt

#### 240. Muscle Physiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: an upper division course in animal physiology; Mathematics 16B or 21B; or consent of instructor. The physical and chemical aspects of muscle function.

Mr. Baskin

#### 250. Recent Developments in Zoology. (1) II.

Seminar—1 hour. Prerequisite: graduate standing in Zoology.

The Staff

#### 251. Seminar in Advanced Cytology. (2) I.

Seminar—2 hours. Prerequisite: consent of instructor. Topics of current interest in the ultrastructure and function of cells. May be repeated for credit.

Mr. Wolfe

#### 287. Seminar in Animal Behavior. (2) II.

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior.

Mr. Spieth



**288. Seminar in Physicochemical Biology. (2) III.**

Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the physicochemical aspects of the organization and function of living systems. Physicochemical properties on the molecular and cellular levels will be considered.

Mr. Baskin

**292. Seminar in Development. (2) II.**

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms.

Mr. Armstrong, Mr. Grey

**293. Seminar in Invertebrate Zoology. (2) II.**

Seminar—2 hours. Prerequisite: course 112 or consent of instructor. Critical review of the literature in selected topics and taxa in the invertebrata. Open to qualified undergraduates.

Mr. Miller, ———

**294. Seminar in Animal Ecology. (3) I.**

Seminar—3 hours. Prerequisite: course 125 or consent of instructor. Readings and discussions of advanced topics in the population and community ecology of animals.

Mr. Rudd, Mr. Salt

**297. Seminar in Systematic Zoology and Evolution.**

(2) III.

Seminar—2 hours. Prerequisite: consent of instructor. Principles of animal classification, speciation, and the evolution of higher categories; emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.

Mr. Rudd

**298. Group Study. (1-5) I, II, III.**

The Staff (Chairman in charge)

**299. Research. (1-9) I, II, III.**

The Staff (Chairman in charge)

## THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

### Regents ex Officio

RONALD REAGAN  
Governor of California and President  
of The Regents

ED REINECKE  
Lieutenant Governor of California

ROBERT MORETTI  
Speaker of the Assembly

WILSON C. RILES  
State Superintendent of Public  
Instruction

ALLAN GRANT  
President of the State Board of  
Agriculture

JOSEPH A. MOORE, JR.  
President of the Mechanics' Institute

CHRISTIAN E. MARKEY, JR.  
President of the Alumni Association  
of the University of California

CHARLES J. HITCH  
President of the University

WILLIAM B. KEENE  
Regent Designate

BERT L. SMITH  
Regent Designate

### Appointed Regents

EDWARD W. CARTER  
MRS. RANDOLPH A. HEARST  
JOHN E. CANADAY  
NORTON SIMON  
WILLIAM E. FORBES  
WILLIAM M. ROTH  
MRS. EDWARD H. HELLER  
FREDERICK G. DUTTON

WILLIAM K. COBLENTZ  
DEWITT A. HIGGS  
W. GLENN CAMPBELL  
WILLIAM FRENCH SMITH  
ROBERT O. REYNOLDS  
DEAN A. WATKINS  
JOHN H. LAWRENCE, M.D.

### Principal Officers of The Regents

RONALD REAGAN  
Governor of California, President

MRS. EDWARD H. HELLER  
Vice Chairman

WILLIAM FRENCH SMITH  
Chairman

THOMAS J. CUNNINGHAM  
General Counsel

OWSLEY B. HAMMOND  
Treasurer

MISS MARJORIE J. WOOLMAN  
Secretary

## ADMINISTRATIVE OFFICERS—UNIVERSITYWIDE

*President of the University*  
Charles J. Hitch

*Vice President of the University*  
Chester O. McCorkle, Jr.

*Vice President—University Relations*  
Robert L. Johnson

*Vice President—Academic Affairs*  
Angus E. Taylor

*Vice President—Administration*  
John A. Perkins

*Vice President—Agricultural Sciences*  
James B. Kendrick, Jr.

*Vice President—Educational Relations*  
Frank L. Kidner

*Vice President—Governmental Relations*  
Jay D. Michael

*Vice President—Planning*  
Joseph W. McGuire

*Vice President—Public Service Programs  
and University Dean of University  
Extension*

David P. Gardner

**UNIVERSITYWIDE OFFICERS EMERITI**

*President of the University, Emeritus:*

Robert Gordon Sproul

*Vice President of the University,  
Emeritus, and Dean of the College  
of Agriculture, Emeritus:*

Claude B. Hutchison

*Vice President of the University, Emeritus:*

Harry R. Wellman

*Vice President, Emeritus:*

Robert M. Underhill

*Vice President—Governmental Relations  
and Projects, Emeritus:*

James H. Corley

**UNIVERSITY CHANCELLORS**

*Chancellor at Berkeley:*

Albert H. Bowker

*Chancellor at Davis:*

James H. Meyer

*Chancellor at Irvine:*

Daniel G. Aldrich, Jr.

*Chancellor at Los Angeles:*

Charles E. Young

*Chancellor at Riverside:*

Ivan H. Hinderaker

*Chancellor at San Diego:*

William D. McElroy

*Chancellor at San Francisco:*

Philip R. Lee

*Chancellor at Santa Barbara:*

Vernon I. Cheadle

*Chancellor at Santa Cruz:*

Dean E. McHenry

**GENERAL ADMINISTRATIVE OFFICERS—DAVIS**

*Chancellor:*

James H. Meyer, Ph.D.

*Chancellor Emeritus:*

Emil M. Mrak, Ph.D.

