

UNIVERSITY

OF

CALIFORNIA

—

GENERAL

CATALOGUE

1960 - 61

DAVIS

**Office of the Registrar**

Am. J. Shantz



**BULLETIN**

## **General Catalogue**

**DAVIS**

**Fall and Spring Semesters 1960-1961**

**AUGUST 20, 1960**

**Price, Twenty-five Cents**

**DAVIS, CALIFORNIA**

**UNIVERSITY OF CALIFORNIA**



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UNIVERSITY OF CALIFORNIA, DAVIS



Entrance to administrative section of  
Library-Administration Building



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# CALENDAR, 1960-1961

## DAVIS CAMPUS

### First Summer Session

June 20, Monday	Registration and first day of instruction.
July 4, Monday	Independence Day—academic and administrative holiday.
July 29, Friday	First Summer Session instruction ends.

### Special Summer Session

July 5, Tuesday	Registration and first day of instruction.
August 13, Saturday	Special Summer Session instruction ends.

### Second Summer Session

Aug. 1, Monday	Registration and first day of instruction.
Sept. 5, Monday	Labor Day—academic and administrative holiday.
Sept. 9, Friday	Second Summer Session instruction ends.

### Fall Semester, 1960-1961

July 15, Friday	Last day for filing credentials and applications for admission to graduate standing in the fall semester with the Dean of the Graduate Division.
Aug. 15, Monday	Applications for admission to undergraduate standing, including applications for intercampus transfer, in the fall semester must be filed, with complete credentials, with the Registrar on or before this date. Credentials received as late as this may not be evaluated in time for the enrollment of the student during the regular registration period.
Aug. 26, Friday	Last day for filing applications for readmission to undergraduate and graduate status with the Registrar.
Sept. 5, Monday	Labor Day—academic and administrative holiday.
Sept. 12, Monday	Fall semester begins.
Sept. 15, Thursday	} Registration.
Sept. 16, Friday	
Sept. 19, Monday	
Sept. 30, Friday	Instruction begins.
	Last day for filing applications in candidacy for master's degrees to be conferred in January, 1961.
	Last day for filing applications and programs in candidacy for the certificates of completion of teacher training curricula to be received in January, 1961.
Oct. 3, Monday	Last day for all candidates who expect to complete the work for A.B. and B.S. degrees in January, 1961, to file, without fee, announcement of candidacy with the Registrar before 5 p.m.
Oct. 7, Friday	Last day for filing applications in candidacy for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June, 1961.
	Last day to enroll or petition to add courses to study lists.
Oct. 14, Friday	Last day to drop courses without scholarship penalty.
Oct. 25, Tuesday	Last day to file applications to take engineering examinations required for admission in the spring semester, 1961.
Nov. 4, Friday	Last day for filing in final form with the committee in charge theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January, 1961.
Nov. 5, Saturday	Engineering examinations, lower division and upper division.
Nov. 24, Thursday	} Thanksgiving holiday—academic and administrative holiday.
Nov. 25, Friday	



- Nov. 24, Thursday } Fall recess—an academic holiday.
- Nov. 26, Saturday }
- Dec. 15, Thursday } Last day for filing credentials and applications for admission to graduate standing in the spring semester with the Dean of the Graduate Division.
- Dec. 19, Monday } Last day for filing in final form with the committees in charge theses for master's degrees to be conferred in January, 1961.
- Jan. 2, Monday } Christmas recess—an academic holiday.
- Dec. 23, Friday } Christmas holiday—academic and administrative holiday.
- Dec. 26, Monday }
- Dec. 30, Friday } New Year's holiday—academic and administrative holiday.
- Jan. 2, Monday }

**1961**

- Jan. 3, Tuesday } Instruction resumes.
- Jan. 4, Wednesday } Last day for filing theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January, 1961.
- Jan. 13, Friday } Last day for filing applications for readmission to undergraduate and graduate status with the Registrar.
- Jan. 14, Saturday } Instruction ends.
- Jan. 16, Monday } Applications for admission to undergraduate standing, including applications for intercampus transfer, in the spring semester must be filed, with complete credentials, with the Registrar on or before this date.
- Jan. 16, Monday } Final examinations.
- Jan. 25, Wednesday }
- Jan. 25, Wednesday } Fall semester ends.
- Jan. 25, Wednesday } Last day for filing theses for master's degrees to be conferred in January, 1961.

**Spring Semester, 1961**

- Jan. 30, Monday } Spring semester begins.
- Feb. 1, Wednesday } Last day for students enrolled in the current session to file applications for undergraduate scholarships for 1961-1962.
- Feb. 2, Thursday } Registration.
- Feb. 3, Friday }
- Feb. 6, Monday } Instruction begins.
- Feb. 7, Tuesday } Last day for filing applications for fellowships and graduate scholarships for 1961-1962.
- Feb. 17, Friday } Last day for filing applications in candidacy for all master's degrees to be conferred in June, 1961.
- Feb. 20, Monday } Last day for filing applications and programs in candidacy for the certificates of completion of teacher training curricula to be received in June, 1961.
- Feb. 22, Wednesday } Last day for all candidates who expect to complete the work for A.B. and B.S. degrees in June, 1961, to file, without fee, announcement of candidacy with the Registrar before 5 p.m.
- Feb. 24, Friday } Washington's Birthday—academic and administrative holiday.
- Feb. 24, Friday } Last day for filing applications in candidacy for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January, 1962.
- Feb. 28, Tuesday } Last day to enroll or add courses to study lists.
- Mar. 2, Monday } Applications for admission to the School of Veterinary Medicine must be filed with the Registrar on or before this date.
- Mar. 3, Friday } Last day for entering students to file applications for undergraduate scholarships for 1961-1962.
- Mar. 20, Monday } Last day to drop courses without scholarship penalty.
- Mar. 20, Monday } Last day for filing in final form with the committees in charge theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June, 1961.

Mar. 27, Monday	}	Spring recess—an academic holiday.
April 3, Monday		
Mar. 28, Tuesday		Last day to file applications to take engineering examinations required for admission in the fall semester, 1961.
April 8, Saturday		Engineering examinations, lower division and upper division.
May 9, Tuesday		Last day for filing in final form with the committees in charge theses for master's degrees to be conferred in June, 1961.
May 19, Friday		Last day for filing theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June, 1961.
May 27, Saturday		Instruction ends.
May 29, Monday	}	Final examinations.
June 8, Thursday		
May 30, Tuesday		Memorial Day—academic and administrative holiday.
June 9, Friday		Spring semester ends.
		Commencement.
		Last day for filing theses for master's degrees to be conferred in June, 1961.

# REGENTS' Lecturer

SIR CHARLES DARWIN  
3/12-22/61

? Edward B. Roessler, Ph.D.  
Extension Representative

x Sidney S. Sutherland, M.S., Director of Summer Sessions

-? John W. R. Quinn, <sup>Public</sup>  
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# THE REGENTS OF THE UNIVERSITY

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State Capitol, Sacramento 14

GLENN ANDERSON, A.B.  
Lieutenant-Governor of California  
State Capitol, Sacramento 14

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State Capitol, Sacramento 14

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State Superintendent of Public  
Instruction  
721 Capitol av, Sacramento 14

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CLARK KERR, Ph.D., LL.D.  
President of the University  
714 University Hall, Berkeley 4  
2147 Administration bldg,  
Los Angeles 24

## APPOINTED REGENTS

The term of the appointed Regents is sixteen years, and terms expire March 1 of the years indicated in parentheses. The names are arranged in the order of original accession to the Board.

EDWIN W. PAULEY, B.S., LL.D. (1970)  
717 N Highland av, Los Angeles 38

EDWARD H. HELLER, A.B. (1976)  
100 Montgomery st, San Francisco 4

VICTOR E. HANSEN, LL.B. (1962)  
1734 Earlmont av, La Canada

CORNELIUS J. HAGGERTY (1966)  
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NW, Washington 6, D.C.

JESSE H. STEINHART, A.B., LL.B., LL.D.  
(1962)

111 Sutter st, San Francisco 4  
DONALD H. MOLAUGHLIN, B.S., M.A.,  
Ph.D., D.Eng. (1966)

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Room 415, 58 Sutter st, San Francisco 4

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401 S Broadway, Los Angeles 13

MRS. DOROTHY B. CHANDLER (1970)  
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MRS. CATHERINE HEARST (1974)  
701 N Canon dr, Beverly Hills

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811 W Seventh st, Los Angeles 17

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NORTON SIMON (1976)  
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## OFFICERS OF THE REGENTS

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President  
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689 University Hall, Berkeley 4

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689 University Hall, Berkeley 4

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Assistant Counsel of the Regents  
and Assistant Secretary  
590 University Hall, Berkeley 4

Mark Owens, Jr., A.B., LL.B.,  
Assistant Counsel of the Regents  
and Attorney in Residence Matters  
590 University Hall, Berkeley 4



# UNIVERSITY OF CALIFORNIA

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Mahlon F. Cook, B.S., *Assistant Chancellor for Business and Finance*  
Howard B. Shontz, M.Ed., *Registrar and Admissions Officer.*  
Byron R. Houston, Ph.D., *Associate Dean of the Graduate Division, Northern Section.*  
*Acting*  
William C. Weir, Ph.D., *Dean of Students.*  
James D. Andrew, M.S., *Dean of Men.*  
Susan F. Regan, M.A., *Dean of Women and Associate Dean of Students.*  
J. Price Gittinger, Ed.M., *Director of Special Services, Assistant Director of Relations with Schools, Foreign Student Adviser, and Manager of the Student and Alumni Placement Center.*  
X J. Richard Blanchard, M.S., *University Librarian.*  
Cecil C. Norris, *Business Manager.*  
Thomas Y. Cooper, M.D., *Director, Student Health Service. Business Manager*  
Edmund T. Price, B.S., *Residence Halls Supervisor.*

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Fred N. Briggs, Ph.D., *Dean of the College of Agriculture.*  
Harry H. Laidlaw, Jr., Ph.D., *Associate Dean of the College of Agriculture.*  
Byron R. Houston, Ph.D., *Associate Dean of the Graduate Division, Northern Section.*  
Donald E. Jasper, D.V.M., Ph.D., *Dean of the School of Veterinary Medicine.*  
Oscar W. Schalm, D.V.M., Ph.D., *Associate Dean of the School of Veterinary Medicine.*  
Herbert A. Young, Ph.D., *Dean of the College of Letters and Science.*  
William F. Dukes, Ph.D., *Associate Dean of the College of Letters and Science.*

# THE UNIVERSITY OF CALIFORNIA

FOUNDED 1868

## HISTORY

*The Beginning.*—The Organic Act passed by the State Legislature and signed by the Governor in 1868, established the University of California. It opened its doors in 1869 on the Oakland campus of the College of California. The University of California moved to Berkeley in 1873 as soon as the first buildings were completed.

*Today.*—The University, currently serving the State of California with seven campuses—Berkeley, Davis, Los Angeles, La Jolla, San Francisco, Santa Barbara, and Riverside—is composed of academic and professional schools and colleges, divisions, departments of instruction, museums, libraries, research institutes, bureaus, and foundations.

In addition to the educational facilities centered on its campuses, the University operates the University Extension and Agricultural Extension Service everywhere in the State where a public demand is apparent. Special instruction and research are carried on throughout the State, in other states, and in foreign countries.

*Scope.*—The University is continuing, as in the past, to keep pace with the growth of the State. Present campuses are being expanded; new campuses are in the planning stage. That the University has steadily increased in quality as well as in size is attested to by the fact that it is generally recognized as one of the four or five greatest universities in the country. The University of California provides a college education for all qualified students, without distinction of sex, creed, or race. It offers instruction in the arts, sciences, and literature, as well as fundamental training for many of the professions.

## GOVERNMENT

The government of the University is entrusted to a corporation, styled The Regents of the University of California, consisting of twenty-four members, sixteen of which are appointed by the Governor; the others are members ex officio.

The Regents select a President of the University, who becomes responsible to the Regents for the proper administration of the University on all of its campuses. The President, in turn, recommends chief administrative officers (chancellors and provosts) for the campuses of the University, state-wide vice-presidents, and administrative deans.

In line with full powers of organization and government granted by the State of California, the Regents are authorized to delegate to committees or to the faculty or to others, such authority or functions in the administration of the University as they may deem wise. Therefore the Regents have created an academic administrative body called the Academic Senate.

The Academic Senate consists of the President, Chancellors, Vice-Chancellors, Vice-Presidents, Provosts, Deans, Directors, Registrars, University Librarians, and all professors and instructors giving instruction in any curriculum under the control of the Academic Senate. The Davis Division of the Northern Section of the Academic Senate is the academic administrative body for the Davis campus. It determines the conditions for admission, for certificates, and for degrees (subject to the approval of the Regents).

The Senate also authorizes and supervises all courses of instruction in the academic and professional colleges and schools, and also recommends to the President all candidates for degrees.

### **SITE AND GROWTH OF THE DAVIS CAMPUS**

Davis, rapidly developing as a general campus of the University, is increasing its offerings each year in the fields of letters and science and engineering as well as agriculture and veterinary medicine.

Undergraduate enrollment in the Colleges of Agriculture and Letters and Science are approximately equal. The Graduate Division, with nearly 25 per cent of total enrollment, offers work to the Ph.D. in many areas, largely in the agricultural and basic sciences but increasingly in the humanities and social sciences. Davis now enrolls students aiming toward all branches of engineering and offers specialized training in agricultural engineering, irrigation and drainage engineering, food process (biochemical) engineering, and climatology. Education programs lead to credentials for elementary and secondary teaching.

The campus adjoins the city of Davis, a college town of 8,000. Flat terrain has led to use of bicycles as a principal mode of travel on campus and in town, creating a distinctive atmosphere. Davis is essentially a residential campus, with nearly half of its students housed on campus. A continuous building program has given a modern face to the campus. Among the new structures are residence halls housing 1,400 students.

The Davis campus remains the University's principal center of agricultural instruction and research. The campus includes 3,000 acres, with some of California's finest farm land.

Davis is situated at main rail and highway junctions 13 miles west of the State capital, Sacramento; and the campus is part of the cultural community of Sacramento. Davis is about 90 minutes away from metropolitan San Francisco and other Bay Area cities.

### **UNIVERSITY EXTENSION\***

University Extension, as a special educational service agency of the University, makes available educational facilities to adults who seek training in some form of higher education. The program includes classes, conferences, correspondence courses, and special activities in a wide range of subject fields and interests. During the past few years, there has developed an increasingly large program of courses designed for those in the professions and those with advanced training. In addition, University Extension offers a large number of courses designed primarily for intellectual and cultural interests in the arts, social sciences, and other fields.

The educational services of University Extension are organized around three primary aims: to help men and women advance professionally; to aid them in meeting their responsibilities as citizens; to assist in their pursuit of intellectual interests.

Five principal methods of instruction are used:

1. Classes are organized in cities and communities wherever a sufficient number of people indicate an interest in a particular subject.
2. Conferences, institutes, and workshops for periods ranging from one day to several weeks, provide intensive instruction for groups interested in pursuing specialized knowledge.
3. Lectures, singly or in series, are provided for committees, clubs, organizations, or communities which make the necessary arrangements for securing this service.
4. Correspondence courses offer lessons, study materials, and University guidance by mail.
5. Visual education aids in the form of motion picture films are available from film libraries maintained by University Extension in Berkeley and Los Angeles.

\* For information concerning admission to the University through University Extension, see page 24.

For information regarding any of these services, contact University Extension on any of the following University campuses: Davis, Berkeley, Los Angeles, Riverside, or Santa Barbara.

### SUMMER SESSIONS

In 1961 there will be two regular six-week Summer Sessions beginning on June 19 and on July 31. The first regular Summer Session will offer a number of lower division courses, upper division and graduate courses, and upper division and graduate courses for teachers and teacher candidates. The second Summer Session will offer courses primarily for teacher candidates who have been admitted to internship programs and to qualified graduate students who may wish to complete requirements for teaching credentials or degrees. In addition, the courses numbered 199 for advanced undergraduates and graduate research courses numbered in the 200 series will be available for qualified students in both regular sessions.

A special Summer Session is offered during the period July 3 to August 12 to provide: (1) upper division and graduate courses in agriculture and education for interested agricultural students, vocational agriculture teachers, and agricultural extension personnel, (2) special study courses numbered 199 for advanced undergraduates and/or graduate research courses in the 200 series.

Summer sessions are also conducted on the Berkeley, Los Angeles, and Santa Barbara campuses. Information about these summer sessions is available in the Summer Sessions bulletins, obtainable from the Registrar, or from the Office of the Summer Sessions, University of California, Berkeley 4; or from the Office of the Summer Sessions, University of California, Los Angeles 24; or from the Office of the Registrar, University of California, Santa Barbara, Goleta.

### SURVEY OF CURRICULA

Instruction is offered in (a) the College of Agriculture; (b) the College of Letters and Science; (c) the College of Engineering; (d) the School of Veterinary Medicine; and (e) the Graduate Division, Northern Section.

The undergraduate curricula of four years in applied science in the College of Agriculture lead to the bachelor's degree in science (B.S.). The curricula include major subject offerings in:

Agricultural Business Management	Poultry Husbandry
Agricultural Economics	Entomology and Parasitology
Agricultural Education	Food Science
Agricultural Production	Dairy Industry
Agricultural Economics	Enology
Agronomy	Food Technology
Animal Husbandry	Home Economics
Dairy Industry	Dietetics
Enology	Foods
Food Technology	General Home Economics
General Agriculture	Nutrition
Irrigation	Irrigation Science
Pest Control	Plant Science
Pomology	Agronomy
Range Management	Genetics
Soils and Plant Nutrition	Landscape Horticulture
Vegetable Crops	Plant Pathology
Viticulture	Pomology
Animal Science	Vegetable Crops
Animal Husbandry	Viticulture
Animal Physiology	Preforestry
Genetics	Preveterinary Science

Range Management  
Soil Science  
  General Soil Science  
  Pedology and Soil Survey

Plant Nutrition and Soil Fertility  
Soil Management and  
  Conservation

Preprofessional training in forestry and veterinary medicine is offered.

The College of Engineering, Berkeley, in cooperation with the College of Agriculture, offers a curriculum in engineering which permits specialization in agricultural power and machinery, processing, and structures; food processing; and irrigation, drainage, and water resources. The freshman, sophomore, and senior years are currently available at Davis. The junior year will be available on this campus for the first time in 1961-1962.

The undergraduate curricula of four years in the College of Letters and Science lead to the bachelor's degree in arts (A.B.) and science (B.S.). Organized majors and professional curricula include:

American Civilization  
Art  
Biological Sciences  
Botany  
Chemistry  
Dramatic Art and Speech  
Economics  
English  
French  
Geology  
German  
History  
Mathematics  
Medical Sciences  
Microbiology  
Music  
Philosophy

Physical Education  
Physical Sciences  
Physics  
Political Science  
Preprofessional Training  
  Pre dental  
  Pre legal  
  Pre medical  
  Pre nursing  
  Pre pharmacy  
  Pre physical therapy  
  Pre social welfare  
Psychology  
Sociology  
Spanish  
Zoology

The School of Veterinary Medicine offers a curriculum of four years, following two or more years of preprofessional work, leading to the degree of Doctor of Veterinary Medicine (D.V.M.).

Graduate study, leading to advanced degrees, is offered to college graduates formally admitted to the Graduate Division (see page 27).

### DEGREES AWARDED

Approximately 200,000 degrees and certificates have been granted by the University of California to students on its various campuses since it was established. Candidates for degrees must satisfy academic and residence requirements as set forth in the collegiate section of this bulletin and bulletins of the schools and colleges, and the Graduate Division.

The prospective student is advised to give careful attention to determining the major or subject in which he wishes to receive a degree before entering the University, and to plan his curricula beginning with his freshman year to facilitate completion necessary to obtain the degree.

### Undergraduate Degrees

The degree of Bachelor of Arts (A.B.) is offered in organized majors or programs in the College of Letters and Science. However, students are permitted to prepare programs that may not be included in the published announcements, upon approval from the Executive Committee.

The degree of Bachelor of Science (B.S.) is offered in the colleges of Agriculture, Engineering, Letters and Science, and in the School of Veterinary Medicine. Detailed descriptions of the departmental and college and school programs will be found in later pages of this bulletin and in the announcements of the schools and colleges.

### **Graduate Degrees**

In the Graduate Division the degrees of Master of Arts (M.A.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) are conferred. Professional degrees are offered in education, engineering, and veterinary medicine.

For information of a detailed nature, the student will wish to seek more specialized bulletins and publications, and the graduate announcements of the several schools and departments, obtainable on request from the Office of the Registrar, University of California, Davis.

### **PREPARATION FOR UNIVERSITY CURRICULA**

In addition to those subjects required for admission to the University outlined on page 19, certain preparatory subjects are recommended for each University curriculum, which, if included in the high school program, will give the student a more adequate background for his chosen field of study. In some cases lack of a recommended high school course will delay graduation from the University. Details of these recommendations will be found in the circular, **PREREQUISITES AND RECOMMENDED SUBJECTS**, which may be obtained from the Registrar, or from the Assistant Director of Relations with Schools.

A statement of the requirements for the bachelor's degree is contained in this bulletin and in the announcement of each school or college of the University. A copy of the desired announcement may be obtained from the Office of the Registrar.

### **Preparation for Curricula in Agriculture**

It is recommended that students entering the College of Agriculture complete, as a part of or in addition to those subjects required for admission, the following subjects in high school: intermediate algebra, 1 unit, or intermediate algebra,  $\frac{1}{2}$  unit, and trigonometry,  $\frac{1}{2}$  unit; physics, 1 unit, and/or chemistry, 1 unit. Students proposing to major in irrigation science should have, in addition, 1 unit of mechanical drawing. Failure to take the proper subjects in high school may delay completion of the University course beyond the usual four-year period.

# ADMISSION TO THE UNIVERSITY

## RULES GOVERNING RESIDENCE

THE TERM "nonresident student" is construed to mean any person who has not been a bona fide resident of the State of California for more than one year immediately preceding the opening day of a semester during which he proposes to attend the University.