*Vice Chancellors:*

Elmer W. Learn, Ph.D., Executive Vice  
Chancellor

William F. Dukes, Ph.D., Vice  
Chancellor—Academic Affairs

Arthur C. Small, M.B.A., Vice  
Chancellor—Business and Finance

Thomas B. Dutton, Ed.D., Vice  
Chancellor—Student Affairs

*Executive Assistant to the Chancellor:*

Lorena J. Herrig

*Assistant Vice Chancellors:*

Robert S. Downie, B.S., Assistant Vice  
Chancellor—Student Affairs

Robert W. Glock, M.B.A., Assistant  
Vice Chancellor—Planning

John W. Mamer, Ph.D., Assistant Vice  
Chancellor—University and Public  
Programs

Scott T. Rickard, Ed.D., Assistant Vice  
Chancellor—Student Development

Maynard C. Skinner, Ed.D., Assistant  
Vice Chancellor—Student Affairs,  
Registrar and Admissions Officer

F. Edwin Spafford, M.Ed., Assistant  
Vice Chancellor—Physical Construc-  
tion and Maintenance

Eugene D. Stevenson, M.A., Assistant  
Vice Chancellor—Student Affairs

*University Librarian:*

J. Richard Blanchard, M.S.

## Deans

### College of Agricultural and Environmental Sciences

Alex F. McCalla, Ph.D., *Dean*  
Sterling Chaykin, Ph.D., *Associate Dean*  
Glenn R. Hawkes, Ph.D., *Associate Dean*  
Donald R. Nielsen, Ph.D., *Associate Dean*  
Harry O. Walker, Ed.D., *Associate Dean*

### College of Engineering

John D. Kemper, Ph.D., *Dean*  
Don O. Brush, Ph.D., *Associate Dean*  
John B. Powers, Ph.D., *Associate Dean*

### College of Letters and Science

Lawrence J. Andrews, Ph.D., *Dean*  
Roland W. Hoermann, Ph.D., *Associate Dean*  
Hendrick J. Ketellapper, Ph.D., *Associate Dean*  
Robert A. Wiggins, Ph.D., *Associate Dean*

### Division of Biological Sciences (Intercollege)

S. Richard Snow, Ph.D., *Associate Dean*

### Division of Environmental Studies (Intercollege)

Robert S. Loomis, Ph.D., *Associate Dean*

### School of Law

Daniel J. Dykstra, LL.B., S.J.D., *Dean*

### School of Medicine

C. John Tupper, M.D., *Dean*  
Alexander Barry, Ph.D., *Associate Dean*  
Loren D. Carlson, Ph.D., *Associate Dean*  
Morton Levitt, Ph.D., *Associate Dean*  
Earl F. Wolfman, Jr., M.D., *Associate Dean*

### School of Veterinary Medicine

William R. Pritchard, D.V.M., Ph.D., J.D., *Dean*  
James R. Douglas, Ph.D., *Associate Dean*  
Jerry R. Gillespie, D.V.M., Ph.D., *Associate Dean*  
R. H. McCapes, D.V.M., *Associate Dean*  
Edward A. Rhode, D.V.M., *Associate Dean*

### The Graduate Division

Allen G. Marr, Ph.D., *Dean*  
David L. Jacobson, Ph.D., *Associate Dean*  
Richard L. Lander, Ph.D., *Associate Dean*  
Martin P. Oettinger, Ph.D., *Associate Dean*

### University Extension

Glen Burch, Ed.D., *Dean*  
John W. Mamer, *Associate Dean*

- Absence, leave of (*see* Withdrawal)
- Academic Senate, 9
- Adding or dropping courses, 26
  - in Letters and Science, 146
- Administration, University, 9
- Administrative officers, general, 449
  - at Davis, 450
  - of the colleges and schools, 451
- Admission to the University, 16-25
  - application procedures, 22
  - by examination, 18
  - change of campus, 24
  - eligibility, notification of, 24
  - failure to register, 24
  - in advanced undergraduate standing, 24
  - in freshman standing, 16
  - in graduate standing, 25
  - in limited status, 21
  - in special status, 21
  - intention to register, statement of, 24
  - intercampus transfer, 24
  - of applicants for second bachelor's degree, 22
  - of applicants from other countries, 20
  - of out-of-state applicants, 16
  - preparatory high school subjects, 16
  - reapplication, 24
  - transcript of record for, 23, 24
- Admission requirements in the
  - College of Engineering, 106
  - Graduate Division, 174
  - Professional schools, 170
  - School of Law, 154
  - School of Medicine, 167
  - School of Veterinary Medicine, 162
- Advanced undergraduate standing, require-
  - ments for admission, 24
- Advanced placement tests, 151
- Advisers
  - faculty (*see also* under various departments), 11
  - College of Agricultural and Environmental Sciences, 59
  - College of Engineering, 106
  - College of Letters and Science, 146
  - for international students, 50
  - peer, 48, 60
- Aerospace Engineering, curriculum, 117
- Afro-American (Black) Studies, 144, 182
- Agricultural
  - Business Management, requirements for the major, (*see* Agricultural Economics)
  - Chemistry, graduate group, 173, 182
  - Economics, 67, 183
  - courses in, 183
- Agricultural (continued)
  - Economics and Business Management, major in, 67
  - Education
    - courses in, 186
    - major in, 66, 68
  - Engineering, Department of, 187, 256
    - courses in, 187, 256
    - curriculum, 118
    - genetics (*see* Genetics)
    - History Center, 13
    - placement service, 60
    - Practices, program, 60, 188
    - processing, 119
    - Science and Management
      - courses in, 188
      - graduate group, 173
      - major in, 65, 69
    - Sciences, Division of, 65
    - Toxicology, *see* Environmental Toxicology
  - Agricultural and Environmental Sciences, College of, 57
    - advising, 59-62
    - college requirements, 62
    - disqualification and probation rules, 31
    - faculty and research departments, 98
    - graduate instruction and degrees, 172
    - honors, 64
    - index of courses (*see* Contents)
    - majors and special programs, 65
    - passed or no record (or not passed) grading, 63
    - scholarships, 64
    - study-list requirements, 62
    - teaching credentials, 65, 69, 177
    - teaching divisions, 65
    - work-learn program, 60
  - Agronomy and Range Science, (*see also* Plant Science)
    - courses in, 189
    - field of interest, 91
  - American History and Institutions, 33
  - American History and Literature, committee, *see* American Studies
  - American Studies
    - courses in, 191
    - major program, 190
  - Anatomy, Department of, 192
    - courses in, 192
    - graduate group, 173
  - Anesthesiology, 357
  - Animal Biochemistry, (*see* Biochemistry)
  - Animal Genetics, (*see* Genetics)
  - Animal Husbandry, 69, 70
  - Animal Nutrition (*see* Nutrition)
  - Animal Physiology, (*see* Physiology)