*The eligibility of a person to register as a resident student may be determined only by the Attorney for the Regents in Residence Matters in accordance with the rules for determining residence prescribed by the provisions of Section 244 of the Government Code of California, and Section 20005 of the Education Code of California.*

Every entering student and every student returning after an absence is required to make a "Statement as to Residence" on the day of registration on a form provided for that purpose, and his status with respect to residence will be determined by the Attorney soon after registration. Application by former or continuing students for reclassification in resident status must be filed within ten days after regular registration and by late registrants, within one week after registration. No application may be made for a change of classification with respect to some preceding semester.

Tuition in the academic colleges is free to students who have been residents of the State of California for one year immediately preceding the opening day of the semester during which they propose to attend the University. Students who are classified as nonresidents are required to pay a tuition fee of \$250 each semester in addition to the incidental fee. On the approval of the Dean of the Graduate Division, the nonresident tuition fee may be remitted for graduate students in the academic departments who enter without deficiencies, who have proved that they are distinguished scholars, and who are carrying full programs toward the fulfillment of requirements for academic higher degrees. For conditions of eligibility for exemption from, and of possible commutation of, this fee, see the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.

Any person who has been incorrectly classified as a resident student shall be subject to reclassification as a nonresident student. If any student who has been classified as a resident student shall be determined to have been erroneously so classified, he shall be reclassified as a nonresident; and if his incorrect classification shall be found to be due to any concealment of facts or untruthful statement made by him at or before the time of his original classification, he must pay all tuition fees that would have been charged to him except for such erroneous classification, and shall be subject also to such discipline as the President of the University may approve. *The attention of prospective students who have not attained the age of 22 years and whose parents do not live in the State of California is directed to the fact that presence in the State of California for a period of more than one year immediately preceding the opening day of the semester during which it is proposed to attend the University, does not, of itself, entitle the student to classification as a resident.*

Every alien who has not been lawfully admitted to the United States for permanent residence in accordance with all applicable provisions of the laws of the United States, or whose status, he having been so admitted, has been changed, is classified as a nonresident. An alien is classified as a nonresident if he has not made, prior to the opening day of the semester during which he proposes to attend the University, a valid declaration of intention to become a citizen of the United States.

Every person who has been or who shall hereafter be classified as a non-resident student shall be considered to retain that status until such time as he shall have made application in the form prescribed by the Registrar of the University for reclassification and shall have been reclassified as a resident student.

Any student in doubt about his residence status may communicate in person or by letter with the Attorney for the Regents in Residence Matters, % the Registrar or at Room 590 University Hall, University of California, Berkeley 4, California.

### **CREDIT AND SCHOLARSHIP**

In both the University and the high school the amount of the student's work is evaluated in terms of units; the quality of his scholarship, in terms of grades. For more exact evaluation of his scholarship, the University assigns a numerical value in grade points to each scholarship grade.

High school credit offered for admission to the University is reckoned in matriculation units; each represents one year's work in a given subject in the high school.

High school credit, when offered in satisfaction of high school graduation requirements, is measured in standard secondary units; that is, the credit granted for the study of a subject throughout the school year of thirty-six to forty weeks is stated in terms of the standard secondary unit. Each unit represents approximately one-quarter of a full year's work in high school and four standard secondary units represent one full year's work in high school.

*Relation between high school matriculation units and University units.*— One year's work in the high school is regarded as equivalent to one University semester's work of college level; that is, a student desiring to make up any high school subject deficiency by offering work of college level can in one University semester earn as much credit as in one high school year.

The value of a University course in units is one unit for three hours of work by the student per week per semester. The credit value assigned to a course is determined by the number of hours of work required of the student and not by the number of class meetings per week. For most courses the average student is expected to spend two hours in preparing for one hour of lecture or recitation.

### **ADMISSION IN UNDERGRADUATE STATUS**

An applicant who wishes to enter the University must fulfill the general requirements for admission as set forth below. The University of California bases its entrance requirements on two principles: first, that the best guarantee of success in the University is high quality of scholarship in previous work, and second, that the study of certain specified subjects will give to the student both good preparation for the work of the University and reasonable freedom of choice of a major field of study after his entrance. These principles apply to admission in either freshman or advanced standing.

### **ADMISSION PROCEDURE**

#### **Application for Admission**

Formal application must be filed with the Registrar and Admissions Officer, University of California, Davis. Application blanks will be supplied by the Office of the Registrar upon request. The application should be filed during the semester preceding that for which the applicant wishes to register and must be filed not later than *August 15* for the fall semester or *January 15* for the spring semester. Applicants for the College of Engineering have earlier dates for filing applications; see under "Special Requirements for Engineering," page 24.



### Application Fee

Every applicant for admission is required to pay a fee of \$5 when the first application is filed. Remittance by bank draft or money order should be sent to the Office of the Registrar, but be made payable to The Regents of the University of California.

### Transcripts and Records

Official transcripts of records should be sent directly to the Office of the Registrar from the graduating high school and from each college attended. Transcripts should be endorsed by the proper authority and final college transcripts should include a statement of good standing or honorable dismissal from the last college attended. A preliminary transcript should show work in progress.

### Examination Requirement

All applicants for undergraduate status (except second baccalaureate degree, limited, foreign, and applicants for Engineering at the junior level) must present a satisfactory score on the College Entrance Examination Board Scholastic Aptitude Test. Arrangements for the test, which must be taken no earlier than the senior year in high school or within the year the applicant applies for transfer, are made with the Educational Testing Service, P. O. Box 27896, Los Angeles 27, California, or P. O. Box 592, Princeton, New Jersey. The fee for the Scholastic Aptitude Test is to be paid to the Educational Testing Service. Scores will be regarded as official only if they are received directly from the Educational Testing Service. See also sections on "Admission of Nonresidents" and "Admission by Examination."

#### APTITUDE TEST DATES FOR 1960 AND 1961

<i>Test Dates</i>	<i>Application Deadlines</i>
Saturday, March 12, 1960.....	February 13, 1960
Saturday, May 21, 1960.....	April 23, 1960
Wednesday, August 10, 1960.....	July 13, 1960
Saturday, December 3, 1960.....	November 5, 1960
Saturday, January 14, 1961.....	December 17, 1960
Saturday, February 4, 1961.....	January 7, 1961
Saturday, March 18, 1961.....	February 18, 1961
Saturday, May 20, 1961.....	April 22, 1961
Wednesday, August 9, 1961.....	July 12, 1961

### Vaccination Certificate

Every new student (and every student returning to the University after an absence) must present at the time of medical examination by the University Medical Examiners a certificate establishing the fact that he has been successfully vaccinated against smallpox within the last seven years. A form for this purpose will be furnished by the Registrar's Office of the University. Vaccination should be completed prior to registration.

### ADMISSION IN FRESHMAN STANDING

An applicant who does not meet at the time of high school graduation the requirements given below for admission to freshman standing must qualify for admission with *advanced standing* (see page 22). The only exception to this regulation is in the case of a student whose subject deficiency was the result of not having studied one or more required high school subjects. It is sometimes possible for such a student to clear the deficiency during the summer, provided approval is secured in advance from the Office of the Registrar.

An applicant who has attended a junior college, four-year college, university, extension classes of college level, or any comparable institution since

graduating from high school is subject to regulations governing admission in advanced standing (see page 22). Such college attendance may not be disregarded, whether or not any courses were completed.

### Requirements for California Residents

This includes applicants from out-of-State high schools who are bona fide residents of California.

1. COLLEGE ENTRANCE EXAMINATION BOARD SCHOLASTIC APTITUDE TEST (see above).
2. GRADUATION FROM AN ACCREDITED HIGH SCHOOL.

An accredited high school in California is one that has been officially designated by the Board of Regents of the University as a school from which students will be admitted to the University primarily on the basis of the record of subjects completed and scholarship attained. The list of accredited schools is published by the University annually in the month of September. Accreditation by the University refers to the college preparatory function of the high school and implies no judgment regarding the other educational functions of the school. For information concerning the accrediting of schools, principals may communicate with the Office of Relations with Schools. If the high school from which the applicant graduated is not accredited, the Office of the Registrar will, upon request, instruct the student regarding the procedure he should follow.

3. ADMISSION—METHOD I (see "Alternate Methods of Admission" under (4) below.

#### *Subject Requirements*

Upon the high school authorities rests the responsibility for determining the scope and content of courses preparatory to admission to the University and for certifying such courses to the University. Students naturally will be guided by their respective high school principals in making their preparation for entrance to the University.

- (a) History .....1 unit. This requirement must be satisfied by 1 unit of United States history or 1 unit of United States history and civics.
- (b) English .....3 units. These must consist of six semesters of English composition, literature, and oral expression, certified by the high school principal as University preparatory in nature.
- (c) Mathematics .....2 units. These must consist of two semesters of algebra and two semesters of plane geometry or an integrated two-year course covering the same material. Advanced algebra and trigonometry may be substituted for algebra, and trigonometry and solid geometry for plane geometry.
- (d) Laboratory Science....1 unit. This must consist of an advanced (eleventh or twelfth grade) year course in one laboratory science. Both semesters must be in the same subject field. Courses designated chemistry or physics are accepted without special certification. Courses in other subjects, such as biology, physiology, botany, physical

science, and zoology, are acceptable on written certification from the high school principal.

- (e) Foreign Language....2 units. These must be in one language.
- (f) Advanced course chosen from one of the following .....1 (or 2) units.
1. Mathematics, a total of 1 unit (second-year algebra,  $\frac{1}{2}$  or 1 unit; solid geometry,  $\frac{1}{2}$  unit; trigonometry,  $\frac{1}{2}$  unit, or other course for which trigonometry is a prerequisite).
  2. Foreign language, either 1 additional unit in the same foreign language offered under (e), or 2 units of a different foreign language.
  3. Science, 1 unit of either chemistry or physics in addition to the science offered under (d) above.

Additional elective units to complete the minimum of 15 standard entrance units.

#### *Scholarship Requirements*

An average of grade B (3.0 based on a marking system of four passing grades) is required in the (a) to (f) subjects listed above, which are taken in the tenth, eleventh, and twelfth years. Courses taken for subject credit in the ninth year need show passing grades only.

In determining the B average, a grade of A in one course may be used to balance a C in another; only courses used to meet the (a) to (f) subject requirements and completed in the tenth, eleventh, and twelfth years are used in computing the grade average. Grades are considered on a semester basis, except from schools that give only year grades.

Courses in the required list completed after the ninth year in which a grade of D is received may not be counted in satisfaction of a subject requirement; an A grade may not be used to compensate for D, E, or F grades. Courses taken in the tenth, eleventh, and twelfth years in which a grade C or lower is received may be repeated to raise grades, when approved by the principal of an accredited high school, in an amount not to exceed 2 units of the (a) to (f) pattern. Only the first repetition of a subject will be used to satisfy scholarship requirements, although additional repetitions are allowed for the purpose of satisfying a subject requirement.

#### 4. ALTERNATE METHODS OF ADMISSION (for students who do not qualify under Method I)

##### METHOD II

*Subject*—complete in the entire high school program not less than 10 units in college preparatory courses chosen from the fields of English, mathematics, science, foreign language, and social science  
and

*Scholarship*—achieve a scholarship rank in the highest ten per cent of the graduating class.

##### METHOD III

*Subject*—complete not less than twelve high school units of grade A or B in the work of the tenth, eleventh, and twelfth grades and have no more than 2 units of subject deficiencies in the (a) to (f) subjects. The 2 units of subject shortage must be the result of *omission* only. Courses such as physical education, study period, work experience, military science,

R.O.T.C., and religion are not to be counted under this method  
and

*Scholarship*—in the subjects completed in the tenth, eleventh, and twelfth years and applied on the (a) to (f) requirements have an average grade of B and no grades lower than C.

#### METHOD IV

*Subject*—complete in the eleventh and twelfth grades not less than 6 high school units of A or B grade selected from the following academic subjects:

Third- and fourth-year English

Third- and fourth-year mathematics

Third- and fourth-year laboratory science

Third- and fourth-year foreign language

Third- and fourth-year history or social science (not more than one unit of social science other than United States history or civics may be used)

and

*Scholarship*—in the subjects completed in the tenth, eleventh, and twelfth years and applied on the (a) to (f) pattern, earn no grade lower than C, and maintain a scholarship average of not more than  $\frac{1}{2}$  unit below a B average.

University authorities believe that high school students who follow the regular (a) to (f) pattern of subjects outlined above, together with the additional subjects recommended for particular majors, will be well prepared for work in the University. However, the University does not wish to exclude a student who has followed a program of university preparatory studies recommended to him by his high school and will therefore admit an applicant on a grade B average scholarship in a different program of University preparatory studies provided such a program has been previously filed with, and approved by, the Board of Admissions and Relations with Schools.

#### 5. EXPERIMENTAL PLANS OF ADMISSION

In addition to the foregoing methods, the Board of Admissions and Relations with Schools authorizes from time to time experimental programs to test the validity of suggested procedures. Information about these programs is communicated promptly to school authorities in California by the Office of Relations with Schools. Also the Registrar is charged by the Board with the authority and responsibility for waiving minor deficiencies when justification is evident in the form of unusual academic records or recommendations.

*Agricultural Experimental Plan.* (Applicable only to high school students starting program prior to 1960.) Applicants for admission to freshman standing in the College of Agriculture may meet the minimum subject requirements prescribed in Method I by substituting for the (e) foreign language requirement either (1) two years of agriculture or home economics or (2) one year of mathematics or laboratory science in addition to that required under (f). Such substitute courses must be passed with grades not lower than C. Under this plan the grades received in the additional mathematics or science will be used in meeting the B average minimum scholarship requirement, but grades received in agriculture or home economics will not be so used.

A student admitted under this plan must realize that if, after registration in the College of Agriculture, he wishes to transfer to another college of the University, he must meet one of the regular methods of admission.

#### Requirements for Out-of-State Applicants

##### 1. Graduation from an Accredited High School.

For schools outside California, regional or other accrediting agencies are consulted. The University makes the final decision regarding acceptability.

2. College Entrance Examination Board Scholastic Aptitude Test.  
An average score of 500 or above in the Aptitude Test—see detailed statement on page 18.
  3. Subject Requirements.  
The same subject pattern required of California residents—see Method I (page 19).
  4. Scholarship Requirements.  
An applicant must present evidence that he has maintained a grade-point average of 3.4 or higher on the required high school subjects. One unit of A counts four points, one unit of B counts three points, one unit of C counts two points, one unit of D counts one point. E and F yield no points.
- The alternate plans of admission given on page 20 are not applicable to out-of-State applicants.

### ADMISSION BY EXAMINATION

Applicable only to high school graduates who are residents of California and ineligible on their school records and who have no college work.

The University of California does not itself offer entrance examinations but accepts on all campuses the results of examinations given by the Educational Testing Service for the College Entrance Examination Board (see page 18 for information as to dates and places of examinations for 1960-1961).

To qualify by examination, the tests must be taken no earlier than the applicant's senior year in high school and arrangements must be made with the Educational Testing Service at least four weeks prior to the test date. Test results must be forwarded directly from the Educational Testing Service to the Office of the Registrar.

#### Assignment of Examinations

An applicant who has completed all of the (a) to (f) subjects with grades of at least C but is deficient in scholarship may qualify by attaining a score of 500 or above on:

- (a) The Scholastic Aptitude Test (Verbal and Mathematics scores may be averaged)

*and*

- (b) Each of any three achievement tests in subject fields. An applicant may not present examinations in both Intermediate and Advanced Mathematics.

The applicant who has not completed all the (a) to (f) subjects with C grades or better must consult the Office of the Registrar to determine the examinations he is required to take.

The applicant who has graduated from an unaccredited high school may qualify by examination but must consult with the Office of the Registrar regarding the required tests.

### HONORS AT ENTRANCE

All entering freshmen are considered for Honors at Entrance on the basis of their high school records. Honors recognition at the time of admission is given to entering freshman students with outstanding high school scholastic records. Certificates are presented to the Honors recipients shortly after registration in the University.

### ADMISSION IN ADVANCED STANDING

#### Requirements for California Residents

1. An applicant who was eligible for admission in freshman standing or whose only deficiency arose from not having studied one or more required high school subjects must present evidence that:

(a) He has satisfied, either through high school or college courses, the subjects required for admission of high school graduates in freshman standing (see page 19).

(b) His advanced work, in institutions of college level, has met the minimum scholarship standard required of transferring students, in no case lower than a grade C average in the last college attended and an over-all grade C average in all college work attempted. "Scholarship standard" is expressed by a system of grade points and grade-point averages in courses acceptable for transfer to the University of California. One unit of A counts four grade points; one unit of B counts three grade points; one unit of C counts two grade points; one unit of D counts one grade point; E and F yield no grade points. The grade-point average is determined by dividing the total number of grade points by the total number of units undertaken. Courses completed with a grade lower than grade C may be repeated but the units and grade points count each time the course is taken.

(c) He is entitled to return as a student in good standing to the last college attended.

(d) He has earned a satisfactory score in the College Entrance Examination Board Scholastic Aptitude Test (see page 18).

2. If an applicant for admission to the University in advanced standing was ineligible at the time of high school graduation because of low scholarship or a combination of low scholarship and incomplete subject preparation, he may remove his deficiencies by completing college courses of appropriate content and amount. These courses completed with satisfactory grades may be taken in any approved college.

(a) The applicant must include in his program courses acceptable for removing high school subject shortages caused by omission or by grades of D or lower  
and

present a minimum of 30 units of transfer courses with a grade-point average of at least 2.4 and a satisfactory score on the College Entrance Examination Board Scholastic Aptitude Test  
or

(b) As an alternative to making up high school subject deficiencies, an applicant may be admitted on the basis of a record showing completion of at least 60 units of transfer courses with a grade-point average of 2.4 or higher in which must be included all the subjects required for junior standing in a school or college of the University. Applicants qualifying under this regulation will also be required to present a satisfactory score on the College Entrance Examination Board Scholastic Aptitude Test.

Ordinarily, it is recommended that graduates of California high schools who are not eligible for admission to the University, attend one of the California junior colleges and complete there the lower division requirements of the college in which they wish to register.

### Special Requirements for Out-of-State Applicants

(See also page 21)

In addition to the regular admission requirements described above, out-of-State applicants with advanced standing must meet the following regulations:

(1) A grade-point average of 2.8\* must be maintained in college subjects acceptable for transfer credit, plus an average score above 500 on the College Entrance Examination Board Scholastic Aptitude Test.

\* One unit of A counts four points; one unit of B counts three points; one unit of C counts two points; one unit of D counts one point; E and F yield no points.

(2) An advanced standing applicant who presents less than 30 units of acceptable transfer courses must also meet the high school requirements listed on page 19.

### **CREDIT FOR WORK TAKEN IN OTHER COLLEGES**

The University grants credit for courses appropriate to the curricula that have been completed in other accredited colleges and universities subject to the restrictions of the senior residence requirement.

As an integral part of the system of public education of California, the University of California accepts at full value approved transfer courses completed with satisfactory grades in the public junior colleges of the State; students who intend to complete their advanced studies at the University will frequently find it to their advantage to complete the first two years of their college course in one of the many excellent California public junior colleges. An applicant may not disregard his college record and apply for admission in freshman standing; he is subject without exception to the regulations governing admission in advanced standing. He should ask the registrars of all high schools and colleges he has attended to forward complete official transcripts directly to the Office of Admissions where he has filed his application. Transcripts not sent directly by the issuing school to the Office of Admissions will be considered unofficial. A statement of good standing from the last college attended must also be sent.

No applicant may receive transfer credit in excess of an average of 18 units per semester. After a student has earned 70 units acceptable toward a degree (except credit allowed on the basis of military service and training), no further unit credit will be granted for courses completed at a junior college.

Extension courses taken at some institution other than the University of California may not be acceptable. The decision as to their acceptability rests with the Office of the Registrar. If such a program is planned with the intention of applying it toward a degree at the University of California, it is wise to have the approval from the Office of the Registrar in advance.

### **REMOVAL OF SCHOLARSHIP DEFICIENCIES BY APPLICANTS FROM OTHER COLLEGES**

Applicants otherwise eligible who seek to transfer from other institutions of collegiate rank but whose college record fails to show a satisfactory scholarship average may be admitted only when the deficiency has been removed by additional work completed with grades sufficiently high to offset the shortage of grade points. This may be accomplished by work in other approved higher institutions, in Summer Sessions, or by courses in the University Extension.

### **SPECIAL REQUIREMENTS FOR ENGINEERING**

An engineering qualifying examination must be taken by all applicants for admission to the College of Engineering at both the lower division and upper division levels. The examination is to be taken the semester previous to that in which the applicant desires to register. No other test results may be substituted for those of the appropriate engineering qualifying examination. The formal application for admission to the University as well as the application to take the test must be filed before the date scheduled for the examination. Students not taking the test on the date scheduled will not be considered for admission to the College of Engineering in the semester immediately following.

Applicants for admission to the lower division of the College of Engineering must take the Engineering Examination—Lower Division, and present a satisfactory score on the Scholastic Aptitude Test of the College Entrance Examination Board. No fee will be charged for the Engineering test where

X

must be  
completed  
by



applicants are required to take both it and the Scholastic Aptitude Test. Applicants for admission to the College of Engineering at or above the junior level must submit satisfactory scores on the Engineering Examination—Upper Division. The Scholastic Aptitude Test will be waived for these upper division Engineering applicants. Identical examination programs are required for admission to the College of Engineering, Berkeley, Davis, or Los Angeles.

The Engineering Examination—Lower Division is primarily an aptitude test, but presumes that the student has had the required subjects in high school, particularly those in mathematics through trigonometry, physics or chemistry, mechanical drawing, and English. The test is designed to demonstrate the applicant's general scholastic ability and his ability to comprehend scientific materials and principles, to use mathematical concepts, and to judge spatial relationships. No preparation beyond successful completion of the high school courses is required.

The Engineering Examination—Upper Division is required of applicants for admission at and above the junior level, and must be passed satisfactorily by all continuing students prior to beginning the work of the upper division and by all new students prior to admission. This examination is an achievement test, including the subject areas of English usage, lower division engineering subjects, general college chemistry, mathematics through integral calculus, and general college physics.

#### LIMITATION OF ENROLLMENT OF OUT-OF-STATE APPLICANTS

It has been necessary to place some limitation on enrollment of applicants who are not residents of California and only those of exceptional promise will be eligible for admission. Children of alumni of the University of California are not subject to the special nonresident requirements for admission, nor are applicants who at the time of application have become bona fide residents of California. The regulations below are designed to admit approximately the upper half of candidates eligible for admission under regular rules as measured by scholastic record and aptitude tests.

##### Admission to Freshman Standing

An applicant must present evidence that he has maintained a grade-point average of 3.4\* or higher on the required high school subjects and an average score above 500 on the College Entrance Examination Board Scholastic Aptitude Test (see "Admission in Freshman Standing," page 18).

##### Admission with Advanced Standing

A grade-point average of 2.8\* must be maintained in college subjects acceptable for transfer credit plus an average score above 500 on the College Entrance Board Scholastic Aptitude Test. See also page 22 for detailed description of admission with advanced standing.

#### INTERCAMPUS TRANSFER

*Registrar*  
An undergraduate student, who has attended a regular session of the University of California and has not since that time been registered in a regular session in another institution, may apply for transfer to another campus of the University by obtaining the proper forms from the campus on which he was last registered. The Intercampus Transfer Application forms may be obtained from the Office of the Registrar and must be filed with that office by January 15 for the spring semester and August 15 for the fall semester.

#### ADMISSION OF SPECIAL STUDENTS

Special students are students of mature years who have not had the opportunity to complete a satisfactory high school program or who have not com-

\* One unit of A counts four points; one unit of B counts three points; one unit of C counts two points; one unit of D counts one point; E and F yield no points.

pleted a substantial amount of college work, and who, by reason of special attainments, may be prepared to undertake certain courses in the University toward a definite and limited objective.

The conditions for the admission of each applicant under this classification are assigned by the Registrar and Admissions Officer and are subject to the approval of the dean of the college. Ordinarily, a personal interview is required before final action can be taken and, in general, special students are required to confine their attention to some special study and its related branches. Admission as a special student is for a limited time only, as fixed by the Registrar and Admissions Officer, and is subject at all times to satisfactory scholastic achievement.

No person under 21 years will be admitted as a special student, but mere attainment of any given age is not in itself a qualification for admission.

An applicant will not be admitted directly from high school to the status of special student. Graduates of high schools are expected to qualify for admission in accordance with the usual rules; students admitted to regular status, if not candidates for degrees, may, with the approval of the proper study-list officer, pursue elective or limited programs.

Transcripts of record from all schools attended beyond the eighth grade must ordinarily be submitted by an applicant for special status. He may also be required to take the examination in Subject A.

The University has no "special courses." All courses are organized for regular students. A special student may be admitted to those regular courses for which, in the judgment of the instructor, he has satisfactory preparation. *A special student will seldom be able to undertake the work of the engineering and professional colleges or schools.*

A special student may at any time attain the status of regular student by satisfying all the matriculation requirements for admission to the University, but an applicant will not be admitted to special status for the purpose of making up requirements.

### ADMISSION OF LIMITED STUDENTS

Limited students are those with a bachelor's degree but ineligible for admission to graduate standing or without a bachelor's degree who have completed a substantial amount of college work in the University of California or in another institution of approved standing with a satisfactory scholarship average and who, by reason of special attainments, may be prepared to undertake certain courses in the University toward a definite and limited objective.

The conditions for the undergraduate admission of each applicant under this classification are assigned by the Registrar and Admissions Officer and are subject to the approval of the dean of the professional school to which he seeks eventual admission or by the dean of the college or school in which the applicant desires to satisfy a definite need or interest.

Transcripts of record from all schools attended beyond the eighth grade must ordinarily be submitted by an applicant for limited status. He may also be required to take the examination in Subject A.

The applicant will not be admitted to limited status for the sole purpose of raising a low scholarship average. Limited students for whom no grades have been specified are subject to the minimum scholarship requirements of the college or school in which they are enrolled. Any deviation from the program as planned or any scholarship deficiency incurred while pursuing it will result in the cancellation of a student's limited status and will render him subject to dismissal from the University.

### ADMISSION OF APPLICANTS WITH BACHELORS' DEGREES

Ordinarily, an applicant with a bachelor's degree substantially equivalent to the bachelor's degree granted by the University of California should apply

for admission to graduate status. Occasionally, such an applicant with a superior record may qualify as a limited student or, as a result of complete change of objective, as an undergraduate seeking a second baccalaureate degree. In either case, the previous scholarship record must be such as to indicate very strong probability of academic success. Admission is also subject to the approval of the dean of the school or college in which the applicant plans to enroll.

### ADMISSION FROM SCHOOLS AND COLLEGES IN FOREIGN COUNTRIES

The credentials of an applicant for admission from a foreign country, either in undergraduate or graduate standing, are evaluated under the general regulations governing admission. An application, with official certificates and detailed transcripts of records, should be submitted to the Registrar six months before the opening of the semester in which the applicant hopes to gain admittance. This will allow time for the necessary correspondence relative to entrance and, if the applicant is admitted, will aid him in obtaining the necessary travel documents.

An applicant from a foreign country whose education has been conducted in a language other than English may be admitted only after demonstrating that his command of English will permit him to profit by instruction in this University. An applicant's knowledge of English is tested by an oral and written examination given by the University. This regulation applies to both graduate and undergraduate foreign students. The admission of an applicant who fails to pass this examination will be deferred until he has attained the required proficiency in English.

*Language Credit for a Foreign Student.*—College credit for the mother tongue of a foreign student and for its literature is given only for courses taken in native institutions of college level, or for upper division or graduate courses taken in the University or in another English-speaking institution of approved standing.

*College of Engineering.*—An applicant for admission to the College of Engineering who is outside the United States must pass with satisfactory scores the Scholastic Aptitude Test (verbal and mathematics sections) and achievement examinations in English composition, physics, and advanced mathematics of the College Entrance Examination Board before a letter of admission to the College of Engineering may be issued. Arrangements to take the tests in another country may be made directly with the College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey. A fee of \$16 is charged for these examinations and should be forwarded to the College Examination Board, not to the University of California. An applicant should request that his scores in the tests be forwarded to the Office of the Registrar.

*Foreign Student Advisers.*—Special advisers have been appointed by the President of the University to assist foreign students in all matters pertaining to their attendance at the University. Each student who is not a citizen of the United States, upon his arrival at the University, must report to the Foreign Student Office.

### ADMISSION IN GRADUATE STANDING

Admission to the Graduate Division may be accorded holders of the bachelor's degree from institutions of acceptable standing on presentation of official transcripts showing all college or university work completed to date together with official evidence of the degree conferred, provided the undergraduate program represents the usual college course of four years, the scholarship record is satisfactory, and the student can be accommodated in the field in which he wishes to pursue study. The University may deny admission to grad-



Memorial Union Court

uate standing in cases where the scholarship record has not been satisfactory or where the undergraduate program has not furnished an adequate basis for advanced work leading to academic or professional higher degrees or certificates. This proviso applies to graduates of the University as well as to graduates of other institutions. *In the absence of official records and official evidence of graduation or receipt of degree, registration will not in any case be permitted.*

Transcripts of students' records and all other official credentials furnished for admission are retained permanently in the files of the Graduate Division, Berkeley or Davis. *In addition to the record sent for admission, the student must furnish an additional set of his official transcripts for conference with departmental advisers and for his own reference in planning a program of study. The Graduate Division office copies may not be borrowed for any purpose.* Admission to the Graduate Division does not necessarily carry with it the privilege of proceeding to candidacy for a higher degree on the basis of minimum residence and subject requirements.

A formal application is required of all persons seeking admission to the Graduate Division, Northern Section, of the University. The application blank may be obtained from the Office of the Dean of the Graduate Division, 250 Sproul Hall, University of California, Berkeley 4, or 268A Hunt Hall, Davis, and must be filed at Berkeley, preferably twelve weeks before the date of registration, and in no case later than July 15 for the fall semester and December 15 for the spring semester. It should be accompanied by a money order or bank draft for \$5 in payment of the application fee.† *The application fee is chargeable to every person who files an application, and is not returnable under any circumstances.* (For readmission of former graduate students, see below.) If applications and complete records are filed later than twelve weeks before the date of registration the student's registration may be delayed and he must pay the \$10 late registration fee.

Every new student and every student returning to the University after an absence must present, at the time of the medical examination by the University Medical Examiner, a certificate establishing the fact that he has been successfully vaccinated against smallpox within seven years. Vaccination should be completed prior to registration. A form for this purpose will be furnished by the University.

The level of work to which graduate students are assigned and their standing as candidates for degrees depend upon the extent and character of their undergraduate courses. If in the opinion of any department the preliminary training of an applicant has not qualified him for graduate work, he may be assigned to such undergraduate courses as are suited to his needs.

**Readmission:** An application for readmission is required of persons formerly registered in a regular session as graduate students who wish to return after an absence. The form for this purpose is obtainable from the Registrar, and no fee is charged. Each applicant is required, however, to file official evidence that he has been satisfactorily vaccinated as explained in the above paragraph for new students.

**Foreign Students:** Applicants for admission to the Graduate Division on credentials from universities and colleges in foreign countries must take the Examination in English for Foreign Students described in the preceding section, to demonstrate whether or not their command of English will enable them to profit by instruction in the University.

For further information concerning the Graduate Division see the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION, obtainable from the Registrar or the Associate Dean of the Graduate Division; or from the Dean of the Graduate Division, University of California, Berkeley 4.

† Veterans who expect to enroll under the provisions of Public Law 894 or Public Law 16 are not required to remit this fee with their applications.

## GENERAL INFORMATION AND REGULATIONS

CERTAIN GENERAL REGULATIONS govern residence and eligibility for study in the academic departments. Unless otherwise stated, these apply to both graduate and undergraduate students.

### ROUTINE OF REGISTRATION

No student in the departments of the University may undertake any work or examination with a view to credit toward a University degree without registration for the work or examination with the Registrar; such registration must be accepted by the proper faculty before the work proposed is undertaken.

The prospective student should plan to arrive early in the registration week. All new undergraduate students may be required to take certain examinations, including Subject A, which are scheduled for specific hours during registration week. A fee of \$1 is charged any student who fails to take a required examination at the prescribed time.

A student in good standing carrying a limited amount of regular classwork may be permitted, on the basis of private study outside of University classes, to take certain University examinations for the purpose of gaining advanced standing. The authorization of the proper faculty must, however, be obtained by written petition before preparation for the examination is begun.

The student or prospective student should consult the *Registration Circular* for the dates upon which he is expected to register and begin work. Registration at a later date requires special permission. Failure to register on the stated registration days will cause difficulty in making a satisfactory program and retard the progress of both the student and of each class to which he may be admitted.

A student who registers after the opening of the session and who later is found deficient in his work may not plead late admission as an excuse for his deficiency.

A fee of \$10 is charged for late registration; this regulation applies both to old and new students.

A qualified student or applicant who fails to register on the stated registration days at the opening of the semester, but who, nevertheless, appears *during the first two weeks of instruction*, will usually be permitted to register. After the first week, however, he is required to obtain written approval from all the instructors in charge of his proposed courses and from the dean of his college, before his registration can be completed. *In no event will a student be permitted to register or file his study list after Friday of the third week of instruction.*

### STUDY-LIST REGULATIONS

At the beginning of each semester every student must file with the Registrar, on a specified date, a detailed study list bearing the approval of a faculty adviser or other designated authority.

The presentation of this study list and its acceptance by the college are evidence of the student's obligation to perform the designated work to the best of his ability. Withdrawal from, or neglect of, any course entered on the study list, or a change in program without formal permission from the dean of the college, makes the student liable to enforced withdrawal from the University, or to other appropriate disciplinary action.

Each college has certain study-list limits with which the student must comply. Detailed regulations of the respective colleges are given in later pages of this bulletin.

A student normally registers for course work at the beginning of each semester. He may sometimes register for year courses in the second semester

without having been registered in the first semester. When this is done, credit is given for the work of the second semester only.

Concurrent enrollment in resident courses and in extension courses is permitted only when the student's entire program has received the approval of the proper dean or study-list officer and the student has been registered at the University before undertaking the work.

After the study list is filed, a student may request changes in program by formal petition, which must be approved by the instructors concerned and by the dean or other proper officer of the student's college.

Every regular student must include in his study list all required work appropriate to the college and year of his work. The Committee on Study Lists of the appropriate college or school is authorized to withdraw study cards that do not comply with this regulation.

*Authority of Instructors.*—No student will be permitted to enter upon the study of any subject if, in the instructor's opinion, he lacks the necessary preparation to ensure competent work.

Every student must satisfy his instructors that he is performing his work in a proper manner. Instructors will report to the Registrar from time to time the names of students whose attendance or work is unsatisfactory.

An instructor, with the Chancellor's and the President's approval, may at any time exclude from his course any student guilty of unbecoming conduct toward the instructor or the class, or a student who, in his judgment, has neglected the work. A student thus excluded will be recorded as having failed in that course unless the faculty determines otherwise.

*Other General Requirements.*—The student's attention is directed to further University regulations concerning the requirements in scholarship and candidacy for degrees. The student should plan his program of studies carefully in relation to these requirements, and consult promptly with his adviser or the dean of the college or school concerning any irregularities in his program that may require special approval.

### **MEDICAL AND PHYSICAL EXAMINATION**

To safeguard the health of the student and the University community, every new student prior to the filing of his registration papers must call upon the University Medical Examiners and pass a medical examination. Every new student must possess at the time of registration a certificate testifying to successful vaccination against smallpox within the last seven years. A form for this purpose is furnished by the University.

Tests for tuberculosis are a part of the physical examination of all new students. Applicants with contagious diseases will be excluded. Any having physical conditions that grossly disturb the classwork of other students, such as uncontrollable convulsive seizures, should not apply for admission, and will be disqualified when detected.

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 comply with the University requirements regarding smallpox vaccination and must have a health evaluation at the Student Health Service.

### **PHYSICAL EDUCATION AND USE OF GYMNASIUM**

All students, by paying the incidental fee, are privileged to use the gymnasium, swimming pool, tennis courts, and athletic fields. Equipment for games and sports is available for exercise and recreation, either with or without instruction.



The Gymnasium



## MILITARY SCIENCE

Under the Act of Congress establishing the land-grant colleges, instruction in military science must be included in the curricula. The Board of Regents of the University of California has therefore directed that every undergraduate male student, unless excused, must pursue the study of military science during the first two years of residence. The University of California has an Army R.O.T.C. unit which offers courses in general military science.

Students must list the prescribed courses in military science on their study cards along with other University courses. Any petition for excuse from, or deferment of, military science must be filed within two weeks of the date of registration, except where illness or physical disability occurs after that date. Further information about the requirement in military science, including a statement of the grounds upon which students may be excused, may be obtained from the Registrar.

If a student who is subject to this requirement lists the prescribed course on his study card, and thereafter without authority fails to appear for the course, his neglect will be reported to the Registrar, who, with the President's approval, will notify the student that he is dismissed from the University. The Registrar will then report the dismissal to the dean of the student's college or other officer in charge of the student's program. Reinstatement will be made only upon approval of the President with the agreement of the Professor of Military Science.

### THE RESERVE OFFICERS' TRAINING CORPS

The Reserve Officers' Training Corps was established by Act of Congress in 1916. Its purpose is to train junior officers possessing qualities and attributes essential to their progressive and continued development in the United States Army Reserve and in the Regular Army. Military leadership is emphasized. Instruction includes subjects common to all branches of the Army with special attention to tactics and techniques of the military team. The United States Government furnishes arms, equipment, uniforms, and textbooks for the use of all students enrolled in courses of the department.

The R.O.T.C. program has been divided into four phases: (1) the required basic course (lower division) of 8 units within the department, (2) the elective advanced course (upper division) of 10 units within the department, (3) summer camp (for upper division only) of 3 units, and (4) 6 elective units outside the department (upper division students) in the general areas of natural science, general psychology, effective communication or political science. The 6 units may fulfill dual requirements for the baccalaureate degree in the colleges as well as for the commission as a Second Lieutenant of the U. S. Army Reserve. Elective subjects selected must be taken while in the advanced course.

*Lower Division.*—The lower division (basic) course is prescribed for all first- and second-year undergraduate male students who are citizens of the United States, able-bodied, under twenty-three years of age at the time of initial enrollment and are not otherwise exempt. The instruction is of a general type which prepares the graduate for duty with any branch of the Army upon completion of additional branch schooling.

A first- or second-year student claiming exemption because of noncitizenship, physical disability, age, or military service will present to the Registrar a petition for such exemption on the prescribed form. Pending action on his petition the student will enroll in the course prescribed for his year and enter upon the work of such course. Under certain conditions, nonresident aliens are permitted to enroll. Inquiry should be made to the Professor of Military Science and Tactics.

*Upper Division.*—The upper division (advanced) course is open to all students who have successfully completed the basic course, or who are eligible

for equivalent credit, and who can complete the course prior to their twenty-eighth birthday. It is also open to veterans having over one year of military service who meet the age and physical requirements.

Application for admission to the advanced course will normally be made in the fourth semester of the basic course, but may be made at any time after completion of one semester of the basic course. To be accepted, an applicant must pass an entrance examination, a physical examination, be selected by the Professor of Military Science and the Chancellor, and execute an agreement with the government to complete the course which includes attendance at a six-week summer camp between the junior and senior years. Students selected for the advanced course are those who have shown potentialities for leadership and command and the promise of developing into efficient officers. Acceptance and enrollment in the upper division course will make the completion of the advanced course a prerequisite to graduation from the University, unless the student is excused by authority of the Secretary of the Army.

During the two-year period of the advanced course, the student will be paid a nominal commutation of subsistence in an amount prescribed by the Secretary of the Army.

During the third semester of the upper division (advanced) course, each student is classified according to his aptitude and qualifications for a particular branch of service and recommendations are made to the Department of the Army for commissioning in the various Arms and Services of the Army. Also, during this semester, outstanding students may be designated by the Chancellor and the Professor of Military Science as Distinguished Military Students. If their high records are maintained, they may be designated, upon graduation from the University, Distinguished Military Graduates. These cadets may then apply for direct commission in the Regular Army as Second Lieutenants.

Successful completion of the advanced R.O.T.C. course, and four years of education at the college level, will qualify the student for appointment as a Second Lieutenant in the United States Army Reserve.

### EXPENSES OF STUDENTS

It is not possible to give exact figures for the budget of a student. Costs will vary according to personal tastes and the financial resources of the individual. In general, the total expense for a college year of two semesters will average about \$1,300 for residents of California and \$1,800 for nonresidents. Expenses of about \$225 for resident students and \$425 for nonresident students are necessary during the first month after entering college. It is possible to live simply and to participate moderately in the life of the student community on a limited budget. The best that University authorities can do to assist the student in planning his budget is to indicate certain and probable expenses.

*Tuition.*—For residents of California, tuition is free. Any student classed by the University Attorney as a nonresident pays a tuition fee of \$250 per semester in addition to the incidental fee. It is important that every student entering the University for the first time note carefully the Rules Governing Legal Residence stated on page 16.

*Incidental Fee.*—The incidental fee is \$60 each semester for graduates and undergraduates. This fee, which must be paid at the time of registration, covers certain expenses for use of library books, for athletic and gymnasium facilities and equipment, for lockers and washrooms, for registration and graduation, for all laboratory and course fees, and for such consultation, medical advice, and hospital care or dispensary treatment as can be furnished by the Student Health Service. No part of this fee is remitted to those students who may not desire to make use of all or any of these privileges.

**Student Body Membership Fee.**—The student body membership fee is \$7.50 each semester. This fee must be paid by all undergraduate students at the time of registration. Membership privileges include participation in student affairs, a free subscription to the student newspaper, free admission to the many athletic contests, and reduced admission rates to others. *The student body membership fee is not mandatory for graduate students.*

**Memorial Union Fee.**—A Memorial Union fee of \$2.50 each semester is required of all students.

**Miscellaneous Expenses.**—Books and stationery for a student average \$50 to \$70 a year. Books and special equipment for students in the preprofessional and professional programs cost \$50 to \$200. Exact information on these items may be obtained by writing directly to the school or department. Students who fail to pass the required examination in Subject A must pay a fee of \$35 for the course in Subject A (see page 40).

**Parking Fee.**—A parking fee of \$3 each semester is required of students who park their cars on the campus.

**Refunds.**—For students who leave before the end of any semester, part of the fees enumerated above may be refunded. A schedule of refunds and other information will be found in a separate circular (STUDENT FEES AND DEPOSITS) which may be obtained from the Registrar.

### SCHOLARSHIPS, PRIZES, LOANS

Through the generosity of alumni and other friends of the University, scholarships, fellowships, prizes, and loan funds are available to undergraduate and graduate students in accordance with the conditions laid down by the donors.

**Scholarships and Fellowships.**—A circular giving information about undergraduate scholarships may be obtained from the Registrar. Students who maintain an excellent scholarship standing are eligible to make application. Awards are made on the basis of scholarship, financial need, and promise. Recipients of undergraduate scholarships must enroll for a minimum of 12 units a semester. Applications for scholarships for any academic year (July 1–June 30) must be filed with the Committee on Undergraduate Scholarships not later than the preceding *February 1* by students already in attendance, and not later than *March 1* by entering students. These dates are subject to change. Application forms are available each year from the beginning of the last week in November in the office of the Dean of Students.

In addition to filing a scholarship application form by March 1, 1961, entering scholarship applicants for the academic year 1961–1962 must take the Scholastic Aptitude Test of the College Entrance Examination Board not later than the February 4, 1961 test date. Applicants must register for this test not later than January 7, 1961 (or January 21 if a \$3 late registration fee is paid) with the Educational Testing Service, Box 27896, Los Angeles 27, California, (or Box 592, Princeton, New Jersey, if the student's home is in Eastern United States). Information as to the centers where the Scholastic Aptitude Tests are given may also be obtained from Educational Testing Service. *Applicants who have already taken this test may submit scores from any administration since January 1, 1958.*

Information about fellowships for graduate students may be obtained from the Associate Dean of the Graduate Division, 268A Hunt Hall. Fellowships and graduate scholarships are ordinarily awarded as a mark of honor, on the basis of scholarship, and not of need. The holders of fellowships or graduate scholarships are expected to devote all their time to graduate study and research in the University. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division, 250 Sproul Hall, University of California, Berkeley 4, not later than *February 7th* (February 8th when the 7th falls on Sunday) prior to the academic year for which the

award is sought. This date may be subject to change. For the latest information, applicants should consult the Office of the Dean of the Graduate Division.