- Animal Science  
 courses in, 194  
 major in, 65, 70
- Anthropology, Department of, 196  
 courses in, 197  
 major program, 196
- Application for admission, procedures, 22  
 Graduate Division, 174  
 Law, 155  
 Medicine, 159  
 Veterinary Medicine, 161
- Applied  
 Behavioral Sciences  
 courses in, 201  
 major in, 66, 71  
 Chemistry, specialization in, 124  
 Economics and Behavioral Sciences,  
 Division of, 66  
 Genetics, 309  
 Science  
 courses in, 258  
 department of, 258  
 graduate study, 138
- Approved living quarters, 43
- Arboretum, 13
- Archaeology, courses in (*see* Anthropology)
- Architecture, courses in (*see* Art)
- Area requirements, Letters and Science, 149
- Art, Department of, 203  
 courses in, 204  
 major program, 203
- Asian American Studies, courses in, 207
- Assistantships, teaching and research, 176
- Associated Students, 53
- Astronomy, courses in, 390
- Athletics (*see* Physical Education)
- Atmospheric Science  
 courses in, 208  
 graduate group, 173  
 major requirements, 66, 72
- Attorney in Residence Matters, 25
- Avian Medicine (*see* Epidemiology and  
 Preventive Medicine)
- Avian Sciences  
 courses, 210  
 (*see* also individual major)
- Awards (*see* Honors and Prizes)
- Bachelor of Arts degree, requirements (*see*  
 also under various departments)  
 College of Letters and Science, 139  
 general University, 33
- Bachelor of Science degree, requirements  
 College of Agricultural and Environmental  
 Sciences, 62, 67-97  
 College of Engineering, 110  
 College of Letters and Science, 139
- Bachelor of Science (continued)  
 general University, 33  
 School of Veterinary Medicine, 165
- Bachelor's degree, applicants for a second, 22
- Bacteriology, Department of, 211  
 courses in, 211  
 major programs, 65, 72, 211
- Bee Biology, (*see* Entomology)
- Behavioral Biology, courses in, 357
- Biochemistry  
 graduate group, 173, 213  
 major requirements, 65, 72, 144
- Biochemistry and Biophysics  
 courses in, 213  
 major program, 72
- Biological Chemistry, 358
- Biological Control, 76, 80
- Biological Sciences  
 courses in, 216  
 major programs, 65, 74, 215
- Biology (*see* Biological Sciences)
- Biomedical Engineering, 123, 135  
 graduate group, 173
- Biometeorology, 72
- Biophysics (*see* Biochemistry and Biophysics)  
 graduate group, 173
- Black Studies  
 Afro-American studies program, 182  
 courses in, 182
- Board and room, 36, 43
- Botany, Department of, 217  
 courses in, 218  
 graduate group, 173  
 major programs, 65, 74, 217
- Breadth requirements, Letters and Science,  
 140
- Brewing technology, 83, 85
- Business Administration, School of,  
 preprofessional requirements, 163
- Business Management (*see* Agricultural Eco-  
 nomics and Business Management)
- Calendar, 6
- Campuses of the University, 9
- Candidacy for degrees, filing of  
 announcement, 35  
 Bachelors' degrees, Letters and Science,  
 145
- Cantonese, courses in (*see* Oriental  
 Languages)
- Chancellors, University, 450
- Change of  
 campus before registration, 24  
 college, school, or major, 26  
 major in Letters and Science, 143  
 name, 26