**Prizes.**—A complete list of available prizes, together with the regulations governing each competition, may be obtained from the Registrar.

**Loans.**—All loans for both graduate and undergraduate students are initiated in the office of Dean of Students. Loans from University loan funds are not available to students during their first semester of residence. The National Defense Education Act of 1958 is providing funds for granting loans up to \$500 per semester and to a maximum of \$5,000 per student. Repayment can be extended over eleven years after graduation or leaving the University. Prospective students and students in their first semester of residence may apply for the N.D.E.A. loans. The number of such loans available will depend upon federal allocation of funds.

### STUDENT EMPLOYMENT

Many students who attend the University expect to earn a 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 and, 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 semester the student should know the demands of University life and his own capabilities well enough to plan a program combining studies and work for subsequent semesters.

A few part-time jobs are available to students who can adjust their academic programs to the employers' needs. Usually, programs must be arranged before referrals for employment can be given. Men with limited time or difficult schedules may often supplement their income by doing casual work such as gardening, housework, or miscellaneous odd jobs on the campus and in the community. Women students have some opportunities for work in food service on the campus and there are calls for housework and baby sitting. Private homes occasionally provide room and board in exchange for assistance within the home for both men and women students.

The Student and Alumni Placement Center assists students in finding part-time employment both on and off the campus. There is no charge for this service. Personal interviews are necessary, as arrangements cannot be made satisfactorily by correspondence. Those wishing part-time work should register with the Student and Alumni Placement Center upon arrival on the campus.

### VETERANS AFFAIRS

The Office of Special Services maintains liaison between certain veterans and veterans' dependents, and the Veterans Administration, the State Department of Veterans Affairs, and other agencies offering veterans educational benefits, and assists veterans in becoming assimilated into the life and spirit of the University. This office is located in Room 114 Temporary Building 8. Offices of the United States Veterans Administration are located as follows:

San Francisco Regional Office, 49 Fourth Street, San Francisco 3, California  
Los Angeles Regional Office, 1380 South Sepulveda Boulevard, Los Angeles 25, California

Veterans wishing to enroll under the provisions of Public Law 550 ("Korean" G. I. Bill) should obtain from the United States Veterans Administration a Certificate for Education and Training, which should be filed with the Office of Special Services upon completion of registration. These veterans must be prepared to pay all fees and educational costs at the time of registration, since education and training allowances are paid to the veteran by

the Veterans Administration and the first monthly payment will normally be received 60 to 75 days after compliance with the above.

Information regarding educational benefits available from the State of California (CVEI) may be obtained from the State Department of Veterans Affairs by writing to P.O. Box 1559, Sacramento 7, California, or to Room 225, 542 South Broadway, Los Angeles 13, California, or to 515 Van Ness Avenue, San Francisco 2, California.

### **OPPORTUNITIES FOR ACQUIRING AGRICULTURAL SKILLS**

Many students who enroll in the College of Agriculture with the intention of making a career either in productive agriculture or in one of the many service industries directly associated with agriculture have had little or no opportunity to acquire actual experience in the area they have tentatively selected for their major.

Although the University of California does not prescribe practical farm experience as a requirement for graduation, nor does it grant degree credit for the acquisition of manual skills attained by repetitive practice, the staff does encourage students who do not have an agricultural background to supplement their academic training with a program of supervised work experience.

As a result of a grant by the late Mr. Fred H. Bixby, the Division of Farm Practice was organized to assist undergraduates in acquiring such practical farm experience.

Each new student is questioned as to his agricultural experience and facility with the skills involved in his proposed major subject. The results are placed in the hands of his individual academic adviser.

Two separate programs are open to him under the supervision of the Farm Practice Division working cooperatively with the subject matter division of the student's major subject. In some fields there is ample opportunity for all major students to find employment in connection with Experiment Station projects dealing with production problems.

For others, however, land has been allocated to the Farm Practice Division where students may learn, by practical experience, the proper use of farm implements and the various manual skills.

In addition, the Farm Practice Division will assist students in finding opportunities with selected farmers in all areas of the State where they may participate as employees in various farm operations to supplement their college instruction. Many students find that the summer vacation period is the most convenient time to enlarge their knowledge and skill in farm operations, while others may find it advantageous to take a leave of absence for a semester or more to insure participation in at least one complete production cycle.

During the period of employment, a Farm Practice representative makes frequent visits to the student and his teacher-employer to develop records and recommendations that will be of value to the student when he seeks permanent employment upon graduation. Also, many students find that they are able to establish contacts that lead to permanent jobs as the result of such practical training employment.

Students whose practical farm experience is limited are encouraged to discuss this problem with their faculty advisers and to contact the Farm Practice Office soon after registration, to insure sufficient time for the development of job opportunities that best meet their requirements for practical training in farming and to avail themselves of the noncredit skills-training program that is in operation on the campus.

### **LIVING ACCOMMODATIONS**

The University maintains residence halls and dining units for men and women, and emergency housing apartments for married students. In pro-

viding meals and living accommodations for students, the University is mindful of two responsibilities: one is to assure wholesome living conditions; the other is to make residence living contribute specifically to the educational experience of the student.

Within the framework of the A.S.U.C.D., the student government functions in the residence halls, each hall maintaining its own council to act upon matters concerning the welfare of the individual residents.

In accordance with the policy of the University, each student is expected to observe the commonly accepted standards of morality, behavior, and good taste. A willful disregard for the spirit of these standards may constitute sufficient cause for terminating the student's connection with the University.

Board and room in the University residence halls costs about \$385 per semester—approximately the same as for fraternities and private accommodations in the city of Davis. Rooms in the residence halls contain the necessary furniture, linen, blankets, and study lamps; the rent includes the weekly laundering of linen. Contracts for residence are on a semester basis. Applications for residence in any of the University halls should be addressed to the Office of Housing Services, University of California, Davis.

A residence card must be filed in the office of the Dean of Women by every woman student before her registration can be completed. Every woman under 21 years of age not living in campus housing must have not only the permission of the Dean of Women for her college residence but also the permission of her parent or guardian, whose approval must be indicated by signature on the woman's residence card provided at registration.

*Fraternities.*—Fraternity membership is by invitation only. These organizations provide living quarters and meals for their members. Men students who are interested in pledging a fraternity in September should not apply for the residence halls. Information about fraternities may be obtained by addressing the Dean of Students.

### STUDENT HEALTH SERVICE

The purpose of the Student Health Service is to conserve the time of students for their classwork and studies, by preventing and treating acute illnesses. This service is made possible in part by the general funds of the University and in part by the staff physicians, and is not a health insurance plan; therefore, the service is limited by the staff and facilities available.

Each student registering in the fall and continuing through the spring semester, and each student registering in the spring semester may, at need, have such medical care as the campus health service is staffed and equipped to provide from the first day of the semester in which the student first registers during the academic year to the last day of the spring semester of the same academic year, or to the date of official withdrawal from the University. Additional service may be provided for seven days after the last day of the semester at the discretion of the Director of the Student Health Service. Any prospective registrant who receives health service and who does not register for the next following semester shall be required to pay toward the cost of the service rendered him up to the amount of the incidental fee. Surgical treatment is also included in the services offered when, in the opinion of the University Physician, this is necessary and within the limitations herein outlined.

In the event of serious illness during the semester, hospital care for a period of up to thirty days may be given on the recommendation of the University Physician. If the patient is still ill at the end of the semester, he will be released from the hospital to the care of his home or community as soon as the University Physician considers it safe. Also, if injuries or illnesses are of a nature requiring prolonged care that will obviously prevent continuance in

college during the current semester, the patient will be returned to his community or home for definitive treatment.

Off-campus medical care on authorized trips will be provided if the student is unable to return safely to the Student Health Center for medical care.

No definitive surgical treatment will be undertaken (as, for example, tumors of the bone) if such treatment would prevent the student from returning to college the same semester. Charges will be made for unusual appliances or remedies not ordinarily available or for hospitalization in excess of thirty days.

The Student Health Service does not take responsibility for dealing with any chronic physical defects or illnesses present at the time of entrance to the University (for example, fitting of eyeglasses, hernias, chronic bone and joint diseases or deformities, chronic gastrointestinal disorders, fibroids of the uterus, chronically infected tonsils, tuberculosis, syphilis, malignant diseases, allergic and endocrine disorders). Except for first aid and emergency care, the Student Health Service does not take the responsibility for dental treatments and will not undertake to treat any injury or illness when treatment has been initiated elsewhere. It does not take responsibility for treating remedial defects where medical or surgical treatment is elective and not of an emergency nature, and where the student's best interests will be served by treatment during vacation.

### UNIVERSITY LIBRARY

The University Library on the Davis campus, occupying much of the Library-Administration Building, contains about 200,000 books and receives annually about 4,000 current periodicals and serials. These have been selected to support the teaching and research needs of the College of Agriculture, the College of Letters and Science, and the School of Veterinary Medicine. The collection of works in agriculture and related sciences is among the largest in the West. As a center for printed materials, the main library serves both students and faculty. It is supplemented by several specialized departmental collections, which are primarily for laboratory or office use. Trained reference librarians are available for information and advice on a 68-hour-a-week basis.

For further information students are referred to a pamphlet, *Using Your Library*, copies of which are available at the Library.

### SELECTIVE SERVICE

Matters relating to the registration and deferment of students eligible under Selective Service are handled by the Director of Special Services. Certifications regarding enrollment, class standing and other pertinent information will be submitted to the student's Selective Service Board upon request. To be considered for deferment by Selective Service, the student must be pursuing a full-time course of instruction, which for undergraduates, consists of at least 15 units. This does not include noncredit courses, such as Subject A. Students who plan to seek deferment continuously until qualified for the bachelor's degree should understand that present policies of Selective Service permit continuous deferment only through the eighth semester of college residence, including not only the period of residence at the University of California but also all semesters spent at junior colleges or other collegiate institutions. Students should plan course sequences for several semesters ahead so that prerequisites for all desired advanced courses can be satisfied within the eight-semester period. To qualify as a full-time graduate student, the student must be in residence, actually spend full time on his studies, and meet the criteria generally applied for normal progress toward the degree—i.e., two years or less for the master's degree and four years or less for the doctor's degree (including time spent working toward the master's degree, if taken). Students desiring deferment on the basis of enrollment in the University R.O.T.C. program should talk with the professor of Military Science.

### COUNSELING SERVICE

Professional counseling on an individual basis is offered to students with questions pertaining to vocational and educational planning or problems of a personal-social nature related to college life.

A choice of a major or future vocation, evaluation of scholastic aptitude as well as other personal characteristics, and improvement of study techniques are common topics of consideration in the counseling interview. The counselor attempts to help the student make the best use of his own resources in order to achieve maximum benefit from the college experience.

Freshman orientation testing is conducted on a group basis by the counseling staff and interpretation of test performance is made individually to students and academic advisors upon request.

Further information about the Counseling Service and appointments for counseling interviews are available through the Counseling Office, Room 2, TB 1.

### SUBJECT A: ENGLISH COMPOSITION

Every undergraduate entrant (except as noted below) must, when first registering in the University, take the *Examination in Subject A*, as a test of his ability to write English without gross errors in spelling, grammar, sentence structure, and punctuation.

This examination is offered at the opening of each fall and spring semester (see REGISTRATION CIRCULAR, obtainable from the Registrar). For late registrants a second examination is given (fee \$1), not later than two weeks after the beginning of the semester.

Results of the first examination are available on the following day. Students are graded as "passed" or "failed." Any student absent from the required examination in Subject A is treated as having failed.

Every student who fails the Subject A examination must enroll in the special *Course in Subject A* (three hours weekly for one semester) which is without unit credit toward graduation. This course is subject to the same rules of grading as other University courses. A fee of \$35, payable before the study list is filed, is required for this course; the charge is repeated each time the student takes the course.

A student who has failed the examination in Subject A cannot take the second examination, but must enroll in the course in Subject A.

No student will be granted the bachelor's degree until he has satisfied the Subject A requirement.

A student who has received a satisfactory rating in the College Entrance Examination Board examination in English composition has satisfied the Subject A requirement. A student who has passed an examination in Subject A given by the University or given under the jurisdiction of the University at various centers in the State annually in May or June also has satisfied the Subject A requirement.

A student is exempt from the requirement in Subject A if he enters the University of California with credentials showing completion elsewhere, with a grade not lower than C, of one or more acceptable college courses in English composition (totaling at least 3 semester units, or the equivalent, of transferable college credit).

A student who maintains a grade of A in the course in Subject A is permitted, on recommendation of the Committee on Subject A, to withdraw from the course at a date determined by that committee and is considered as having fulfilled the Subject A requirement. Should any student fail in this course, he will be required to repeat the work in the next succeeding semester of his residence in the University.

Students from other countries whose native language is not English should take the special examination in English for foreign students rather than the Subject A examination. Students who subsequently complete Speech 26, the



advanced course in English for foreign students, with a grade of C or higher, will be credited as having met the Subject A requirement.

### **EXAMINATION IN MATHEMATICS**

All freshman students entering the College of Letters and Science intending to pursue programs leading to the A.B. degree must take an examination in Subject C, consisting of elementary algebra and plane geometry.

### **AMERICAN HISTORY AND INSTITUTIONS**

Every student who intends to be a candidate for the bachelor's degree must demonstrate a knowledge of American History and Institutions. He may meet the requirement in any of the following ways:

1. By passing a single examination in American History and Institutions. Successful completion of the examination carries three units of course credit. Students electing to satisfy the requirement by examination are requested to do so before the senior year.
2. By completing any two of the following courses, subject to the conditions noted below: † History 17A, 17B, 171A, 171B, 172A, 172B, 174A, 174B, 176A, 176B, 178A, 178B, 179, 180, 183; Political Science 1A, 1B, 102, 105, 113, 128A, 157A, 157B, 162, 163, 166.
3. (a) By the automatic equivalence granted for courses offered by collegiate institutions within the state of California, provided an official transcript of the student's record indicates satisfaction of the requirement by such courses, or by meeting the requirement as prescribed by other branches of the University.  
(b) By presenting a certificate of completion of acceptable courses at other collegiate institutions. Certificates may be obtained from the office of the Supervisor.

All foreign students attending the University on student visas who are candidates for the bachelor's degree are advised to see the Supervisor of the American History and Institutions Requirement early in their academic work at the University.

Further information concerning this requirement and the examination to meet it may be obtained from the Supervisor of the Requirement of American History and Institutions, Room 163 Academic Office Building.

### **CANDIDACY FOR DEGREES**

Every student who intends to be a candidate for a bachelor's degree at the end of the semester, must file with the Registrar, on a date to be fixed by the Registrar, an announcement of candidacy. For filing this announcement later than the appointed date, a fee of \$3 is charged. In 1960-1961 these dates are: Monday, October 3, 1960, for candidates who expect to complete their work in January, 1961; and Monday, February 20, 1961, for candidates for graduation in June, 1961.

All candidates for the bachelor's degree must have been enrolled throughout the senior or final year of residence in that college of the University in which the degree is to be taken. This applies both to students entering from other institutions and to students transferring from one college to another within this University. Of the 120-124 units required for the bachelor's degree, at least 24 must be completed at this University in resident courses of instruction during the final or senior year.

All graduates of any one calendar year—January 1 to December 31—are considered as belonging to the "class" of that year.

For filing dates concerning graduate degrees, see the University calendar. Candidates for advanced degrees will file announcement of candidacy on the dates set by the Dean of the Graduate Division.

† Students taking these courses are subject to the regular rules that apply for prerequisites and majors. Upper division history courses may be taken to satisfy the requirement only with the permission of the instructor.

### GRADES OF SCHOLARSHIP

The result of a student's work in each course (including courses in which credit is sought by examination) is reported to the Registrar in one of six scholarship grades, four of which are passing, as follows: A, excellent; B, good; C, fair; D, barely passing; E and F, not passing. Grades are not otherwise defined, as for example, by percentages, or by a rule stipulating the manner in which the several grades shall be distributed among the members of a class.

Grade E (not passed) indicates a record below passing, but one which may be raised, without repetition of the course, by success in a further examination or by performing other tasks required by the instructor. Grade F (not passed) denotes a record so poor that it may be raised to a passing grade only by repeating the course.

The term "incomplete" is not used in reporting the work of students. The instructor is required to assign, for every student, a definite grade based upon the work actually accomplished, irrespective of the circumstances which may have contributed to the results achieved.

Course reports filed by instructors at the end of each semester are final.

A student who desires a report on his scholarship grades at the end of the semester should deposit with the Registrar a self-addressed, stamped envelope.

### GRADE POINTS

Grade points are assigned to the respective scholarship grades as follows: for each unit of credit, the scholarship grade A is assigned 4 points; B, 3 points; C, 2 points; D, 1 point; E and F, no points.

To qualify for the bachelor's degree in the College of Agriculture, College of Engineering, College of Letters and Science, or School of Veterinary Medicine, the student must obtain at least twice as many grade points as there are units in the total credit value of all courses undertaken by him in the University of California.

### MINIMUM SCHOLARSHIP REQUIREMENTS

The following provisions apply to all undergraduate students except students in the School of Veterinary Medicine and the College of Engineering:

*Probation.*—A student shall be placed on probation

(1) If at the close of his first semester his record shows six or more grade points less than twice the number of units undertaken; or

(2) If at the close of any subsequent semester his grade-point average is less than two (a C average), computed on the total of all courses undertaken in this University for which he has received a final report.

*Dismissal.*—A student shall be subject to dismissal

(1) If during any semester he fails to pass with a grade of C or higher courses totaling at least 4 units; or

(2) If while on probation his grade-point average for the work undertaken during any semester falls below two (a C average); or

(3) If after two semester of probationary status he has not obtained a grade-point average of two (a C average), computed on the total of all courses undertaken in this University for which he has received a final report.

A student who becomes subject to the provisions of this regulation will also be subject to such supervision as the faculty of his college or school may determine. The faculty may dismiss from the University a student under their supervision; or, by suspending the provisions of this regulation, they may permit a student subject to dismissal to remain in the University or permit the return to the University of a student dismissed under this regulation.

### SCHOOL OF VETERINARY MEDICINE

The following scholarship provisions apply to students in the School of Veterinary Medicine:

*Probation.*—A student shall be placed on probation if at the close of his first semester in the School of Veterinary Medicine his record for that semes-

ter falls below a C average, computed on the total of all courses taken in the veterinary curriculum.

*Dismissal.*—A student shall be subject to dismissal from the School of Veterinary Medicine

(1) If at the end of any semester subsequent to his first he has failed to maintain a grade-point average of two (a C average), computed on the total of all courses taken in the veterinary curriculum subsequent to his admission to the School for which he has received a final report; or

(2) If during any semester he fails to pass with a grade of C or higher courses totaling at least 4 units; or

(3) If at any time he has, in the judgment of the faculty of the School, proved himself to be physically, morally, or mentally unfit for the profession of veterinary medicine.

A student in the School of Veterinary Medicine who becomes subject to the provisions of this regulation shall be under the supervision of the faculty of the School. The faculty, or persons designated by it, shall have the power to dismiss from the University students under its supervision, or at its discretion to suspend the provisions of this regulation and permit the retention in the University of students thus subject to dismissal, and the return to the University of students who have been dismissed under this regulation.

Graduate students who acquire scholarship deficiencies are subject to action at the discretion of the Dean of the Graduate Division.

#### COLLEGE OF ENGINEERING

A student will be subject to dismissal from the University (a) if during any semester or Summer Session he fails to attain at least a grade C average in all courses for which he was enrolled; or (b) if at the end of any semester or Summer Session he has failed to attain at least a grade C average in all courses undertaken in the University. A student who becomes subject to the provisions of this regulation will also be subject to such supervision as the faculty of the College may determine. The faculty of the College, or persons designated by it, shall have the power to dismiss from the University students under its supervision; or, at its discretion, it may suspend the provisions of this regulation and permit the retention in the University of the students thus subject to dismissal, and the return to the University of students who have been dismissed under this regulation.

#### CREDIT BY EXAMINATION

An undergraduate student in residence and in good standing may, under certain conditions, take examinations for degree credit either (a) in courses offered in the University, without formal enrollment in them, or (b) in subjects appropriate to the student's curriculum, but not offered as courses by the University. The results of all such examinations, with grades and grade points, are entered on the student's record in the same manner as are regular courses of instruction. No fees are required.

The privilege of taking an examination for credit will ordinarily be granted only to students who have at least a B average for all University courses undertaken.

Arrangements must be made in advance with the dean of the student's college or school; his approval, and that of the instructor appointed to give the examination, are necessary before an examination can be given.

The application form for examinations may be obtained from the Registrar.

#### FINAL EXAMINATIONS

Final examinations are obligatory in most undergraduate courses. All examinations will, as far as practicable, be conducted in writing. For each examination, a maximum time is assigned beforehand which no student is allowed to exceed. The time for examination sessions will be not more than three hours. Leave to be absent from a final examination must be sought by written petition to the proper faculty.

If a final examination is among the regular requirements in a course, there can be no individual exemption, except as provided in the preceding paragraph.

Any department may examine a student, at the end of the semester immediately preceding his graduation, in the major subject in which the department has given instruction; and a student to be examined in a major subject may, at the discretion of the department, be excused from all final examinations in courses in the department of the major subject in which he has been enrolled during the semester. Credit value may be assigned to this general examination in the major subject.

Reexaminations are permitted only for the purpose of raising grade E (not passed) to a passing grade. A student who received grade B, C, or D in any course is not allowed a reexamination for the purpose of raising the grade. Methods of raising nonpassing grades to passing grades are described under "Removal of Deficiencies," below.

Application for examination for advanced standing on the basis of work done before entrance to the University should be made to the Registrar upon entrance.

### REMOVAL OF DEFICIENCIES

The following rules for removal of deficiencies are effective for all work completed on and after July 1, 1957.

A student who receives a grade lower than C in a lower division course may repeat the course. The units will count only once toward the degree; however, he will be charged with the units undertaken on each attempt. Upon repetition of the course, the student will receive the grade assigned by the instructor and grade points appropriate to that grade. The foregoing privilege does not apply to grades received in upper division or graduate courses. A student who receives grade E or F in an upper division or graduate course may repeat the course. The units will count only once toward the degree; however, he will be charged with the units undertaken on each attempt. Upon repetition, the student can receive no more than two grade points per unit.

Special provision is made for students whose university work has been interrupted by one year or more of service with the armed forces of the United States and who, before such service, had undertaken one or more courses forming part of an announced sequence. Such a student may, with the approval of the dean of his college or school (or if he is a graduate student, with the approval of the Associate Dean of the Graduate Division), be permitted to repeat any course previously undertaken in the sequence, irrespective of the grade previously assigned, and to receive the new grade assigned by the instructor and grade points appropriate thereto. However, the unit credit thereby allowed toward graduation or the satisfaction of major requirements may not exceed the difference between the full unit value of the course and the number of units, if any, that he has previously received from the same course.

For the purpose of raising an E to a passing grade the student may, with the consent of the instructor concerned and of the dean of the appropriate school or college, have the privilege of a "condition examination."

Any examination, term paper, or other exercise that the instructor may require of the student to raise an E to a passing grade in a course is a "condition examination." For every such examination a formal permit, to be obtained in advance from the Registrar, must be shown to the instructor in charge; otherwise he will lack authority to consider and report upon the work submitted by the student. For each course in which a special examination is undertaken with a view to raising an E to a passing grade, \$4 is charged. There is no fee for a reexamination (final examination taken with the class), if the final examination is the only task required by the instructor

to raise E to a passing grade and if this final examination is taken with the class not later than the close of the next succeeding semester of the student's residence during which the course is offered. The Registrar will provide a form of petition for a special examination or for admission to an examination with a class, with instructions concerning procedure. Grade E in a course in which a final examination is regularly held can be raised to a passing grade only if the student passes a satisfactory final examination.

If a student who has received a grade E in any course fails to raise it to a passing grade by the end of the next semester of his residence in which the course is regularly given, then the grade shall be changed to F. But if, meanwhile, the student has repeated the course and has again received an E, his grade in the course will remain grade E, as it would be if he were taking the course for the first time. A student who fails to attain a grade D or higher in any course following a reexamination for the purpose of raising an E to a passing grade will be given a grade of F in the course.

With respect to conditioned examinations, no grade points will be assigned to a student who raises a grade E, incurred in any course (lower division, upper division, or graduate), to a passing grade by *examination* or by performing other tasks required by the instructor (short of actual repetition of the course). An exception to this rule is permitted, however, when the deficiency consists solely in the *omission* of the final examination or other required exercise because of illness or other unavoidable circumstances, the student's performance in all other respects having been satisfactory. In such circumstances the student may petition to have that grade assigned which he would have received had the work been completed without delay, together with the appropriate number of grade points. His petition must set forth in detail the reasons for his failure to complete the course within the usual limit of time. The petition must be endorsed by the instructor concerned, and must be submitted for final approval as follows: by undergraduate students, to the Dean of Students; by graduate students, to the Associate Dean of the Graduate Division.

### STUDENT CONDUCT AND DISCIPLINE

The University authorities assume that the student has an earnest purpose and that his conduct will bear out this presumption. If, however, he should be guilty of unbecoming behavior or should neglect his academic duties, the authorities will take such action as, in their opinion, his conduct warrants. Students who fail to utilize properly the opportunities freely given to them by the University must expect to have their privileges curtailed or withdrawn.

*Administration.*—By authority of the Academic Senate, the President of the University administers student discipline and has full power to act. He accomplishes this duty through the assistance of his teaching staff, the administrative officers concerned with student welfare, and the Faculty-Administrative Committee on Student Conduct.

*Degrees of Discipline.*—There are five degrees of discipline: warning, censure, suspension, dismissal, and expulsion. Censure indicates that the student is in danger of exclusion from the University. Suspension is exclusion for a definite period. Dismissal is exclusion for an indefinite period, with the presumption that the student's connection with the University will be ended by it. Expulsion, the most severe academic penalty, is final exclusion from the University.

*Student Welfare Council.*—The Welfare Council of the Associated Students deals with student welfare, student conduct, and student-faculty relations. The Council fosters the Honor Spirit, a code creating favorable attitudes toward education and student life by placing the responsibility of good classroom and campus conduct with the individual student. With the student accepting this responsibility a greater respect for knowledge is gained. Recommendations regarding matters of student conduct may be made to the Dean

of Students. Appeals of such recommendations are reviewed by the Faculty Administrative Committee on Student conduct. The Honor Spirit is a most cherished tradition at the Davis campus.

#### LEAVE OF ABSENCE AND HONORABLE DISMISSAL

A student in good standing who needs to withdraw for a short time but wishes to retain his status in classes and resume work before the end of the current semester should apply for a *brief leave of absence*, which expires on a definite date. A petition for this purpose may be obtained from the Registrar. No excuse for absence will relieve a student from the need to complete all work in each course to the satisfaction of the instructor.

For any college exercise other than a final examination, leave to be absent or an excuse for absence should be presented to the instructor in charge. Leave to be absent from a final examination should be sought by written petition to the proper faculty.

If a student must depart suddenly, as in a family emergency, he should write the Registrar as soon as possible, requesting a leave.

An *honorable dismissal* or an *indefinite leave of absence* may, upon petition, be issued to any student in good standing who complies with the instructions on the petition, which may be obtained from the Registrar. Undergraduate students will need to have the petition approved by the dean of the school or college and the Dean of Students. Graduate students require the approval of the Dean of the Graduate Division. In addition, men who are receiving veterans' benefits or who have been deferred by Selective Service because of registration in the University must immediately upon ceasing class attendance report in writing or in person to the Supervisor of Special Services.

A student is in good standing if he is entitled to enjoy the normal privileges of the status in which he is officially registered. Students dismissed for scholarship deficiencies, students on scholastic probation, students under censure, and students under suspension are not in good standing.

*Discontinuance Without Notice.*—Students who discontinue their work without formal leave of absence do so at the risk of having their registration privileges curtailed or withdrawn.

#### STUDENT RESPONSIBILITY FOR MATERIALS SUBMITTED IN SATISFACTION OF COURSE REQUIREMENTS

All material of whatever nature submitted by a student in satisfaction of all or any portion of a course requirement is the property of the University and is not subject to any claim on the part of the student who has so submitted the same. Further, it is a condition of attendance of any student in any course that any material that he shall produce independently and not as a part of any course requirement must be removed by him from University premises not later than the last day of the semester in which he produced such material and that if he shall fail to remove the same, as here provided, there shall be no obligation on the part of the University to hold or safeguard the same, and all risks of its destruction, loss, or other dispositions shall rest solely upon the student.

#### CHANGE OF COLLEGE OR MAJOR

A student may be transferred from one college, major, or department of the University to another upon the approval of the dean or other responsible officer or committee of the college (or department) to which admission is sought. A form of petition for transfer is supplied by the Registrar.

No student may transfer from one major department to another after the opening of the final semester of his senior year.

#### HONORS

Honor students include those who receive honorable mention upon attaining junior standing in the College of Agriculture, College of Engineering, and

the College of Letters and Science. Honors are granted also with the bachelor's degree. Regulations concerning honors are given with explanations of curricula in the various colleges in later pages of this bulletin.

### TRANSCRIPT OF RECORD

Each student will be provided, upon request to the Registrar, with one official transcript (copy) of his University record, without charge. After the first request a minimum of \$1 is charged for each additional transcript. Students who plan to seek employment after graduation should obtain one or more transcripts as official evidence of attendance at the University.

Application for a transcript of record should be made directly to the Registrar one week in advance of the time when needed.

### STUDENT ACTIVITIES

Students participate in the general student affairs of the University as well as in activities relating to their major departments and to their special interests. The entire student body has membership in the Associated Students, an organization that governs all student affairs on the campus and maintains the honor system. All women students are also members of the Associated Women Students.

The *California Aggie*, a weekly newspaper, and *El Rodeo*, the yearbook, are published by students.

Opportunity to participate in many forms of athletics is presented. The University of California at Davis is a member of the Far Western Intercollegiate Athletic Conference and stresses both intercollegiate and intramural athletics. The major sports include football, basketball, boxing, track, and baseball; the minor sports are tennis, wrestling, golf, swimming, and skiing. The Women's Athletic Association sponsors women's sports.

The Associated Students also support other activities, including the University band, an orchestra, ensemble groups, men's and women's choruses, dramatics, radio broadcasting, and a rifle team.

The California Club is an organization that emphasizes the unity of student life on all campuses of the University and stresses both intercollegiate and intramural athletics. The International Club promotes friendly relations among foreign-born and native students and studies world problems. Students maintain clubs serving those interested in various special fields. Women who have achieved a grade B average during the freshman year are eligible for Agathon, sophomore honor society. Junior and senior honoraries include Phi Kappa Phi for both men and women, Blue Key, Alpha Zeta, and Scabbard and Blade for men students, and Prytanean for women. Those with high academic achievement may qualify for Phi Beta Kappa.

### THE JUNIOR YEAR ABROAD

Undergraduate students may spend a year of their college career in study abroad in one of several organized programs of group study conducted in European centers by recognized American institutions of higher learning. The University of California does not itself conduct such a program but accepts the academic credits so earned as applying toward the requirements for graduation.

Because of the desirability of maximal cultural preparation as well as the senior year residence requirement, the junior year is recommended for such foreign study. Thorough preparation in the language of the country selected for study is of great importance; students should have completed at least four semesters of college courses in that language.

Students interested in studying abroad during their junior year are encouraged to consult early in their academic career with the campus Adviser for Undergraduate Study Abroad: D. M. Reynolds, Department of Bacteriology.

# REQUIREMENTS AND CURRICULA IN THE SEVERAL COLLEGES AND SCHOOLS

## COLLEGE OF AGRICULTURE\*

THE PROSPECTIVE STUDENT should read the requirements and recommendations for admission on pages 16-29.

### Faculty Advisers and Study-List Requirements

*Freshmen and Sophomore Years.*—Each student designates a major subject upon matriculation and must consult his adviser each semester for guidance in following the requirements of the curriculum which includes the major of his choice. Program schedules for the freshman and sophomore years are shown for each curriculum. Students who are unable to meet the suggested outlines of study during the first two years may take some of the requirements in their junior or senior year. It should be noted, however, that any great departure from the recommended programs may delay graduation beyond the normal four-year period.

*Junior and Senior Years.*—The schedule for the junior and senior years is determined by the major subject requirements, supplemented by optional courses selected by the student with the advice and consent of the major adviser.

*Approval of Study List.*—The study lists of all students must be endorsed by the major-subject adviser before they may be filed with the Registrar. Students will not be permitted to enroll for fewer than 12 or more than 18 units a semester without approval of the Dean of the College of Agriculture. To this maximum there may be added a lower division course in physical education of not more than 1 unit.

### Honors

*Honors in Junior and Senior Years.*—Students who have completed 62 units with an average of at least 3 grade points for each unit undertaken and who maintain this average are designated as honor students, receiving recognition in the Student Directory and certain privileges in the use of the library.

*Honors at Graduation.*—Honors are granted to the graduating student who has completed his major with distinction and whose general record is satisfactory to the Study-Lists Committee. The student who has done work of unusual excellence may be recommended for highest honors. The list of students to whom honors and highest honors in the College have been awarded is published in the COMMENCEMENT PROGRAM.

### Admission in Junior Standing

To be admitted in junior standing in the College of Agriculture the student must have completed at least 60 units of college work including (1) a total of 9 units of mathematics, which may include high school courses required for matriculation, and (2) 40 units of college level work selected from the courses listed below, with not less than 18 units from Group A and not less than 12 units from Group B, or equivalent.

\* For details concerning agricultural curricula on the other campuses, see PROSPECTUS OF THE COLLEGE OF AGRICULTURE, obtainable without charge from the Dean of the College of Agriculture, or from the Registrar, University of California, Davis.



**Group A**

Bacteriology 1, 2  
 Botany 1, (3), (6), 12  
 Chemistry 1A, 1B, 5, (5A), 8, (10)  
 Geology 1, 2, 5  
 Mathematics 3A, 3B, 12, 13, 16A,  
 16B  
 Physics 2A, 2B, 3A, 3B, 10  
 Physiology 1, 1L  
 Zoology 1A, 1B, 10, (15)  
 (Biology 12)

**Group B**

Business Administration 1A, 1B  
 Economics 1A, 1B, 2 or Psychol-  
 ogy 5  
 English 1A, 1B  
 History (7A), (7B), 17A, 17B  
 Psychology 1A  
 Speech 1A, 1B

(Courses offered only at Los Angeles, either in place of, or in addition to those offered at Berkeley and Davis, appear in parentheses.)

### Requirements for the Degree of Bachelor of Science

The degree of Bachelor of Science is awarded to those candidates who:

1. Satisfy the general University requirements as follows:
  - (a) *Subject A*. See page 40.
  - (b) *Air, Military, or Naval Science*. See page 33.
  - (c) *American History and Institutions*. The student may meet this requirement by the passing of an examination in American History and American Institutions or by the completion of courses prescribed by the University.
  - (d) *Residence in the University during the senior year* in the college and completion of at least the final 24 units of credit.
  - (e) *Attain at least twice as many grade points as units of credit* in courses undertaken at this University.
  - (f) File notice for candidacy with the Registrar on dates as prescribed by the University Calendar.
2. Satisfy the general requirements of the College of Agriculture as follows:
  - (a) *At least 124 units of University work*. Not more than 4 units may be in lower division physical education courses.
  - (b) *Thirty-six units of the above total in upper division courses* (courses numbered 100-199).
  - (c) *Nine units of mathematics*. Matriculation work may be offered toward this requirement, counting each year of high school work as 3 units. Trigonometry taken in high school is recommended as partial satisfaction of this requirement.
3. Satisfy the requirements of one of the curricula in the College of Agriculture.

#### AGRICULTURAL ECONOMICS

This curriculum is concerned with the economics of the agricultural industry. For those studying to obtain a Bachelor of Science degree, it is designed to serve two general purposes. Basically, its objective is to improve the individual's understanding of economic forces and the economic environment in which the agricultural industry plays a prominent role. At the same time, an equally important goal is to afford the essential preparation for commencing a career in some phase of agriculture. Consistent with these dual objectives, the curriculum offers a considerable range of choice for those aiming toward broad educational achievement, and also for those wishing a more concentrated specialization in particular fields.

The undergraduate curriculum is designed primarily to meet the needs of the person who expects to terminate his formal education with the attainment of the Bachelor of Science degree. Nevertheless, the flexibility in the cur-

riculum and the choice of courses are adaptable to the needs of those who anticipate continuing in graduate study with the intention of becoming professional agricultural economists.

Graduates in agricultural economics find employment in a wide range of occupations. The major fields of employment are:

- (1) Farming—either as farm operators or salaried managers.
- (2) Businesses serving or related to agriculture—in firms processing and marketing farm products or supplying farm equipment and materials and in credit agencies.

More specialized training to meet the internal operational needs of agricultural business firms is available in the agricultural business management curriculum (page 52).

(3) Public service agencies; federal, state, local—as economic analysts, statisticians, administrative or regulatory officers.

(4) Teaching and/or research—in high schools, junior colleges, universities, and the Agricultural Extension Service, and in many private agencies. A year or more of graduate work is usually required for many of these professional occupations.

The agricultural economics curriculum has no major groups or formal subdivisions. On the other hand, the choice of courses is sufficient to permit specialized emphasis in farm management, marketing, land economics, agricultural policy, or agricultural statistics—or the student may select broadly from among these fields of study. To prepare for a particular specialization, the student should consult his major adviser who will recommend appropriate foundation courses to be taken during the freshman and sophomore years.

To graduate in agricultural economics a student must have at least a grade C average in all of the upper division courses taken in agricultural economics.

#### Curriculum in Agricultural Economics

(Major: Agricultural Economics)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Accounting .....	3
Analytic geometry, calculus, and/or linear algebra.....	6
Chemistry .....	5
Principles of economics .....	6
English and/or speech.....	6
Physics .....	3
Statistical methods .....	3
 (b) <i>Agriculture</i>	
Agriculture, other than agricultural economics.....	8
Upper division agricultural economics .....	18
 (c) <i>Electives</i> (restricted)	
Anthropology, geography, history, philosophy, political science, psychology, or sociology and social institutions	12
Bacteriology, botany, geology, physiology, zoology or additional chemistry, mathematics, and physics (beyond that specified in 3 (a).....	10

4. Additional courses chosen by the student with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.)..... 44

5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3 above: Agricultural Economics 100A, 100B and 106.

#### Example of Agricultural Economics Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Agricultural Economics 1	3	..	Agricultural Economics 18	3	..
Chemistry 1A	5	..	Botany 1	..	5
Economics 1A-1B	3	3	Economics 11A	3	..
English 1A-1B	3	3	History 17A	..	3
Mathematics 13	..	3	Mathematics 16A-16B	3	3
Military Science	2	2	Military Science	2	2
Vegetable Crops 1 or elective	..	2 or 3	Physics 2A	..	3
Elective	..	2 or 3	Soil Science 1	3	..
	16	16	Elective	2	..
				16	16

#### AGRICULTURAL EDUCATION

This curriculum provides training for students planning to teach agriculture in the high schools and junior colleges of the State. The basic requirements provide a good foundation in the physical and biological sciences and include the necessary prerequisites for many courses in all of the major agricultural departments.

Besides preparing students to teach in high schools and junior colleges, the training in agricultural education has also proved to be an excellent preparation for work in agricultural extension and general farming, and for positions with federal and state departments of agriculture.

#### Credentials

Teaching agricultural subjects (for general background rather than for a vocation) is authorized by one of two credentials: The general secondary credential with a teaching major in agriculture; or the special secondary limited credential in agriculture. The holder of a limited credential is restricted to teaching the subjects named therein, and he must have taken at least 8 college units of work in each subject.

Holders of the special secondary credential in vocational agriculture are entitled to teach agriculture as a vocation in departments organized under the Federal and State Vocational Education Acts.

Undergraduate preparation for this credential, as specified by the California State Plan for Vocational Education, includes:

1. Three years of farm experience, or its equivalent. (Students not so qualified should seek their major adviser's assistance in arranging summer work.)
2. Technical agricultural subjects, totaling 60 units and so selected as to meet the minimum requirements of each of the following fields:

	Minimum	Recommended
(a) Plant and soil science	12	20
(b) Animal science	12	20
(c) Agricultural engineering and mechanics	8	10
(d) Agricultural economics and rural sociology	6	10

For requirements of the general secondary credential see "Curricula for Teacher Education," pages 116-121.

#### Curriculum in Agricultural Education

(Major: Agricultural Education)

1. General University requirements. (see page 49.)

2. College of Agriculture requirements. (See page 49.)

3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Botany and zoology (laboratory courses).....	9
Chemistry (including organic) .....	8
Economics .....	3
Education .....	3
English and/or speech .....	6
Physics .....	4
Psychology .....	3
(b) <i>Agriculture</i>	
Genetics .....	4
Soil science .....	3
Agricultural courses distributed as follows:.....	45
Animal science .....	12 units
Plant science .....	12 units
Agricultural engineering .....	9 units
Agricultural economics .....	6 units
Agricultural electives .....	6 units
(c) <i>Electives (restricted)</i>	
Bacteriology, botany, chemistry, entomology, geology, mathematics, physics, plant pathology, or zoology.....	8
Anthropology, dramatic art, economics, English, foreign languages, geography, history*, philosophy, political science*, psychology, sociology, or speech.....	6
4. Additional courses chosen by the student with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.).....	22
	124

5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3 above: Animal Husbandry 103; Chemistry 1A, 8; Education 160 or 187, 320A; Entomology 124; Irrigation 110 or equivalent; Plant Pathology 120. Recommended: Veterinary Science 111.

#### Example of Agricultural Education Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Animal Husbandry 7.....	3	..	Agronomy 1 .....	3	..
Animal Husbandry 8 .....	1	..	Chemistry 8 .....	..	3
Botany 1 .....	..	5	Economics 1A .....	..	3
Chemistry 1A .....	..	5	English 1B .....	..	3
English 1A .....	3	..	Military Science .....	2	2
Military Science .....	2	2	Physics 2A, 3A .....	4	..
Vegetable Crops 1 and 2 ..	..	3	Pomology 1 .....	3	..
Zoology 1A .....	4	..	Psychology 1A .....	3	..
Elective .....	3	..	Pomology 9 .....	..	2
	16	15	Elective .....	..	3
				15	16

#### AGRICULTURAL BUSINESS MANAGEMENT

This curriculum is designed to provide training in the business and management aspects of agriculture. This includes farms and also the firms and industries that supply farmers with production materials and services and that process and distribute farm products.

\* In addition to University requirements.

Agriculture in California represents a complex of many types of production units, such as ranches, farms, orchards, vineyards, nurseries, and green-houses. Each of these production units is part of an interrelated economic system which includes many specialized businesses. An understanding of agricultural business requires knowledge of the applications of science and technology and also training in the social sciences and agricultural business management. This curriculum is especially designed for those persons who desire to obtain such a combination of academic training. In addition to emphasis on training for a career in some phase of agricultural business, a well-rounded education is assured by the requirements in natural and social sciences and by the wide opportunity for choice of electives.

Recent surveys have shown that numerous employment opportunities exist for students with training in agricultural business management. For example, many positions are available in food processing and marketing agencies. Additional opportunities are found in such businesses as banks and other credit agencies, in cooperative organizations buying and selling products for farmers, and in the manufacturing and distribution of farm equipment and supplies. Many newspapers, farm journals, and trade papers also employ personnel with such training.

Since there is considerable flexibility in the selection of particular courses satisfying general curriculum requirements, the student should consult his major adviser. The adviser will be able to recommend appropriate foundation courses to be taken during the freshman and sophomore years as well as to indicate the choice of more advanced courses that a student may take during the junior and senior years.

To graduate in agricultural business management a student must have at least a grade C average in all upper division courses taken in the major.

#### Curriculum in Agricultural Business Management

(Major: Agricultural Business Management)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Accounting .....	3
Anthropology, geography, history, philosophy, political science, psychology, or sociology and social institutions	12
Bacteriology, botany, geology, physics, physiology, or zoology or additional chemistry or mathematics .....	7
Business law .....	3
Chemistry .....	5
English and/or speech .....	6
Mathematics .....	3
Principles of economics .....	6
Statistics .....	3
 (b) <i>Agriculture</i>	
Agriculture (other than agricultural economics and botany) .....	12
 (c) <i>Electives (restricted)</i>	
Additional upper division work in agricultural economics, economics or business administration .....	24
 4. Additional courses chosen by the student with approval of major adviser. (These may be used to satisfy the requirements under 1 and 2 above.) .....	
	40

5. Certain courses or their equivalents are required for the curriculum and, where applicable, may be used toward satisfaction of 3 above: Agricultural Economics 100A, 100B, 106, 110, 111, 115A or 115B; Physics 2A.