- Chemical Engineering, Department of, 262  
 courses in, 262  
 curriculum, 114, 123
- Chemistry  
 Agricultural, graduate group, 173, 182  
 applied, specialization in, 124  
 courses in, 222  
 department of, 221  
 major programs, 222
- Child Development, courses in (*see* Human Development)  
 graduate group, 173  
 major in, 66, 74
- Chinese, courses in (*see* Oriental Languages)
- City Planning, 81
- Civil Engineering, Department of, 264  
 courses in, 264  
 curriculum, 125
- Classics (Department of Spanish and Classics)  
 courses in, 226  
 major program, 226
- Clinical Pathology, Department of, 228  
 courses in, 229
- Clinical Sciences, Department of, 229  
 courses in, 230
- Clothing, 77, 95, 434
- Comparative Biochemistry (*see* Biochemistry graduate group)
- Comparative Pathology, graduate group, 173
- Comparative Pharmacology and Toxicology, graduate group, 173
- Composition, English, required, 33
- Community Development, 71, 88
- Community Nutrition, 65, 75
- Computer Center, 13
- Computer Science, 132
- Concurrent courses, 189
- Conduct and discipline, 51
- Conservation, 93, 94, 96
- Consumer Economics  
 courses in, 237  
 fields of interest, 78
- Consumer Food Sciences, 65, 75
- Consumer Sciences  
 courses in, 238  
 graduate group, 173
- Costume design, 77, 95
- Counseling Center, 48
- Courses, classification and numbering, 178
- Credentials, teaching, 69, 148, 177, 251
- Credit  
 and scholarship, 30  
 by examination, 31, 63, 111, 151  
 for work taken in other colleges, 20, 181  
 upon repetition of a course, 31  
 value of courses, explained, 178
- Criminal Justice, Center for Administration of, 13
- Crocker Nuclear Laboratory, 13
- Crop Protection, 65, 76
- Curricula (*see also* various Colleges and Schools)  
 preparation for University, 16, 18  
 preprofessional, 167-172
- Davis  
 campus, 9  
 community, 11
- Deans of the colleges, schools, and graduate division, 451
- Deficiencies  
 disciplinary action, 31  
 of transfer students, 19, 32  
 removal of grade deficiencies, 30, 31
- Degree candidacy, filing for, 35
- Bachelors' degrees, Letters and Science, 145
- Degree Requirements  
 Bachelor of Arts  
 College of Letters and Science (*see also* various departments), 139  
 general University, 33
- Bachelor of Science  
 College of Agricultural and Environmental Sciences, 62  
 College of Engineering, 110  
 College of Letters and Science, 139  
 general University, 33  
 School of Veterinary Medicine, 165  
 dual, 108
- Graduate degrees (*see* Graduate Division, also various Colleges and Schools)  
 unit, 34
- Dental Hygiene, 164
- Dentistry, School of, preprofessional requirements, 164
- Departmental majors, Letters and Science, 143
- Design  
 courses in, 239  
 major in, 66, 79
- Development, Resource and Consumer Economics, 66, 78
- Dietetics (*see also* Nutrition)  
 major in, 65, 79
- Dining Commons, 43, 54
- Discipline  
 for scholastic deficiencies, 51  
 degrees of, 51
- Discontinuance without notice (*see* Withdrawal)
- Dismissal (*see* Disqualification)
- Disqualification for scholastic deficiency, 31



- Dramatic Art, Department of, 240  
 courses in, 240  
 major program, 240  
 University Theatre, 240
- Dropping courses  
 general regulations, 26  
 Letters and Science, 146
- Ecology  
 courses in, 219, 244, 316, 445  
 graduate group, 173, 244, 414, 442  
 Institute of, 13
- Economics, Department of, 245  
 courses in, 246  
 major program, 245
- Economics, Agricultural (*see* Agricultural Economics)  
 Consumer, courses in, 237
- Education  
 Abroad program, 50  
 Agricultural (*see* Agricultural Education)  
 courses in, 257  
 department of, 250
- Educational Placement Service, 48
- Educational Planned Leave Program, 27
- Educational Opportunity Program, 22, 48
- Electrical Engineering, Department of, 269  
 courses in, 270  
 curriculum, 128
- Eligibility for admission, notification of, 24
- Employment, student, 39, 42
- Endocrinology, graduate group, 173
- Engineering, College of, 105, 254  
 courses in, 254  
 admission to, 106  
 college requirements, 110  
 dismissal and probation rules, 31  
 graduate group, 173  
 graduate study, 138  
 honors with bachelor's degree, 113  
 humanistic-social studies, 111  
 lower division program, 114  
 major, choosing a, 107  
 minimum scholarship requirements, 33, 110  
 passed or not passed grading, 113  
 passed or no record option, 112  
 requirements for Bachelor of Science degree, 110  
 study-list requirements, 108  
 technical electives, 109  
 upper division curricula, 117
- Engineering  
 aerospace, curriculum, 117  
 Agricultural, Department of, 187, 256  
 courses in, 187, 256  
 curriculum, 118
- Applied Science, Department of, 258  
 courses in, 258  
 graduate study, 138
- Chemical, Department of, 262  
 courses in, 262  
 curriculum, 115, 123
- Civil, Department of, 264  
 courses in, 264  
 curriculum, 125-  
 core courses, 254
- Electrical, Department of, 269  
 courses in, 270  
 curriculum, 128
- Material science and engineering, 132
- Mechanical, Department of, 274  
 courses in, 274  
 curriculum, 135
- English, Department of, 278  
 courses in, 280  
 major program, 279
- English Examination, Subject A, 33  
 for foreign students, 20, 33
- English requirement  
 for admission to the University, 16  
 in the College of Engineering, 114, 115  
 in the College of Letters and Science, 140
- Enology (*see* Viticulture and Enology)
- Enrollment  
 Davis campus, 10  
 School of Medicine, 158  
 School of Veterinary Medicine, 168
- Entomology  
 courses in, 288  
 major in, 65, 80
- Entrance examinations  
 for California residents, 17  
 for nonresidents, 18
- Entrance requirements (*see* Admission)
- Environmental engineering specialization, 123
- Environmental Education, 81, 93
- Environmental Horticulture, 81, 91
- Environmental Planning and Management  
 major in, 66, 81  
 courses in, 291
- Environmental Studies, 292  
 courses in, 293  
 curriculum, 293
- Environmental Toxicology, 81  
 courses in, 295  
 field of interest, 76
- Epidemiology and Preventive Medicine  
 courses in, 296  
 department of, 296
- Examinations  
 advanced placement, 151  
 American History and Institutions, 33, 245,  
 324, 383, 401

- Examinations (continued)  
 credit by, 32  
 English composition, Subject A, 33  
 entrance, 17  
 final, 32  
 foreign language placement, 25, 147, 151  
 in English for foreign students, 20, 33  
 Law School admission, 155  
 medical required, 46  
 Medical School admission, 158  
 regulations concerning, 32  
 Expanded course descriptions, 59  
 Expenses of students (*see also* Fees), 36  
 Exploratory program, 66  
 Extension courses, acceptability of  
 approval required, 181  
 in the College of Letters and Science, 139  
 taken at another institution, 19  
 Extension, University, 14  
 Extra-session courses defined, 180
- Fabrics, 95  
 Faculty advisers, 11  
 Faculty "48" courses, 180  
 Family and Consumer Sciences (*see* Applied Behavioral Sciences, Child Development, Consumer Science, Home Economics)  
 Farm management (*see* Agricultural Economics)  
 Fees and deposits  
 application for admission, 23, 37  
 Education, 36  
 Subject A course, 33  
 health insurance, 36, 46  
 incidental (*see* University Registration), 36  
 intention to register, 24  
 late registration, 25, 37  
 Memorial Union, 36  
 nonresident tuition, 28, 36  
 parking, 37  
 reapplication, 24  
 registration, 37  
 residence hall contract, 44  
 student body membership, 36  
 tuition, 7, 36  
 transcript of record, 32  
 University registration, 36  
 Fellowships, assistantships, and loans, 176  
 Fermentation Sciences, 65, 83  
 Final examinations, regulations concerning, 32  
 Finance, 67  
 Financial aids, 36  
 application for, 37  
 student aid not handled by Financial Aid office, 42
- Fine Arts and Museology, Laboratory for  
 Research in, 13  
 Fish and game management, 96  
 Flexibility, 62, 108, 144, 183  
 Floriculture, 91  
 Food and Consumer Sciences, teaching division, 65  
 Food biochemistry, major in, 65, 84  
 Food processing, specialization in  
 engineering, 124  
 food science, 85  
 Food Protection and Toxicology Center, 13  
 Food science  
 graduate group, 173  
 major in, 65, 85  
 Food Science and Technology  
 courses in, 298  
 Food service management, major in, 65, 85  
 Food technology and management, 85  
 Foods  
 courses in, 301  
 major in, 75  
 Foreign language  
 Letters and Science requirement, 140  
 placement test, 25, 147  
 professional courses in teaching (*see* under various departments)  
 requirement for admission, 16  
 Foreign literature in translation, courses in, 302  
 Foreign students (*see* International)  
 Forest engineering, 119  
 Forestry (*see* Preforestry)  
 Fraternities, 45  
 French (Department of French and Italian)  
 courses in, 304  
 major program, 303  
 Freshman standing, admission to, 16
- Genetics  
 courses in, 307  
 courses in plant genetics (*see* Agronomy and Range Science)  
 graduate group, 173  
 major program, 65, 87, 144  
 Geography, Department of, 309  
 courses in, 310  
 major program, 309  
 Geology, Department of  
 courses in, 313  
 major programs, 313  
 German (Department of German and Russian)  
 courses in, 318  
 major program, 317  
 Government of the University, 9  
 Governmental Affairs, Institute of, 13

- Grade points defined, 30
  - computation of grade-point average, 31
- Grades, defined, 30
  - passed or not passed, 30, 63, 113, 142
  - removal of deficiency, 31
- Grades, midterm, 32
- Graduate degrees offered, 172
- Graduate Division, 172
  - courses, 180
  - fellowships, assistantships and loans, 176
  - graduate groups, list of, 173
  - intercampus exchange program, 176
  - majors and degrees, 172
  - program of study, 176
  - requirements for admission, 174
  - requirements for foreign students, 175
  - teacher credential program, 177
- Graduate students
  - financial aids, 176
  - grades of Satisfactory or Unsatisfactory, 30
  - reentry, 175
  - scholarship deficiencies, 32
- Graduate study
  - College of Agricultural and Environmental Sciences (*see* Graduate Division)
  - College of Engineering, 138
  - Engineering, Applied Science, 138
  - School of Veterinary Medicine, 165
  - without degree objective, 175
- Graduation, University requirements for, 33-34
- Grants, 39
- Greek (Department of Spanish and Classics)
  - courses in, 227
  - major program, 226
- Group majors in
  - College of Letters and Science, 144
  - Graduate Division, 173
- Gymnasium, use of, 386
- Health insurance, supplementary, 46
  - fee, 36
  - required for international students, 46
- Health sciences, 67
- Health Service, Student, 46
- Hematology, 362
- High-frequency phenomena and devices, 129
- High School
  - preparation for engineering, 106
  - preparatory subjects for University curricula, 16
  - requirements for admission, 16
- History, Department of, 323
  - courses in, 324
  - major program, 324
- History and government of the University, 9
  - of the Davis campus, 9
- History requirement for admission, 16
- Home economics, major in, 65, 87
- Home Economics Education, courses in, 332
- Home Management, courses in, 332
- Honor Spirit, 11
- Honors
  - at graduation, 35
  - College of Agricultural and Environmental Sciences, 64
  - College of Engineering, 113
  - College of Letters and Science, 148
  - deans lists, 35
  - prizes, 35
- Honors courses defined, 179
- Honors programs, Letters and Science, 148
- Honors students
  - credit by examination, 35
  - passed or not passed grades, 113, 148
  - privileges, Letters and Science, 35
- Horticulture (*see* Environmental Horticulture)
  - graduate group, 173
  - field of interest, 91
- Housing, information, 43
- Human Anatomy, courses in, 360
- Human Development
  - courses in, 332
  - field of interest, 71, 74
- Human Physiology, courses in, 361
- Humanities-social sciences, College of
  - Engineering, 111
- Humanities, Letters and Science
  - breadth requirement, 140
  - list of courses, 149
- Incomplete, grade of, 30
- Independent Study program, defined, 179
- Individual majors
  - Letters and Science, 144
  - Agricultural and Environmental Sciences, 65, 66
- Information and control, 129
- Institution Management, courses in, 334
- Insurance, health (*see* Health Insurance)
- Integrated Studies, courses in, 334
- Intention to register form, 24
- Intercampus transfer, 24
- Intercampus exchange program for graduate students, 176
- Interdepartmental majors, Letters and Science, 144
- Interior decoration (*see* Design)
- Internal Medicine, courses in, 362-363
- International Agricultural Development
  - courses in, 335
  - graduate group, 173
  - major in, 65, 88
- International Agricultural Institute, 13