#### Example of Agricultural Business Management Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Agricultural Economics 1..	3	..	Agricultural Economics 18.	3	..
Chemistry 1A .....	5	..	Agronomy 1 .....	3	..
Economics 1A-1B .....	3	3	Botany 1 .....	..	5
English 1A-1B .....	3	3	Economics 11A .....	3	..
Mathematics 13 .....	..	3	Mathematics 16A .....	..	3
Military Science .....	2	2	Physics 2A .....	..	3
Psychology 1A .....	..	3	Military Science .....	2	2
Elective .....	..	2	Soil Science 1 .....	3	..
			Elective .....	2	3
	16	16		16	16

#### AGRICULTURAL PRODUCTION

This curriculum provides agricultural training for students who wish to go into diversified farming or businesses and services related to agriculture. The student chooses a primary and a secondary field of interest (see below) after consulting his adviser. The curriculum is not intended to replace majors in the College of Agriculture in which students specialize in a single field.

The requirements are flexible. They not only insure a good foundation in the basic physical, biological, and social sciences, but also enable students to prepare for advanced work in two or more phases of agriculture. The student is thus free to choose from numerous agricultural courses those that will best meet his needs.

Graduates in production agriculture will find their greatest opportunity for employment in the production of agricultural commodities and in closely related industries. Farm units in California often engage in two or more types of agricultural activities. Some examples of the combinations commonly found are livestock and field crops; field crops and vegetable crops; orchards or vineyards combined with vegetable crops. Agricultural economics and agricultural engineering are examples of other important aspects of modern farming. Those interested in sales and services will find a broad knowledge of agriculture of great value in their business.

#### Primary Fields of Interest

*Agricultural Economics.*—The student selecting agricultural economics as a primary field of interest may elect one of several options, depending upon his interests and his chosen secondary field of interest. Subject matter available includes agricultural business management, agricultural finance, agricultural marketing, farm management, and general agricultural economics.

A secondary field of interest ordinarily would be one of the following: agronomy, animal husbandry, dairy industry, food technology, pomology, poultry husbandry, or vegetable crops.

*Agronomy.*—The student who wishes to emphasize training in field crops production will go to agronomy for his primary instruction. Field crops include cotton, alfalfa, barley, rice, wheat, beans, sugar beets, corn, sorghums, flax, irrigated pastures, dry ranges and many other crops less well known.

A secondary field of interest ordinarily would be one of the following: agricultural economics, agricultural engineering, animal husbandry, irrigation, range management, soils, or vegetable crops.

*Animal Husbandry.*—The student interested in production of beef cattle, dairy cattle, sheep, swine, horses, or other livestock or in sales or service fields related to the livestock industry should choose animal husbandry as the primary field of interest.

A secondary field of interest might be one of the following: agricultural economics, agricultural engineering, agronomy, irrigation, or range management.

*Dairy Industry: Dairy Plant Management.*—A student interested primarily in dairy plant operations may choose dairy industry as his primary field of interest.

*Enology.*—The student who is interested in wine and brandy production will go to viticulture and enology for his primary field of interest.

A secondary field of interest might be one of the following: agricultural economics, agricultural engineering, or food technology.

*Food Technology.*—The student who wishes to emphasize training in the field of processing fruits, vegetables, cereal crops, and meat products should choose food technology as his primary field of interest. Processing procedures include canning, dehydration, freezing, juice manufacture, concentration, pickling, storing, packing and packaging of foods.

A secondary field of interest might be in one of the following: agricultural economics, agricultural engineering, agronomy, animal husbandry, pomology, poultry husbandry, vegetable crops, or viticulture.

*General Agriculture.*—This option is intended for the student who desires the broadest type of agricultural training. His course work will ordinarily be distributed in animal science, plant science, agricultural economics, and agricultural engineering.

*Irrigation.*—Management of irrigation water is an important aspect of crop production affecting both yield and quality of agricultural products. The department offers instruction in general irrigation practices and in more specialized subjects such as development of water supplies, determination of the suitability of a water supply for irrigation, drainage of land, and the effects of irrigation on crop production and cultural practices.

A secondary field of interest would ordinarily be in a production department or in soils.

*Pest Control.*—The increasing complexities of the use and application of agricultural chemicals calls for a specialized knowledge and training in this phase of agricultural sales and service. This field of study covers the fundamentals of disease, insect and weed identification and control. The nature of the agents responsible for the adverse effect upon the host and their mode of injury is covered. The emphasis is in the fields of entomology and plant pathology.

Students trained in this field will be well prepared for positions in pesticide sales and services, agricultural extension service and in county and state agencies charged with identification and regulation of agricultural pests.

*Pomology.*—The student wishing specialized training in the production of tree and small fruits will go to pomology for instruction in his primary field of interest. Crops considered are all deciduous tree fruits and nuts, bush fruits, strawberries, and the olive.

A secondary field of interest might be one of the following: agricultural economics, agricultural engineering, agronomy, vegetable crops, or viticulture.

*Range Management.*—If a student is interested in the management of grazing lands or livestock ranching he may choose range management for primary emphasis. Such students should have a combination of courses representing agronomy, animal husbandry, and range management. The emphasis within this combination will depend on the secondary field of interest chosen by the student. Ordinarily this secondary field will be one of the following:

agricultural economics, agronomy, animal husbandry, or soils and plant nutrition.

*Soils and Plant Nutrition.*—Students who select soil science as a primary field of interest may elect training in soil fertility, the use and characteristics of fertilizers, soil survey and classification, and in the management of unproductive soils.

A secondary field of interest might be selected from the following: agricultural economics, agricultural engineering, agronomy, irrigation, pomology, vegetable crops, or viticulture.

*Vegetable Crops.*—A student with a special interest in vegetables should place the primary emphasis of his studies in vegetable crops. Potatoes, sweet potatoes, and some twenty other vegetables are of commercial importance in California.

A secondary field of interest could be agricultural economics, agricultural engineering, agronomy, food technology, irrigation, pomology, or soils.

*Viticulture.*—The student who is interested in table, raisin, or wine grape production will go to viticulture in his primary field of interest.

A secondary field of interest might be one of the following: agricultural economics, agricultural engineering, enology, irrigation, pomology, soils, or vegetable crops.

### Curriculum in Agricultural Production

(Major: Agricultural Production)

Primary fields of interest: Agricultural Economics; Agronomy; Animal Husbandry; Dairy Industry; Enology; Food Technology; General Agriculture; Irrigation; Pest Control; Pomology; Range Management; Soils and Plant Nutrition; Vegetable Crops; Viticulture.

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

	<i>Units</i>
<i>(a) General</i>	
Botany .....	5
Chemistry .....	8
Economics .....	3
English and/or speech .....	6
Physics .....	3
Zoology .....	3
<i>(b) Agriculture</i>	
Genetics .....	3
Agricultural courses distributed as follows:	
<i>Primary fields of interest:</i> See above .....	12
<i>Secondary fields of interest:</i> agricultural economics, agricultural engineering, agronomy, animal husbandry, enology, food technology, genetics, irrigation, pomology, poultry husbandry, range management, soils and plant nutrition, vegetable crops, viticulture .....	9
Additional agriculture .....	24
<i>(c) Electives (restricted)</i>	
Group I—Animal physiology, bacteriology, botany or plant physiology, chemistry, genetics, geology, mathematics*, physics or zoology .....	9
Group II—Anthropology, art, economics, English, foreign languages, geography, history or political science†, philosophy, psychology, music, sociology or speech .....	6

\* Not including Mathematics C or D.

† Beyond University requirements.



	<i>Units</i>
4. Additional courses chosen by the student with approval of adviser. (These electives may be used to satisfy the course requirements under 1 and 2 above.).....	33
	124
5. Certain courses are required and where applicable may be used in partial satisfaction of 3 above:	
<i>Agricultural Economics</i>	
Primary Field.—Economics 1A, 1B; Agricultural Economics 100A, and 9 additional units of upper division courses in agricultural economics. To graduate with a primary field of interest in agricultural economics, a student must have at least a grade C average in all upper division courses taken in agricultural economics.	
Secondary Field.—Economics 1A, 1B; Agricultural Economics 1, and 6 additional units of upper division courses in agricultural economics.	
<i>Agricultural Engineering</i>	
Primary Field.—No primary field given.	
Secondary Field.—Nine units chosen from the following courses: Agricultural Engineering 12, 103, 104, and 105.	
<i>Agronomy</i>	
Primary Field.—Botany 7; Chemistry 8; Entomology 124 or Plant Pathology 120; Irrigation 110 or Soil Science 1; Agronomy 1, and 9 additional units of upper division courses in agronomy.	
Secondary Field.—Botany 7; Chemistry 8; Entomology 124 or Plant Pathology 120; Irrigation 110 or Soil Science 1; Agronomy 1, and 6 additional units of upper division courses in agronomy.	
<i>Animal Husbandry</i>	
Primary Field.—Bacteriology 1; Chemistry 1A, 8; Physics 2A, 3A; Veterinary Science 111; Zoology 1A, 1B; Animal Husbandry 7, 8, 101, 103, 110, and 112 or 118.	
Secondary Field.—Chemistry 1A, 8; Animal Husbandry 7, 8, 103, and 112 or 118.	
<i>Dairy Industry: Dairy Plant Management</i>	
Primary Field.—A minimum of 12 units in upper division dairy industry courses. At least 9 units in upper division courses chosen from economics, agricultural economics, or other fields with the approval of the adviser. Required dairy industry courses: Dairy Industry 1 and 2 or 3; 101A, 101B, 102A, 102B, 107 or 108.	
Secondary Field.—No secondary field given.	
<i>Enology</i>	
Primary Field.—Bacteriology 1; Botany 1; Chemistry 5; Physics 2A, 2B; Viticulture 1, 3, and 9 units selected from Viticulture 124, 125, 140.	
Secondary Field.—Bacteriology 1; Chemistry 5; Viticulture 1, 3, and 6 units selected from Viticulture 124, 125, 140.	
<i>Food Technology</i>	
Primary Field.—Bacteriology 1; Chemistry 1A, 1B, 8; Physics 2A, 2B. Also 12 units selected from the following: Food Technology 105A, 112, 113, 127; Agricultural Engineering 102; Dairy Industry 108; Poultry Husbandry 121; Veterinary Science 111.	
Secondary Field.—Bacteriology 1; Chemistry 1A, 8; Physics 2A, 2B. Also 9 units selected from the list of courses given under the primary field above.	

*General Agriculture*

Primary Field.—A total of 21 units of animal and plant science. Twelve units to be chosen from either animal or plant science and 9 units for the secondary field from the other field; 6 units of agricultural engineering; 6 units of agricultural economics; and completion of 5 of the following courses which may be used in partial fulfillment of the above requirements: Animal Husbandry 103; Botany 107; Entomology 124; Irrigation 10 or 110; Plant Pathology 120; Soil Science 1; Veterinary Science 111.

*Irrigation*

Primary Field.—Botany 7; Mathematics 16A; Soil Science 1, 107; and 12 units of irrigation including Irrigation 10 or 110, and 100.

Secondary Field.—Botany 7; Soil Science 1, 107; and 9 units of irrigation including Irrigation 10 or 110, and 100.

*Pest Control*

Primary Field.—A minimum of 12 units for the primary field in entomology or plant pathology and 9 units as the secondary field in the other of the two fields. The 12 and the 9 units to be chosen from the following courses: Entomology 1 or 5 and 5L, 124, 128, and 198; Plant Pathology 120, 122, 125A, 125B, 126, 199. In addition, students must complete 4 of the following courses: Agricultural Engineering 104; Botany 107, 119; Plant Nematology 100; Soil Science 1 or 109; Zoology 116.

*Pomology*

Primary Field.—Botany 1, 7; Chemistry 1A, 1B, 8; Physics 2A; Plant Pathology 120; Irrigation 110; Entomology 124; Soil Science 1; Pomology 2 plus 12 units in pomology, 9 of which must be upper division units.

Secondary Field.—Pomology 2 plus 9 other units in pomology, 6 of which must be upper division units.

*Poultry Husbandry*

Primary Field.—No primary field given.

Secondary Field.—Poultry Husbandry 1, 48A, 48B, 112; and Veterinary Science 111.

*Range Management*

Primary Field.—Engineering 1A, Botany 7, and Agronomy 115 or 3 units of Range Management; 9 units selected from the following list of courses with the approval of the range management adviser: Agronomy 112; Animal Husbandry 7, 8, 103, 118; Botany 108, 110; Soil Science 1; and the following courses offered at Berkeley: Forestry 103; Range Management 101, 102, 123, 133.

Secondary Field.—Agronomy 115 or 3 units of Range Management; 9 additional units selected from the listing of courses under the primary field above.

*Soils and Plant Nutrition*

Primary Field.—Chemistry 1A, 1B, 8; Geology 1; Physics 2A, 2B; Soil Science 1, 107, 108 or 109, 118, 124.

Secondary Field.—Chemistry 1A, 1B, 8; Geology 1; Soil Science 1, and 6 additional units selected from the soil science courses listed under primary requirements above.

**Vegetable Crops**

Primary Field.—Botany 7; Chemistry 8; Entomology 124; Irrigation 110; Plant Pathology 120; Soil Science 1; Vegetable Crops 1, 1L, 101, and 6 additional units in vegetable crops. Recommended: Agricultural Economics 140; Botany 107.

Secondary Field.—Vegetable Crops 1, 1L, 101, 105. Recommended: Botany 107; Irrigation 110.

**Viticulture**

Primary Field.—Botany 7; Chemistry 8; Physics 2A; Soil Science 1; Viticulture 1, 3, 105 and 116; and an additional course chosen from the following: Agricultural Engineering 103; Pomology 121; Botany 107.

Secondary Field.—Viticulture 1, 3, 105 and 116.

**Example of Agricultural Production Program**

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1	..	5	Chemistry 1A	5	..
English 1A-1B	3	3	Chemistry 8	..	3
Military Science	2	2	Economics 1A	3	..
Physics 2A	..	3	Military Science	2	2
Zoology 1A	4	..	Physics 2B	..	3
Elective	3	..	Elective Agriculture	3	3
Elective Agriculture	4	3	Elective Science	..	3
			Elective Social Science	3	3
	16	16		16	17

**ANIMAL SCIENCE**

The animal science curriculum is designed to train men in the fundamentals of animal production, including the handling and processing of animal products. It thus covers a very broad field. The courses include the physical and biological sciences, with English and economics, in a general requirement.

This is followed by a wide range of specialization in the upper division work between and within the majors involved—animal husbandry, animal physiology, genetics, and poultry husbandry.

Graduates are fitted to enter a variety of animal-production and technical fields, including general agriculture. They may also become high school teachers (after additional graduate work) or proceed with graduate work in genetics, nutrition, agricultural biochemistry, or physiology.

**Majors**

*Animal Husbandry (Including Dairy Husbandry).*—Instruction in animal husbandry deals with the sciences and their application to livestock husbandry, with special reference to conditions in California.

The department has developed herds and flocks of each species of livestock of economic importance. These are used for student instruction to illustrate principles of genetics, physiology, and nutrition important to the animal industry.

Nutrition, physiology, genetics, and wool laboratories, a respiration chamber and a psychrometric room for large animals, and a small-animal colony are provided in the Animal Science Building.

*Animal Physiology.*—The major is offered by the Group in Animal Physiology, a cooperative body of members of the several departments on the Davis campus concerned with this field of science. Courses in the major deal with vital functions of animals; with a systematic study of the physiology of

tissues and organs; with comparisons between fundamental processes of various classes of animals, such as reaction and adaptation to the environment, endocrine control of biological processes, reproduction, etc., with special attention to appreciation of the physiological basis of the husbandry of domestic mammals and birds. The major is intended to prepare students for the following: a) employment in certain fields related to animal production; b) graduate studies particularly in the field of Animal Physiology (see the Graduate Division bulletin entitled ANNOUNCEMENT IN AGRICULTURE AND RELATED SCIENTIFIC FIELDS); and c) other occupations which require a basic knowledge of the physiology of a wide variety of animals. Facilities are available within the School of Veterinary Medicine, and the Departments of Agricultural Engineering, Animal Husbandry, Poultry Husbandry, and Zoology.

*Genetics.*—The principles of genetics are the same in plants and animals (see "Plant Science," page 70), but mathematical and statistical methods play an especially important role in the improvement of domestic animals by selective breeding. Students who intend to specialize in the genetics of farm animals should therefore obtain an adequate mathematical background for the study of modern statistical methods.

*Poultry Husbandry.*—Courses in this major present the applications of scientific knowledge to commercial poultry production. Special emphasis is placed upon the methods of poultry husbandry practiced in California and other western states.

The introductory course consists of a survey of the poultry industry in the United States, including the application of the several sciences which contribute methods used in poultry husbandry. Laboratory instruction deals with the biology of the fowl, culling and selection, poultry products, and flock management. Advanced courses in the application of genetics, physiology, biochemistry, and embryology, to poultry production provide a review of knowledge regarding successful methods of breeding, feeding, and incubation, as well as the basis for the experimental solution of problems in these fields. Special studies are designed to be taken by advanced undergraduates or graduates and provide opportunities to become acquainted with experimental methods; they involve work dealing with some form of poultry or poultry products elected by the student.

This major prepares students for commercial chicken and turkey farming, for service or production work with poultry breeders, hatcheries, and feed manufacturing firms, and for positions with organizations dealing with poultry products or supplies. Students with good scholarship and sound fundamental training are eligible for employment in federal, state, or commercial experimental work, and in agricultural extension services. Excellent opportunities exist for men in graduate study in fields related to poultry husbandry.

#### Curriculum in Animal Science

(Majors: Animal Husbandry, Animal Physiology, Genetics,  
Poultry Husbandry)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Bacteriology .....	4
Botany .....	4
Chemistry and/or biochemistry .....	16
Economics .....	3

	<i>Units</i>
English and/or speech.....	6
Physics .....	4
Zoology .....	10
(b) <i>Agriculture</i>	
Animal nutrition .....	3
Animal pathology, parasitology, or additional zoology...	3
Animal physiology .....	5
Genetics .....	4
Upper division courses in the major or a closely related field .....	12
4. Additional courses chosen by the student with approval of the major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.).....	50
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5. Certain courses are required by the following majors and where applicable may be used in partial satisfaction of 3 above:

*Animal Husbandry.*—Animal Husbandry 7, 8, 110, and Veterinary Science 111. Animal Husbandry 105 satisfies the animal nutrition requirement and Veterinary Science 111 satisfies the pathology requirement in the list of general animal science requirements. Genetics 100, and in addition Genetics 100C or Animal Husbandry 107, will satisfy the genetics requirement. Chemistry 1A, 1B, 8, and Animal Husbandry 101 are included in the 16 units of required chemistry. Twelve units of upper division animal husbandry courses (or courses in related fields) including Animal Husbandry 109 are required. In most instances it will be advisable for a student to take courses selected from the following: Animal Husbandry 113, 114, 115, 117, and 119.

(For students interested primarily in dairy husbandry the following elective courses are highly recommended: Animal Husbandry 107, 112, 114, 116, 121; Dairy Industry 1, 3, 106, 142.) It is recommended that animal husbandry majors select as many courses as possible from the following list: Agricultural Economics 140; Agricultural Engineering 103, 104; Agronomy 2 or 112, 115; Irrigation 110; and Soil Science 1 or 108.

Students in this major must spend the last two semesters (before the degree) in residence as bona fide animal husbandry majors.

*Animal Physiology.*—Majors in this subject must take Chemistry 1A, 1B, 5, and 8, Zoology 1A, 1B, and at least 5 units from the following: Zoology 100, 100L, 106, 107, and 112. Animal Husbandry 105 or Poultry Husbandry 105 satisfies the animal nutrition requirement. In addition to animal science curriculum requirements, students must include in their program the following: biochemistry lecture and laboratory which may be used for upper division credit in the major, additional physics (Physics 2B, 3B) and calculus (Mathematics 3A–3B or 16A–16B). A minimum of 12 units of animal physiology courses must be completed; these must include at least 5 units of mammalian physiology, and at least 3 units must be in physiology laboratory courses.

*Genetics.*—Chemistry 1A, 1B, 8; Botany 1; Zoology 1A, 1B, 100, 100L; Physiology 1, 1L; Mathematics 13, 105. Recommended: Botany 130; Mathematics 3A, 3B; German 1, 2.

*Poultry Husbandry.*—Poultry Husbandry 1; Veterinary Science 111 and 112; Biochemistry 101; Zoology 100, 100L or their equivalents. Poultry Husbandry 105 satisfies the nutrition requirement and Veterinary Science 111 and 112 satisfies the pathology requirement of the animal science curriculum. Chemistry 1A, 1B, 8, and Biochemistry 101 are included in the 16 units of required chemistry.

**Example of Animal Husbandry Program**

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Animal Husbandry 7, 8...	4	..	Bacteriology 1 .....	..	4
Chemistry 1A .....	..	5	Botany 1 .....	5	..
English 1A-1B .....	3	3	Chemistry 1B, 8 .....	5	3
Military Science .....	2	2	Economics 1A .....	..	3
Zoology 1A-1B .....	4	4	Military Science .....	2	2
Elective .....	3	3	Physics 2A-3A .....	4	..
			Elective .....	..	4
	16	17		16	16

**Example of Animal Physiology Program**

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A-1B .....	5	5	Bacteriology 1 .....	..	4
English 1A-1B .....	3	3	Botany 1 .....	5	..
Mathematics 16A-16B .....	3	3	Chemistry 5, 8 .....	3	3
Military Science .....	2	2	Economics 1A .....	3	..
Zoology 1A-1B .....	4	4	Military Science .....	2	2
			Physics 2A-2B, 3A-3B .....	4	4
			Elective .....	..	3
	17	17		17	16

**Example of Genetics Program**

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Animal Husbandry 7, 8 or Poultry Husbandry 1 .. 4 or 3	..	..	Bacteriology 1 .....	..	4
Chemistry 1A .....	..	5	Botany 1 .....	5	..
English 1A-1B .....	3	3	Chemistry 1B, 8 .....	5	3
Military Science .....	2	2	Economics 1A .....	..	3
Zoology 1A-1B .....	4	4	Military Science .....	2	2
Elective .....	3	3	Physics 2A-3A .....	4	..
	16 or 15	17	Elective .....	..	4
				16	16

**Example of Poultry Husbandry Program**

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A .....	..	5	Bacteriology 1 .....	..	4
English 1A-1B .....	3	3	Botany 1 .....	5	..
Military Science .....	2	2	Chemistry 1B, 8 .....	5	3
Poultry Husbandry 1 .....	3	..	Economics 1A .....	..	3
Zoology 1A-1B .....	4	4	Military Science .....	2	2
Elective .....	3	3	Physics 2A-3A .....	4	..
			Elective .....	..	4
	15	17		16	16

**ENTOMOLOGY AND PARASITOLOGY**

The curriculum in this department is designed to furnish basic training for students planning a career in one of the phases of entomology and parasitology and to serve the needs of students in the general fields of biology and agriculture. Graduates of the four-year curriculum are qualified for many positions with private, municipal, county, state, and federal agencies and with the pest control industry. Professional positions at higher levels in college teaching and in agricultural experiment station work as well as research with commercial organizations usually require several years of graduate study leading to a higher degree. (See the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.)



Patio of one of the new women's residence halls, Struve Hall.



The Memorial Union patio, center of Davis student life.



A study session  
in the Memorial  
Union lounge.



The heated outdoor swimming pool, open the year around  
for classes, sports, and recreational swimming.





A zology laboratory session.



An education class moves outdoors on a fine spring day.

The following principal fields of emphasis should be considered by the undergraduate who is planning graduate work at Davis as guides to his selection of courses within the prescribed curriculum.

*Agricultural Entomology.*—The study of insects and related arthropods which attack agricultural crops, their life histories, mode of injury, economics, distribution and methods of control.

*Systematic Entomology.*—This field covers phylogeny, classification, nomenclature, and identification of insects.

*Apiculture.*—A study of the biology and agricultural significance of honeybees. This includes life history of individuals, division of labor in colonies, manner of propagation, food sources, and pollination.

#### Curriculum in Entomology and Parasitology

(Major: Entomology and Parasitology)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Bacteriology .....	4
Botany and zoology .....	20
Chemistry .....	13
English and/or speech .....	6
Geography, geology or paleontology .....	3
Physics .....	3
 (b) <i>Agriculture</i>	
Agriculture (other than entomology and parasitology) and/or forestry .....	6
Genetics .....	3
Plant or animal pathology .....	4 or 3
Plant or animal physiology, nutrition, or biochemistry...	3
Entomology and parasitology courses for the major....	23
Summer practice course .....	0

4. Additional courses chosen by the student with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.).....

36 or 37

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5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3 above. Entomology and parasitology 49, 1 or 100, 106, 112, and 127. One course in high school or college trigonometry is required. This may satisfy in part the mathematics specified in 2 above.

#### Example of Entomology and Parasitology Program

FRESHMAN YEAR			SOPHOMORE YEAR		
<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>	<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>
Chemistry 1A-1B .....	5	5	Bacteriology 1 .....	..	4
English 1A-1B .....	3	3	Botany 1 .....	5	..
Military Science .....	2	2	Chemistry 8 .....	3	..
Zoology 1A-1B .....	4	4	Entomology 1 .....	..	4
†Elective .....	2	2	Military Science .....	2	2
			Physics 2A .....	..	3
			Pomology 1 .....	3	..
			†Elective .....	3	3
	—	—		—	—
	16	16		16	16

† Recommended electives: Agricultural Engineering 12, Agronomy 1, Animal Husbandry 7, Geography 3, Vegetable Crops 1, Viticulture 1, 3.

### FOOD SCIENCE

The curriculum in food science is intended to prepare students for service and leadership in the food processing industries—dairy industry, enology, and food technology (including plant and animal products and brewing technology). The courses include the physical and biological sciences with English and economics in a general requirement followed by intensive specialization in the upper division work between and within the majors involved.

Several lines of specialization are open to the student. Graduates are fitted for careers in plant operation and the handling of milk, fresh fruits or vegetables intended for processing, animal products, in chemical research and control, or in the economic and management side of the food-processing industries. Many graduates are engaged in creameries, wineries, breweries, canneries, freezing plants, dried fruit packing plants, other food plants and allied industries such as can, glass, food equipment and others. Some have followed the plant operation, managerial, or sales phases of the food industries. Others are engaged in research or teaching in various universities and experiment stations, in federal government research, Food and Drug Administration and food-inspection laboratories. A student may also undertake graduate work to fit him more particularly for one of a number of specialized fields such as agricultural chemistry, comparative biochemistry, microbiology, and food engineering.

### Majors

No formal subdivisions have been made in the curriculum; but with the approval and advice of his faculty adviser, a student may plan a curriculum leading to specialization in one of the following majors:

*Dairy Industry.*—Instruction in this major is offered in the principles and art of manufacturing dairy products for the student who wishes to enter dairy manufacturing; to prepare for positions as operator, manager, or inspector of dairy farms, creameries, cheese factories, or city milk and ice cream plants; or to become a farm advisor, a teacher in high school or agricultural college with additional graduate work, a technician, or a research worker in an agricultural college.

The facilities of the Department of Dairy Industry consist of a modern dairy plant, with the latest types of equipment for dairy products manufacturing, and chemical, bacteriological, and testing laboratories. The dairy manufacturing is in daily operation: market milk is pasteurized, and butter, cheese, ice cream, condensed milk, and dried milk are processed regularly. This provides excellent opportunities for student instruction. Courses in dairy cattle production are given by the Department of Animal Husbandry, which maintains a well-equipped dairy barn and a herd representing the principal breeds of dairy animals.

*Enology.*—The Department of Viticulture offers facilities for undergraduate and graduate work in enology. A vineyard of over 1,000 named varieties of wine grapes is maintained for instruction and research. The Enology and Horticulture Science buildings, designed for teaching and investigation, provide chemical and microbiological laboratories, fermentation and conditioning rooms, distilling equipment, and storage and aging cellars for research on wines and brandies. Classroom instruction is supplemented by cellar practice.

Students primarily interested in grape and raisin production will normally major in viticulture under plant science.

*Food Technology.*—The laboratories and facilities of this department afford opportunity for instruction and research in the application of chemistry, biochemistry, physics, biology, statistics, and engineering to the manufacture, utilization, and preservation of foods. Typical fields of advanced

study include the biological and chemical factors involved in the preparation and preservation of canned, dried, and frozen foods; enzyme behavior and control; foreign chemicals in food products; behavior and properties of the pigments of foods; the properties of and utilization of yeasts, molds, and bacteria; influence of maturity, variety, and cultural conditions on the quality of processed fruits and vegetables; factors influencing acceptability of foods as evaluated by taste panel; development of new food products; and food plant sanitation.

Graduate instruction leading to the M.S. degree is offered in food science and to the Ph.D. degree in the fields of agricultural chemistry, microbiology, comparative biochemistry, nutrition, engineering, and plant physiology.

*Specialization in Brewing Technology.*—The Department of Food Technology also offers facilities for undergraduate and graduate specialization in brewing technology.

#### Curriculum in Food Science

(Majors: Dairy Industry, Enology, Food Technology)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements.

(a) <i>General</i>	<i>Units</i>	
Bacteriology .....	4	
Biochemistry and/or physiology .....	6	
Botany or zoology .....	5 or 3	
Chemistry .....	16	
Economics .....	3	
English and/or speech .....	6	
Mathematics (including differential calculus) .....	6	
Physics (including laboratory) .....	8	
 (b) <i>Agriculture</i>		
Courses in either the major or closely related fields, with approval of major adviser .....	20	
 (c) <i>Electives (restricted)</i>		
Anthropology, art, economics, English, foreign language, geography, geology, history*, music, political science*, philosophy, psychology, or sociology .....	6	
 4. Additional courses chosen by the student with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) .....		44 or 46

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5. Certain courses are required by the following majors and where applicable may be used in partial satisfaction of 3 above:

*Dairy Industry.*—Animal Husbandry 103 or 105, and 112; Chemistry 1A, 1B, 5, 8; Dairy Industry 1, 2, 49 (or equivalent practical experience), 160A–160B.

*Enology.*—Bacteriology 105B; Viticulture 1, 3, 124, 125, 140; 6 units selected with the approval of the adviser from: agricultural economics; Chemistry 9, 109; Dairy Industry 108; Food Technology 105B, 124.

*Food Technology.*—Bacteriology 1; Chemistry 1A–1B, 5, 8, 109; 18 units of food technology including 112, 113, 114, 115, 127, or equivalent.

*Food Technology (Brewing Technology Specialization).*—Agricultural Engineering 102; Bacteriology 105A–105B; Chemistry 1A–1B, 5, 8, 9, 109; Mathematics 13; Food Technology 105A–105B, 115, 116, 118, 124, or equivalent.

\* In addition to University requirements.

## Example of Dairy Industry Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A-1B .....	5	5	Bacteriology 1 .....	..	4
Dairy Industry 1 and 2 ..	4	..	Chemistry 5 .....	3	..
English 1A-1B .....	3	3	Chemistry 8 .....	3	..
Mathematics 16A-16B ...	3	3	Economics 1A-1B .....	3	3
Military Science .....	2	2	Military Science .....	2	2
Zoology 10 .....	..	3	Physics 2A-2B .....	3	3
			Physics 3A-3B .....	1	1
			Elective .....	..	3
	17	16		15	16

## Example of Enology Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A-1B .....	5	5	Bacteriology 1 .....	..	4
English 1A-1B .....	3	3	Botany 1 .....	5	..
Mathematics 16A-16B ...	3	3	Chemistry 5, 8 .....	3	3
Military Science .....	2	2	Economics 1A-1B .....	3	3
Viticulture 1, 8 .....	2	2	Military Science .....	2	2
			Physics 2A-2B .....	3	3
			Physics 3A-3B .....	1	1
	15	15		17	16

## Example of Food Technology Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1 .....	5	..	Bacteriology 1 .....	..	4
Chemistry 1A-1B .....	5	5	Chemistry 5 .....	..	3
Chemistry 8 .....	..	3	Mathematics 16A-16B ...	3	3
Economics 1A .....	3	..	Physics 2A-2B .....	3	3
Speech 1A or English 1A. .	..	3	Physics 3A-3B .....	1	1
Military Science .....	2	2	Speech 1B or English 1B.	3	..
Elective .....	..	3	Military Science .....	2	2
			Elective .....	3	..
	15	16		15	16

## HOME ECONOMICS

The curriculum in home economics provides opportunity for personal development, training for the responsibilities of homemaking and citizenship, and preparation for a variety of professional careers. Credits required for the Bachelor of Science degree are divided approximately equally among required courses within the Department of Home Economics, credits in various other departments, and electives.

The number of homemakers who accept positions beyond marriage is increasing regularly. Successful performance of the dual role taken by many women is a challenge which requires an understanding of the needs of the family, knowledge of how to solve home and family problems, plus training which is in demand for interesting and worthwhile positions. A university degree in home economics has aided many women in carrying out this dual role successfully.

## Curriculum in Home Economics

(Majors: General Home Economics, Dietetics, Foods, Nutrition)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Natural sciences .....	18
One course in each of the following: chemistry, physics, statistics	
One course in each of two areas of the biological sciences: physiology, bacteriology, zoology, or botany	
Social sciences .....	18
One course in two areas of Group I and Group II	
Group I (psychology, sociology, cultural anthropology)	
Group II (political science†, history†, economics)	
Humanities .....	18
English—6 units	
One course in design and color	
One course in Group I and Group II	
Group I (literature, foreign language, philosophy)	
Group II (art, dramatic art, speech, music)	
(b) <i>Home economics and closely related fields</i>	
Lower division .....	6-12
Upper division .....	19-27
4. Additional courses chosen by the student with approval of adviser, some of which may be required in satisfaction of the major requirements under 5. (These may also be used to satisfy the course requirements under 1 and 2 above.).....	45-31

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5. Certain courses are required by the following majors and where applicable may be used in partial satisfaction of 3 above:

*General Home Economics\**: Decorative Art 6A, 130A and 130L; Home Economics 1A-1B, 6, 7, 112A-112B, 131, 133, 137, 140, 142, 150; Bacteriology 1; Chemistry 1A, 8; Economics 1A-1B; Physiology 1; Psychology 1A.

*Dietetics*: Home Economics 1A-1B, 1AL-1BL, 112A-112B, 112AL-112BL, 116, 121, 122, 141 or Agricultural Economics 130; Bacteriology 1; Chemistry 1A, 1B, 8, 101 (or Biochemistry 101); Economics 1A-1B, 11A; Education 110; Physiology 1, 1L; Psychology 1A.

*Foods*: Decorative Art 6A; Home Economics 1A-1B, 1AL-1BL, 104A-104B, 112A-112B, 112AL-112BL; Bacteriology 1; Chemistry 1A-1B, 5, 8; Economics 1A-1B; food technology, 6 units; Physics 2A-2B; Physiology 1; Psychology 1A.

*Nutrition*: Home Economics 1A-1B, 1AL-1BL, 112A-112B, 112AL-112BL, 117, 141; Bacteriology 1; Chemistry 1A-1B, 5, 8, 101 and 102 (or Biochemistry 101 and 101L); Economics 1A-1B; Physiology 1, 1L.

#### Example of General Home Economics Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A .....		5	Bacteriology 1 .....		4
Decorative Art 6A .....	2		Chemistry 8 .....	3	
English 1A-1B .....	3	3	Economics 1A-1B .....	3	3
Physiology 1 .....	3		Home Economics 7-7L,		
Psychology 1A .....		3	6-6L .....	2 or 3	2 or 3
Sociology or Anthropology.	3		Mathematics 13 .....		3
Elective .....	4	5	Physics 2A or 10 .....	3	
			Elective .....	3 or 4	3 or 4
	15	16		15	16

\* Majors planning to meet the secondary teaching credential requirements or to qualify for agricultural extension positions should complete the laboratory sections in courses 1A-1B, 6, 7, 112A-112B and courses 140L and 175.

† May be used to meet the American History and Institutions requirement.

## Example of Dietetics Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A, 8	5	3	Bacteriology 1	..	4
Decorative Art 6A	..	2	Chemistry 1B	5	..
English 1A-1B	3	3	Economics 1A-1B	3	3
Physiology 1, 1L	5	..	Home Economics 1A-1B,		
Psychology 1A	..	3	1AL-1BL	3	3
Elective	3	4	Elective	4	6
	16	15		15	16

## Example of Foods Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A, 8	5	3	Bacteriology 1	..	4
Decorative Art 6A	..	2	Chemistry 1B, 5	5	3
English 1A-1B	3	3	Economics 1A-1B	3	3
Physiology 1	3	..	Home Economics 1A-1B,		
Psychology 1A	..	3	1AL-1BL	3	3
Elective	4	5	Elective	4	3
	15	16		15	16

## Example of Nutrition Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A, 8	5	3	Bacteriology 1	..	4
Decorative Art 6A	..	2	Chemistry 1B, 5	5	3
English 1A-1B	3	3	Economics 1A-1B	3	3
Physiology 1, 1L	5	..	Home Economics 1A-1B,		
Psychology 1A	..	3	1AL-1BL	3	3
Elective	3	4	Elective	4	3
	16	15		15	16

## IRRIGATION SCIENCE

In many areas of the world, a successful agriculture is dependent upon sound irrigation and drainage practices. The need for persons trained in the scientific management of water resources in agriculture is becoming increasingly critical.

The fundamental training in the agricultural phases of irrigation provided by this broad curriculum prepares a student for many occupations—in farming, industry, irrigation enterprises, public agencies, research and teaching. In addition to instruction in irrigation, this curriculum includes courses in soils, crops, engineering, and in the basic sciences of mathematics, chemistry and physics.

The first and second years of this curriculum may be taken at Berkeley, Los Angeles, or Davis; the last two years are offered only at Davis.

Students desiring to emphasize the engineering aspects of irrigation, drainage, and water resources problems should see the Curriculum in Engineering, Davis campus (see page 105).

## Facilities

Excellent laboratory, greenhouse and field installations are available for instruction and research. These include indoor and outdoor hydraulic laboratories, drainage laboratories and equipment for studies of plant-soil-water relationships. More than 2,500 acres of the University Experimental Farm at



Davis are irrigated, thus providing demonstrations of many types of systems on a variety of crops.

#### Employment

The irrigation science curriculum (plus advanced study for some occupations) prepares students to become managers of large farm enterprises or operators of individually owned farms; employees of irrigation districts and water companies; instructors and scientists in schools, universities and experiment stations; and workers in agricultural extension services and in other state and federal agencies dealing with the supply, use, control, and conservation of water. A number of commercial opportunities are available with irrigation equipment companies and public utilities.

#### Subject Matter

Undergraduate instruction covers surface and ground water supply, wells and pumps, water rights, water quality and salinity; irrigation hydraulics; land preparation and irrigation systems; water-soil-plant relationships and crop water requirements; irrigation management and water conservation; drainage in relation to irrigation; and organization and operation of irrigation enterprises.

Advanced instruction is offered in water quality and salinity problems, physics of soil water, water relations of plants, and in other phases of irrigation science and irrigation engineering.

#### Curriculum in Irrigation Science

(Major: Irrigation)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Botany .....	9
Chemistry .....	13
Economics or agricultural economics .....	3
Engineering .....	3
English and/or speech .....	6
Geology .....	3
Mathematics .....	6
Physics .....	8
(b) <i>Agriculture</i>	
Agricultural engineering .....	3
Soil science .....	8
Irrigation courses .....	24

4. Additional courses chosen by the student with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.)..... 38

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5. Certain courses are required by the major and where applicable may be used in partial satisfaction of 3 above: Agricultural Engineering 103 or 104 or 106; Botany 1, 7 or 120A, 121A; Engineering 1A; Mathematics 16A-16B; Physics 2A-2B, 3A-3B; Soil Science 107 or equivalent.

A knowledge of mechanical drawing is required of all students. This requirement may be satisfied by a high school or University Extension course, or by demonstrating proficiency.

**Example of Irrigation Science Program**

FRESHMAN YEAR			SOPHOMORE YEAR		
<i>Course</i>	Fall <i>Units</i>	Spring <i>Units</i>	<i>Course</i>	Fall <i>Units</i>	Spring <i>Units</i>
Botany 1 .....	..	5	Chemistry 5 .....	..	3
Chemistry 1A-1B .....	5	5	Engineering 1A .....	3	..
English 1A-1B .....	3	3	Irrigation 10 .....	..	3
Geology 2 .....	3	..	Mathematics 16A-16B .....	3	3
Military Science .....	2	2	Military Science .....	2	2
Elective .....	3	..	Physics 2A-2B .....	3	3
			Physics 3A-3B .....	1	1
			Soil Science 1 .....	3	..
	16	15		15	15

**PLANT SCIENCE**

The plant science curriculum is designed to serve the people of California by training young men and women for positions of leadership in plant production and processing. The courses offered at the University are based upon the latest information developed through research on field crops, vegetable crops, grapes, tree fruits, berries, nuts, plant diseases, genetics, landscape horticulture and ornament horticulture. University teaching is continually kept up to date and the demand is great for students graduating from the University. Students become familiar with recent research in such fields as chemical control of weeds and diseases, breeding better varieties to meet market demands, and better cultural practices to improve yield and quality. They also become personally acquainted with the research workers. These contacts are invaluable to young men and women who must continue to keep abreast of new developments after graduation. These are some of the reasons why university-trained men and women in plant science are in great demand by agricultural industries.

The curricula in plant science permit a student at the University to specialize in fields which are of particular interest to him and for which he is best suited. These fields of specialization include agronomy (field crops), vegetable crops, pomology (fruit crops), viticulture, landscape horticulture, plant pathology, and genetics. Nearly all graduates find positions in the type of work for which they prepare themselves.

The occupational objectives of university training in plant science are to prepare young people to engage in farming for themselves and to become managers and operators of large-scale farming enterprises for others; to enter commercial work in agricultural industries; or to become agricultural teachers in high schools and colleges; extension specialists and county farm advisors; farm management consultants; plant breeders for private or government agencies; research workers in private, state, or federal agencies; or to become laboratory or field technicians for public or private organizations.

Educated men and women working in these fields are better equipped to serve the needs of agriculture and to accept leadership in community affairs.

*Graduate Work*

The student may pursue graduate work leading to the degree of Master of Science in the following plant science fields: agronomy, genetics, horticulture, (pomology, viticulture), plant pathology, and vegetable crops.

Students may prepare for a research career in plant science by seeking a doctorate in agricultural chemistry, botany, comparative biochemistry, genetics, plant pathology, plant physiology, or soil science.

Students contemplating graduate work in plant science should familiarize themselves with the requirements for higher degrees. (See ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.) They are strongly advised to include appropriate basic courses, such as languages and mathematics, in their undergraduate programs.

### Majors

**Agronomy.**—This major prepares the student for defining, analyzing, and solving the problems of field crop agriculture, which supplies food, feed, fiber, and other industrial materials. Agronomy embraces cotton, alfalfa, cereals, beans, sugar beets, corn, sorghums, flax, oil crops, irrigated pastures, dry ranges, and many crops less well known. Supporting and elective courses are taken in related fields to broaden the student's knowledge in the entire field of agriculture. Students learn to produce better crops more profitably and to understand the scientific principles behind better farming practices. Knowledge of principles as well as practices of field crop production enable operators to adjust production and marketing practices to changing demands.

Students are prepared for: agricultural industries dealing with commodities such as seeds, fertilizers, and herbicides—on their research staffs or in the commercial end of the business; agricultural extension; other state and federal agencies (including soil conservation); farming; graduate study.

The Department of Agronomy offers graduate instruction leading to the degree of Master of Science. Students expecting to continue on in graduate work should note the requirements for science specialization in their agronomy major (see page 74). Problems in agronomy leading to the degree of Doctor of Philosophy are undertaken under the supervision and in the laboratories of agronomy staff members in the fields of botany, genetics, plant physiology, soil science, agricultural chemistry, and comparative biochemistry. Problems suitable for graduate students may include investigations in genetics and plant breeding as related to the improvement of field crops; physiological and chemical problems of crops as related to factors such as light, heat, drought, and disease resistance; crop and soil interrelations with special reference to fertility, legumes, crop residues, enzymes, and crop sequence.