- International Relations, committee, 335
  - major program, 336
- International students
  - admission, undergraduate, 20
  - admission to the Graduate Division, 175
  - adviser for, 50
  - American History and Institutions, 34
  - courses in English for, 280
  - examination in English for, 20, 33
  - health insurance required, 46
  - rules governing residence, 28
  - Subject A examination, 33
- Irrigation, 94, 119, 126
- Italian (Department of French and Italian)
  - courses in, 336
  - major program, 336
- Japanese, courses in (*see* Oriental Languages)
- Kearney Research Foundation, 13
- Laboratory science, requirement for
  - admission, 16
- Laboratory technician (*see* various natural sciences)
- Landscape, 81, 91
- Landscape Horticulture, 91
- Landscape Management (*see* Environmental Planning and Management), 81
- Language requirement for admission, 16
- Late registration and filing, 25-37
- Latin (Department of Spanish and Classics)
  - courses in, 228
  - major program, 226
- Law, School of, 154, 338
  - agricultural, 67, 71
  - courses in, 338
  - residence rules for Juris Doctor candidates, 34
- Leave of absence (*see* Withdrawal)
- Letters and Science, College of, 139
  - advanced placement examinations, 151
  - area requirement lists of courses, 149
  - breadth requirements, 140
  - check list of requirements, 152
  - college requirements, 140
  - faculty advisers, 146
  - honors, 148
  - individual major, 144
  - interdepartmental majors, 144
  - majors, list of, 143-144
  - minimum scholarship requirements, 141
  - planning the program, 145
  - preprofessional study, 148
  - probation and disqualification rules, 31
  - requirements for the bachelor's degree, 139
  - student services, 153
  - teaching departments, 150
- Library, University, 13
- Limited status, requirements for, 21
- Linguistics
  - committee, 345
  - courses in, 346
  - graduate group, 173
  - major program, 345
- Livermore, courses in Engineering, Applied Science, 260
- Living accommodations, 43
- Loans, 40
  - for graduate students, 176
- Lower division requirements (*see* under various Colleges and Schools)
- Major
  - change of, 26, 143
  - declaration of, 143
- Management
  - agricultural science and, 69, 188
  - business, 67
  - home, 332
  - institution, 334
- Mandarin, 379
- Marketing, 67, 85
- Married students, housing for, 44
- Materials science
  - curriculum in, 132
- Mathematics
  - applied, specialization, 124
  - courses in, 348
  - department of, 347
  - major programs, 348
  - requirement for admission, 16
- Meat technology (*see* Food Science)
- Mechanical Engineering, Department of, 274
  - courses in, 274
  - curriculum, 135
- Medical Education, courses in, 363
- Medical examination, required, 26, 46
- Medical Microbiology, courses in, 363
- Medical Technology, preparation for
  - postgraduate training in, 164, 216
- Medicine, School of, 158, 354
  - courses in, 357
  - health professions student assistance program, 42
  - preprofessional requirements, 160, 163
- Medicine and paramedical sciences, 216
- Memorial Union
  - Dining Commons, 45, 54
  - fee, 36
- Merchandising, 67, 78, 95
- Meteorology, 72
- Microbiology, graduate group, 173, 369
  - courses in, 363, 369

- Microbiology, Veterinary (*see* Veterinary Microbiology)  
 Mid-term grade standing, 32  
 Military Science, Department of, 369  
   courses in, 370  
 Military training  
   Army ROTC program, 369  
   scholarships, 42, 369  
 Minimum undergraduate scholarship requirements, 34  
 Molecular Biology, 216 (*see* also Biochemistry and Genetics)  
 Music, Department of, 371  
   courses in, 371  
   major program, 371  
  
 Name change, 26  
 Native American Studies, 71  
   courses in, 374  
 Natural sciences, Letters and Science  
   breadth requirement, 140  
   list of courses, 149  
 Nematology  
   courses in, 375  
   field of interest, 76, 91  
 Neurology, courses in, 355  
 Neurosurgery, 364  
 Nonresident students  
   admission requirements, 16  
   rules governing residence, 28  
   tuition fee for, 28, 36  
 Nursery School education, 74  
 Nursery production or management, 91  
 Nursing, School of, pre-professional requirements, 164  
 Nutrition Science (*see* also Dietetics)  
   courses in, 376  
   field of interest, 75, 89  
   graduate group, 173  
   major in, 65, 89  
  
 Off-campus living accommodations, 44  
 Officers, administrative, 450  
 Optometry, School of, preprofessional requirements, 165  
 Oriental languages (Department of Anthropology)  
   courses in, 379  
   major programs, 379  
 Ornamental Horticulture, 91  
 Outdoor education, 81  
 Out-of-state applicants  
   admission requirement, 18  
   rules governing residence, 28  
  
 Park and Recreation Administration (*see* Environmental Planning and Management), 81, 290  
 Parking fee, 37  
 Pass or not passed grades, 30, 63, 113, 142  
 Pathology, Clinical (*see* Clinical Pathology)  
 Pathology (Medicine), courses in, 364  
 Pathology (Veterinary Medicine), Department of, 380  
   courses in, 381  
 Pediatrics, courses in, 365  
 Pharmacology, 365  
 Pharmacy, School of, preprofessional requirements, 165  
 Philosophy, Department of, 382  
   courses in, 382  
   major program, 382  
 Physical Education, Department of, 385  
   courses in, 386  
   major program, 386  
 Physical examination required, 26, 46  
 Physical Medicine and Rehabilitation, 367  
 Physical Sciences, 389  
 Physical Therapy, School of, preprofessional requirements, 165  
 Physics, Department of, 389  
   courses in, 390  
   major programs, 390  
 Physiological Sciences, Department of, 394  
   courses in, 394  
 Physiology  
   courses in, 396, 399, 444  
   field of interest, 70  
   graduate group, 174  
   major in, 65, 90  
 Placement examination in foreign languages, 25, 147  
 Placement Services, Students and Alumni, 47  
 Planned Educational Leave Program, 27  
 Plant disorder diagnosis, 76, 91  
 Plant genetics, courses in, 91  
 Plant Pathology  
   courses in, 398  
   field of interest, 76, 91  
   major in, 91  
 Plant Physiology  
   courses in, 399  
   graduate group, 174  
 Plant Protection, requirements for the major, 76  
 Plant Science (*see* also Viticulture)  
   courses in, 399  
   major in, 65, 91  
 Political Science, Department of, 400  
   course in, 401  
   major program, 401  
 Pomology (*see* also Plant Science)  
   courses in, 409  
   field of interest, 91

- Portuguese (Department of Spanish and Classics), courses in 430
- Poultry Husbandry (*see* Avian Sciences)
- Power and machinery, 119
- Preforestry  
major in, 66, 92, 163
- Preparation for  
College of Engineering, 106  
professional schools not at Davis, 167  
School of Law, 154, 163  
University curricula, 16
- Prerequisites, 181
- Preventive Veterinary Medicine, graduate group, 165
- Preveterinary medicine curriculum, 70, 92, 161, 167
- Primate Biology, National Center for, 13
- Prizes, 35  
medals, 35, 64, 149
- Probation, rules governing, 31
- Probe work-learning programs, 49, 110
- Professional courses  
defined, 180  
in foreign language teaching (*see* under various departments)  
preprofessional, curriculum, 92, 167-172
- Professional schools, preparation for admission, 167  
Allied Health Sciences, 163, 216  
Business Administration, 169  
Dental Hygiene, 170  
Dentistry, 170  
Forestry, 92, 169  
Law, 154  
Medical Technology, 164  
Medicine, 158, 169  
Nursing, 170  
Optometry, 171  
Pharmacy, 171  
Physical Therapy, 171  
Reference books, 171  
Social Welfare, 423  
Veterinary Medicine, 92, 169
- Psychiatry, courses in, 367
- Psychology, Department of, 410  
courses in, 410  
major program, 410
- Public Health (*see* Epidemiology and Preventive Medicine)  
field of interest, 75, 79
- Quantitative Biology (*see* Biochemistry, Nutrition Sciences, Physiology)
- Quarter system, explanatory note, 31, 178
- Quarter units, how to convert, 31
- Radiobiology Laboratory, 13
- Ranching, 165-166
- Range Management  
courses in, 414  
graduate group, 174
- Range Science  
courses in, 189  
major in, 66, 91, 92
- Readmission  
after an absence, 28  
after disqualification, 32, 141  
application for, 7  
health requirement, 26, 46  
of graduate students, 175
- Reapplication for admission, 24
- Reexaminations, 30
- Regents of the University, 449
- Registration procedures, 25
- Renewable Natural Resources  
major in, 66, 93
- Reports of student grades, 30-32
- Requirements  
for admission, 16-25  
for graduation, 33-35
- Research  
assistantships, 176  
departments (agricultural and environmental sciences), 98  
facilities on campus, 13
- Reserve Officers' Training Corps, 42, 369
- Residence  
costs, 36  
halls, 43  
requirement for graduation, 33  
requirement in Engineering, 110  
requirement in Letters and Science, 142  
rules governing, 28  
statement of, 29
- Resource Sciences  
courses in, 415  
field of interest, 93  
teaching division, 66
- Rhetoric, Department of, 416  
courses in, 417  
major program, 416
- ROTC Army program, 369  
scholarship program, 42, 369
- Russian (Department of German and Russian), 419  
courses in, 419  
major program, 419
- Russian Literature and History,  
major in, 422
- Satisfactory and Unsatisfactory, grades of, 30
- Scholarship  
deficiencies, 31  
grades of, 30

- Scholarship (continued)
  - honors and prizes, 35
  - mid-term grade standing, 32
  - requirements for admission, 17
  - requirements for graduation, 34
- Scholarships, 37
  - California State, 43
  - in the College of Agricultural and Environmental Sciences, 64
  - President's, 38
  - Regents, 37
  - ROTC program, 42, 369
  - University, 38
- Science requirement for admission, 16
- Second bachelor's degree, applicants for, 22
- Selective Service, 49
- Social sciences, Letters and Science
  - breadth requirement, 140
  - list of courses, 150
- Social welfare, preparation for postgraduate training in, 403, 423
- Sociology, Department of, 422
  - courses in, 423
  - major program, 423
- Soil science
  - courses in, 428
  - graduate group, 174
- Soil and water engineering, 119
- Soil and water science
  - courses in, 429
  - major in, 66, 94
- Soils, 92, 94
- Solid-state devices and physical electronics, 129
- Spanish (Department of Spanish and Classics), 430
  - courses in, 431
  - major program, 430
- Special admission categories, 21
- Special-study courses defined, 179
- Speech (*see* Rhetoric)
- Statement of
  - intention to register, 24
  - residence, 29
- Structural engineering and mechanics
  - specialization, 126
- Structures and environment, 119
- Student
  - activities, 53
  - conduct and discipline, 51
  - employment, 47-49
  - expenses, 36
  - handicapped, 43
  - Health Service, 46
  - housing, 43-45
  - publications, 54
  - recreational facilities, 54
  - Relations Council, 53
  - Responsibility, 53, 58
  - Student Body membership fee, 36
  - Study-list regulations
    - at registration, 25
    - College of Agricultural and Environmental Sciences, 62
    - College of Engineering, 108
    - College of Letters and Science, 145
  - Subject A
    - at registration, 25, 33
    - department of, 434
    - fee, 33
    - requirements for graduation, 33-35
  - Summer Sessions, 14
    - course acceptability in Letters and Science, 143
    - courses and residence requirement, 34
    - credit from other institutions, 181
  - Swedish (Department of German and Russian), 434
  - Symbols, footnotes, 181
  - Systems and circuits specialization, 129
  - Teacher education
    - courses defined, 180
    - courses in, 186, 251, 332
    - credentials, 65, 148, 177
    - curricula
      - in College of Agricultural and Environmental Sciences, 66, 68, 71
      - in College of Letters and Science, 251
  - Teaching assistantships, 176
  - Tests (*see* Examinations)
  - Textiles
    - major in, 65, 77, 95
    - and Clothing, courses in 434
  - Theatre, University, 55, 236, 240
    - Wyatt Pavilion, 56
  - Toxicology (*see* Environmental Toxicology)
  - Transcripts of record, 23, 32
    - for admission, 23
    - for intercampus transfer, 24
    - from the University, 32
  - Transfer students
    - application for admission, 19
    - American History and Institutions requirement, 33
    - requirements for admission, 19, 60
    - Subject A, 33
  - Transfer to another campus, 24
    - regulations for students dismissed or on probation, 32
  - Transportation, 12
  - Truck crops (*see* Plant Science, Agricultural Science and Management)
  - Tuition, for nonresidents, 28, 36



## BUILDINGS AND FACILITIES

1. Academic Office Building No. 3 C-9
2. Aggie Villa D-14
3. Agricultural Extension D-11
4. Agricultural Field Stations and Agricultural Practices E-10
5. Animal Science D-9
6. Architects and Engineers F-8
7. Art Building E-10
8. Art Laboratory E-12
9. Asmundson Hall C-8
10. Bainer Hall F-8
11. Becket Hall A-7
12. Briggs Hall D-7
13. Bixby Hall B-6
14. Central Garage I-5
15. Chemistry Building F-9
16. Cole Facility I-7
17. Cowell Student Health Center B-8
18. Crocker Nuclear Laboratory G-8
19. Cruess Hall B-8
20. Dairy Cattle Research F-5
21. Dramatic Art Building E-11
22. East Hall C-11
23. Enology Laboratory C-9
24. Environmental Horticulture G-11
25. Environmental Toxicology C-7
26. Everson Hall E-10
27. Experimental Animal Resources J-7
28. Faculty Club F-12
29. Fire House E-12
30. Freeborn Hall S-10
31. Gilmore Hall B-5
32. Graduate Residence G-6
33. Haring Hall E-8
34. Hickey Gymnasium B-11
35. Hoagland Hall C-7
36. Home Management D-12
37. Horse Arena H-8
38. Hughes Hall A-7
39. Hunt Hall B-9
40. Hutchison Hall D-8
41. Information Booth D-12
42. Irrigation Laboratory B-8
43. King Hall G-10
44. Kleiber Hall D-7
45. Library D-10
46. Malcolm Hall A-6
47. Mann Laboratory C-7
48. Marine Resources Laboratory B-7
49. Memorial Union C-10
50. Mrak Hall F-10
51. Music Building E-11
52. National Center for Primate Biology E-1
53. North Hall C-11
54. Olson Hall D-11
55. Orchard Park Apartments B-2
56. Physical Plant and Storehouse G-9
57. Physical Sciences Library F-9
58. Physics-Geology Building G-9
59. Physics Shops E-10
60. Pierce Hall G-7
61. Plant Pathology Field Headquarters J-7
62. Police Department H-9
63. Primero Dining Commons A-7
64. Putah Creek Recreation Lodge J-6
65. Radiobiology Annex D-6
66. Radiobiology Laboratory J-7
67. Recreation Swimming Pool Complex E-4
68. Regan Hall B-7
69. Roadhouse Hall D-12
70. Robbins Hall D-9
71. Roessler Hall F-9
72. Ryerson Hall A-5
73. School of Medicine E-7
74. Segundo Dining Commons A-6
75. Silo Snack Bar E-8
76. Solano Park Apartments F-13
77. South Hall D-11
78. Sproul Hall D-11 Storehouse (see No. 56)
79. Storer Hall D-7
80. Struve Hall A-7
81. Telephone Office F-6
82. Temporary Building (5-6) E-10
83. Temporary Buildings (13-16) B-7
84. Temporary Building (29-35) H-8
85. Temporary Buildings (98-115) E-9
86. Temporary Buildings (116-121, 123, 124) D-13
87. Temporary Buildings (134-158) F-7
88. Temporary Buildings (161-172, 175, 191-194) F-7
89. Tercero Dining Commons G-6
90. Thille Hall F-6
91. Titus Hall A-6
92. Toomey Field A-11
93. University Extension Mini Center E-2
94. University House D-11
95. Vegetable Crops Field Headquarters E-3
96. Veihmeyer Hall B-8
97. Veterinary Medical Teaching Hospital J-3
98. Veterinary Medicine Isolation Housing J-7
99. Visual Aids, Agricultural Extension F-4
100. Voorhies Hall D-11
101. Walker Hall E-9
102. Wellman Hall D-9
103. Wickson Hall C-9
104. Wyatt Pavilion Theatre E-12
105. Wyatt Snack Bar E-11
106. Young Hall C-11