**Genetics.**—It is possible to arrange various combinations of courses so as to complete an undergraduate major in genetics. Such a major must include general genetics, statistics and either plant or animal cytology; it may include cytogenetics, plant breeding, fruit breeding, vegetable breeding, organic evolution, or theory of probability.

Prospective students should study general botany and zoology, followed by either plant or animal morphology, anatomy, physiology, and taxonomy. Students intending to specialize in statistics as a genetic tool should have at least one semester of calculus.

**Landscape Horticulture.**—This major is designed to train the student in the basic knowledge of the culture and management of ornamental plants, as well as in the use of construction materials and their application in landscape design.

By proper selection of courses, a student may prepare himself for one of the following careers: teaching, research, extension, nursery production and management, nursery inspection, propagation, the management of parks and public grounds, the field of landscape construction and contracting, or for graduate study.

**Facilities:** Courses offered by the department are given in the Landscape Horticulture Building where a drafting room, classrooms and offices are located. A new field headquarters, with an ornamentals laboratory, construction laboratory, shop, greenhouse, lath house, growing areas and land for construction operations, is used in the teaching program. A research laboratory is available also for the use of staff and advanced students in this new facility.

Large collections of plant materials on the University campus and in the University Arboretum are available for use in teaching and research.

**Subject Matter:** The department offers courses in plant science relative to

ornamental plant materials, arboriculture, nursery management, turf grass culture, floriculture, and in landscape design and construction.

To make up a well-rounded program, students are advised to enroll in courses in related fields such as soils, irrigation, engineering, botany, pomology, art, business law and accounting.

Students desiring to enter the teaching or research fields may complete their training in the Graduate Division.

*Plant Pathology.*—The upper division courses afford instruction in the different types of plant diseases and the principles and techniques of plant pathology.

Those desiring to go into professional work involving teaching or research ordinarily take several years of graduate work after attaining the bachelor's degree. For such students the following courses are recommended: botany (taxonomy, anatomy, cytology, physiology, and mycology), bacteriology, entomology, genetics, chemistry (quantitative, organic, and biochemistry), physics, soils, zoology, French, and German.

*Pomology.*—This major deals with principles and practices involved in the production of deciduous tree fruits, nuts, bushberries, strawberries, and olives.

Upper division lecture and laboratory instruction is directed toward the evaluation and integration of such orchard operations as pruning, fruit thinning, spraying, fertilization, irrigation, and cultivation and their influence upon the ultimate quantity and quality of the fruit produced, whether fresh or processed. The effects of environment (site, soil, climate), selection of varieties and rootstocks, use of plant growth regulators, propagation methods, attention to the need of cross-pollination facilities, and experimental techniques are some of the subjects studied in relation to fruit production. The principles involved in fruit handling including harvesting, packaging, pre-cooling and storage are stressed.

The major is flexible enough to permit the student to prepare for fruit growing as a vocation either independently or as a superintendent for others, or for a position as field representative of a fertilizer or spray company, an employee of a federal or state governmental agency, or for graduate study.

The Department of Pomology offers graduate instruction for the degree of Master of Science in horticulture. Also problems related to horticulture and leading to the degree of Doctor of Philosophy may be studied under the supervision of pomology staff members in such fields as botany, plant physiology, genetics, soil science, and comparative biochemistry.

Facilities available for both undergraduate and graduate studies include well-equipped laboratories and cold storage rooms, greenhouse and lathouse space, and fruit variety and species collections including more than 20 species and 1,000 named varieties. Orchards totaling over 300 acres of the major California fruit crops are maintained under irrigation and are used for research and instruction.

Problems suitable for graduate students include studies on such varied subjects as the genetics and techniques of fruit breeding, the chemistry of fruit maturation, factors influencing flower formation and fruit setting, and the mineral nutrition of fruit crops.

*Vegetable Crops.*—This major deals with all the various aspects of the production, harvesting, and distribution of the many important California vegetables.

The upper division lecture and laboratory studies are concerned with the principles and practices of plant production, soil management, transplanting, fertilization, irrigation and weed control in their effects on yield and quality. Seed production, variety adaptation, soil and climate as factors in vegetable production, special cultural techniques, development of new varieties, mechan-

ical harvesting, and post-harvest handling for fresh market, canning, or freezing are considered. Flexibility is provided by the various courses of the major so as to prepare students for vegetable farming, employment with seed, fertilizer, shipping and processing companies, graduate study, or positions in governmental agencies. Courses in allied fields may be used to broaden the vegetable production option.

The Master of Science degree is offered by the department. Work for the degree of Doctor of Philosophy may be taken under staff members of the Vegetable Crops Department on a problem related to vegetable production in any one of seven fields of concentration: agricultural chemistry, comparative biochemistry, botany, genetics, plant pathology, plant physiology, and soil science.

The department is equipped with excellent chemical, physiological, and morphological laboratories, greenhouses, lathhouse, specially constructed bulb-storage house, cold storage facilities, and 140 acres of land with a complete irrigation system for studies on the problems of this major California industry.

*Viticulture.*—This major comprises the study of the grapevine and its products. Teaching and investigation are directed toward the improvement of the production and quality of table, wine, and raisin grapes.

Upper division instruction includes such cultural operations as pruning, thinning, girdling, fertilization, and cultivation. Methods of propagating the vine, the breeding and testing of new varieties, insect and disease control, and the use of growth-regulators are part of the course work. The basic importance of soil, climatic conditions and variety is emphasized in relation to the yield and quality of the fruit and its products.

The world's most complete collection of cultivated grape varieties, native species and hybrids, is maintained for instruction and research. A vineyard of 95 acres supplies fruit of the important varieties for studies on packing, pre-cooling, and storage. Laboratories, greenhouse space, and a field house provide facilities for the growing and handling of the vine and its fruit.

Graduate instruction leading to the degree of Master of Science in horticulture is offered by the Department of Viticulture. Problems related to viticulture and leading to the degree of Doctor of Philosophy may be studied under the supervision of viticulture staff members in such fields as genetics, cytology, plant physiology, or soil science.

#### Curriculum in Plant Science

(Majors: Agronomy, Genetics, Landscape Horticulture, Plant Pathology, Pomology, Vegetable Crops, Viticulture)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Botany and plant physiology .....	9
Chemistry .....	13
Economics .....	3
English and/or speech .....	6
Physics .....	3
 (b) <i>Agriculture</i>	
Entomology and parasitology .....	4
Genetics .....	4
Irrigation, plant nutrition, or soils .....	3
Plant pathology .....	4
Upper division courses in the major or closely related field with approval of major adviser .....	12

## Units

- (c) *Electives* (restricted) selected from the two areas listed below: ..... 16

Natural sciences: at least 9 units to be selected from animal physiology, bacteriology, biochemistry, botany or plant physiology, chemistry, entomology, geology, irrigation, mathematics\*, physics, plant pathology, plant nutrition, soils, or zoology.

Social sciences and foreign languages: at least 3 units to be selected from economics, English, foreign language, history or political science†, philosophy, psychology, sociology, or speech.

4. Additional courses chosen by the student with approval of major adviser. (These electives may be used to satisfy course requirements under 1 and 2 above.)..... 47

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5. Certain courses are required by the following majors and where applicable may be used in partial satisfaction of 3 above:

*Agronomy*.—(Production Major): Agronomy 1; Botany 1, 7; Chemistry 1A-1B, 8; Entomology 124; Irrigation 110; Mathematics 13; Plant Pathology 120; Soil Science 1; zoology, 3 units.

*Agronomy*.—(Science Specialization): In addition to the requirements for a production major, the following courses are required; Botany 105 or 108; Chemistry 5, 9, or 101; German 1 or French 1; Mathematics 16A-16B (or 3A-3B); Physics 2B.

*Genetics*.—Chemistry 1A-1B, 8; Mathematics 13, 105; Zoology 1A. Recommended: Botany 130; German 1, 2; Mathematics 3A-3B.

*Landscape Horticulture*.—Botany 1, 7 (or 120A-120B); Chemistry 1A-1B, 8; Landscape Horticulture 1A-1B or 3, 105A-105B; Pomology 9. Recommended: Agricultural Economics 18; Art 2A; Botany 108 and 110; Economics 11A-11B; Engineering 1A; Pomology 1 or 2.

*Plant Pathology*.—Bacteriology 1 or 2; Botany 119; Chemistry 1A-1B, 8, 5, 101 or Biochemistry 101; Entomology 124; Irrigation 100 or 110; Soil Science 1 or 108; Zoology 1A or 10.

*Pomology*.—Bacteriology 1; Botany 1, 7 (or 120A-120B, 121A-121B); Chemistry 1A-1B, 8; Irrigation 110; Physics 2A-2B; Pomology 2; Soil Science 1. Recommended: Agricultural Engineering 103; Pomology 9, 105, 106A-106B, 112, 121; Viticulture 116.

*Vegetable Crops*.—Botany 1, 7; Chemistry 1A-1B, 8; Vegetable Crops 101, 190. Recommended: Agricultural Economics 140; Botany 107; Irrigation 110; Physics 2B.

*Viticulture*.—Botany 1, 7; Chemistry 1A-1B, 8; Viticulture 1, 3, 105, 116. Recommended: Agricultural Engineering 103; Irrigation 110; Viticulture 124, 125 or Pomology 121.

## Example of Agronomy Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Agronomy 1	3	..	Botany 7	..	4
Botany 1	5	..	Chemistry 1B, 8	5	3
Chemistry 1A	..	5	Economics 1A	..	3
English 1A-1B	3	3	Military Science	2	2
Military Science	2	2	Physics 2A	3	..
Zoology 10	..	3	Soil Science 1	3	..
Elective	3	3	Elective	3	3
	16	16		16	15

\* Not including Mathematics C or D.

† In addition to University requirements.

## Example of Genetics Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Agronomy 1 or Pomology 1	3	..	Bacteriology 1	..	4
Botany 1	5	..	Botany 7	..	4
Chemistry 1A	..	5	Chemistry 1B, 8	5	3
Economics 1A	3	..	Mathematics 1B	3	..
English 1A-1B	3	3	Military Science	2	2
Military Science	2	2	Physics 2B	3	..
Physics 2A	..	3	Elective	3	3
Elective	..	3			
	<hr/>	<hr/>		<hr/>	<hr/>
	16	16		16	16

## Example of Landscape Horticulture Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1	5	..	Botany 7	..	4
Chemistry 1A	..	5	Chemistry 1B, 8	5	3
Economics 1A	3	..	Engineering 1A	3	..
English 1A-1B	3	3	Landscape Horticulture		
Landscape Horticulture			1A-1B	3	3
4, 3	3	3	Physics 2A	3	..
Military Science	2	2	Pomology 9	..	2
Elective	..	3	Military Science	2	2
			Elective	..	2
	<hr/>	<hr/>		<hr/>	<hr/>
	16	16		16	16

## Example of Plant Pathology Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Agronomy 1	3	..	Bacteriology 1	..	4
Botany 1	5	..	Botany 7	..	4
Chemistry 1A	..	5	Chemistry 1B, 8	5	3
English 1A-1B	3	3	Economics 1A	3	..
Vegetable Crops 1 and 1L	..	3	Physics 2A	3	..
Military Science	2	2	Pomology 2	3	..
Elective	3	3	Military Science	2	2
			Elective	..	3
	<hr/>	<hr/>		<hr/>	<hr/>
	16	16		16	16

## Example of Pomology Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Agronomy 1 or Soil			Botany 7	..	4
Science 1	3	..	Chemistry 1B, 8	5	3
Botany 1	5	..	Military Science	2	2
Chemistry 1A	..	5	Physics 2A-2B	3	3
Economics 1A	3	..	Pomology 2	3	..
English 1A-1B	3	3	Pomology 9 or Vegetable		
Military Science	2	2	Crops 1 and 1L	..	2 or 3
Pomology 9 or Vegetable			Electives	2 or 3	2
Crops 1 and 1L	..	2 or 3			
Elective	..	3			
	<hr/>	<hr/>		<hr/>	<hr/>
	16	15 or 16		15 or 16	16 or 17

## Example of Vegetable Crops Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Agronomy 1	3	..	Botany 7	..	4
Botany 1	5	..	Chemistry 1B, 8	5	3
Chemistry 1A	..	5	History 17B	..	3
Economics 1A	3	..	Military Science	2	2
English 1A-1B	3	3	Physics 2A	3	..
History 17A	..	3	Psychology 1A	3	..
Military Science	2	2	Soil Science 1	3	..
Vegetable Crops 1 and 1L	..	3	Elective	..	3 or 4
	16	16		16	15 or 16

## Example of Viticulture Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1	5	..	Agronomy 1, or Vegetable Crops 1 and 1L	..	3
Chemistry 1A	..	5	Botany 7	..	4
Economics 1A	3	..	Chemistry 1B, 8	5	3
English 1A-1B	3	3	Military Science	2	2
Military Science	2	2	Physics 2A	3	..
Viticulture 1, 3	2	2	Pomology 2	3	..
Elective	..	3	Elective	3	3
	15	15		16	15

## PREFORESTRY

The preforestry curriculum is administered by the College of Agriculture, and is designed to offer a broad basic training which will prepare the candidate for the courses in the School of Forestry.

The School of Forestry of the University of California is located on the Berkeley campus. For further information concerning admission to the School of Forestry see the ANNOUNCEMENT OF THE SCHOOL OF FORESTRY, or write to the School of Forestry, 243 Walter Mulford Hall, University of California, Berkeley 4.

## Curriculum in Preforestry

(Major: Preforestry)

1. General University requirements (a), (b), and (e). (See page 49.)
2. College of Agriculture requirement (c). (See page 49.)
3. Curriculum requirements:

(a) General	Units
Botany (general botany) . . . . .	5
(This requirement is based on Botany 1 as given at Berkeley)	
Chemistry (general inorganic and organic) . . . . .	8
Economics (elements of economics) . . . . .	6
Engineering (plane surveying) . . . . .	3
English and/or speech . . . . .	6
Geology (structural) . . . . .	3
Mathematics (beyond trigonometry) . . . . .	3
Physics (general physics) . . . . .	6
Statistics . . . . .	3
Zoology (general biology) . . . . .	3



(b) *Forestry* Units

Summer field practice course ..... 0

4. Additional courses chosen by the student with approval of major adviser. (These may be used to satisfy the course requirements under 1 and 2 above.) ..... 14

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60

For admission to the School of Forestry, a student must have junior standing with at least 60 units of credit, including essentially the prescribed subjects listed above, and a grade average of C or higher. The summer field practice course, Forestry 49, is prerequisite to all required forestry courses.

The schedule of study offers a broad basic training in the first four semesters. To complete his work for the degree of Bachelor of Science in the normal eight-semester period, the student should adhere closely to the recommended program, which follows. It enables him to complete the maximum number of lower division courses in an orderly manner and without conflicts. Much of this work is prerequisite to necessary courses in the School of Forestry, and by following the recommended program the student is prepared to make an advantageous selection of electives and a logical arrangement of requirements after his admittance to the School of Forestry.

**Example of Preforestry Program\***

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A .....	..	5	†Botany 1 .....	5	..
Economics 1A-1B .....	3	3	Chemistry 8 .....	..	3
English 1A-1B .....	3	3	Engineering 1A .....	3	..
Mathematics 16A .....	3	..	Geology 2 .....	3	..
Military Science .....	2	2	Mathematics 13 .....	..	3
Zoology 10 .....	..	3	Military Science .....	2	2
Elective .....	3	..	Physics 2A-2B .....	3	3
			Elective .....	..	3
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	14	16		16	14

**PREVETERINARY MEDICINE**

The preveterinary curriculum is administered by the College of Agriculture and is designed to offer a well-balanced basic training in natural science and the humanities which will not only prepare the candidate for the courses in the School of Veterinary Medicine, but also for the varied problems in his chosen profession.

The School of Veterinary Medicine offers instruction leading to the Bachelor of Science and Doctor of Veterinary Medicine degrees. For further information concerning admission to the School, see page 109.

**Curriculum in Preveterinary Medicine**

1. American History and Institutions; Subject A; Military or Naval Science; and mathematics, 6 units§, as required.

\* One-half year of geometrical drawing and one-half year of trigonometry are necessary for forestry courses. Trigonometry is also prerequisite to engineering. They should be taken in high school. The University does not offer a course in geometrical drawing.

† Students who prepare for forestry at other institutions which do not offer a one-semester 5-unit course in general botany (equivalent to Botany 1) should take the year course (Botany 1A-1B or equivalent) usually with a total of 8 units of credit. This does not take the place of 4 units of plant physiology with laboratory (Botany 111).

§ May be completed in high school. Trigonometry is prerequisite to physics at the University.

## 2. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Chemistry (general, inorganic, organic, and analytical) . .	16
English composition and additional English or speech . . .	6
Physics (mechanics, heat, light, electricity) . . . . .	6
Social sciences, foreign languages, philosophy, psychology, fine arts, literature, and/or additional English, speech, and mathematics† . . . . .	12
Zoology . . . . .	8
3. Additional courses chosen by the student with approval of the major adviser . . . . .	12
	60

At least 60 units of credit in one of the colleges of the University of California, or in an accredited institution, including the prescribed subjects listed in the preveterinary curriculum above (except that minor shortages may be waived by the admissions committee of the School of Veterinary Medicine).

**Example of Preveterinary Medicine Program**

The following schedule of study need not be rigidly adhered to but it satisfies the requirements without conflicts. This schedule also satisfies the general requirements of the Animal Science Curriculum if Botany 1, Bacteriology 1, and Economics 1A are taken as electives.

FRESHMAN YEAR			SOPHOMORE YEAR		
<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>	<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>
Chemistry 1A-1B . . . . .	5	5	Chemistry 8, 5 . . . . .	3	3
English 1A-1B . . . . .	3	3	History 17A-17B . . . . .	3	3
Military Science . . . . .	2	2	Military Science . . . . .	2	2
Elective . . . . .	5	5	Physics 2A-2B . . . . .	3	3
			Zoology 1A-1B . . . . .	4	4
	15	15		15	15

**RANGE MANAGEMENT**

The curriculum in range management is designed to give students broad training and to qualify them as managers of ranch properties, as farm advisors, as range technicians in state and federal agencies, and for graduate studies leading to positions in teaching and research. Range management has been growing in importance in the past few years and has made very great advancement in California. The California Agricultural Experiment Station has several research projects on the various range problems; many farm advisors are taking range management information to the ranchers; and several state and federal agencies have both research and educational programs in this field.

Over 44,000,000 acres, or 45 per cent of the land of California, are used to some extent for domestic livestock grazing. The actual grazing value of many of the acres is low, but collectively, they are the supporting base for California's second largest agricultural industry—livestock production. Much of this land also has values other than livestock grazing, in watershed development, timber production, recreation, and wildlife.

The varied nature of range management work, whether it be in public service or as a ranch operator, makes it desirable that a student entering

† Mathematics beyond trigonometry.

this field have some training in several or all of the following fields: animal husbandry, agronomy, range management, soils, forestry, watershed management, and wildlife. For this reason, the student must spend either his third or fourth year on the Berkeley campus where he takes required courses chiefly in range management.

The first and second years of the range management curriculum offer a broad basic training. Since the number of courses required in the freshman and sophomore years is large, students are advised to adhere closely to the program. The junior and senior years are purposely not crowded with specific required courses to make it possible for the student to exercise considerable selection in the courses he wishes. For example, if the student has a special wish to take more courses in animal husbandry, forestry, or some other field, the large space for electives will make it possible for him to do so.

### Curriculum in Range Management

(Major: Range Management)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Botany .....	16
Chemistry .....	8
Economics or economics and agricultural economics.....	3
Engineering .....	3
English and/or speech .....	6
Physics .....	6
Zoology .....	8
 (b) <i>Agriculture</i>	
Agronomy and range management .....	12
Animal husbandry .....	10
Soil science and/or geology .....	6
Summer field practice course .....	0
 (c) <i>Electives</i> (restricted) additional units in botany, chemistry, genetics, geology, statistical methods, zoology.....	
Anthropology, art, foreign language, geography, music, sociology, history*, political science*, philosophy, psychology, or additional economics, English, speech.....	9
 4. Additional courses chosen by the student with approval of major adviser. (These electives may be used to satisfy course requirements under 1 and 2 above.) .....	
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5. Certain courses are required for the major, and, where applicable, may be used in partial satisfaction of above requirements: Economics 1A, a course in surveying, plant physiology, plant taxonomy, and plant ecology. The choice of 12 units in agronomy and range management must be selected from Agronomy 115 and Range Management 102, 123, 133 (Berkeley). Students will be expected to spend a minimum of one year on each of the Berkeley and Davis campuses.

\* In addition to courses in these fields used at Davis in fulfillment of University requirements.

## Example of Range Management Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Animal Husbandry 7, 8...	4	..	Botany 1 .....	3	5
Chemistry 1A .....	..	5	Botany 8 .....	..	2
Economics 1A .....	..	3	Chemistry 8 .....	3	..
English 1A-1B .....	3	3	Economics 1B .....	3	..
Military Science .....	2	2	Engineering 1A .....	3	..
Zoology 1A-1B .....	4	4	Geology 2 or Soil Science 1 .....	3	..
Elective .....	3	..	Military Science .....	2	2
			Physics 2A-2B .....	3	3
			Elective .....	..	3
	16	17		17	15
† JUNIOR YEAR-BERKELEY			† SENIOR YEAR-DAVIS		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 111†, 108 .....	4	4	Agronomy 115 .....	..	3
Forestry 103 .....	4	..	§Animal Husbandry 7, 8..	4	..
Range Management 102 .....	..	3	Animal Husbandry 103 .....	..	3
Range Management 123 .....	3	..	Animal Husbandry 118 .....	..	4
Range Management 133 .....	..	3	Genetics 100, 100C .....	4	..
Zoology 116 .....	4	..	‡Soil Science 108 .....	..	2
Elective .....	..	6	‡Soil Science 109 .....	2	..
			Elective .....	6	4
	15	16		16	16

Range Management 49, a four-week extra-session field course, is required of all students with a major in range management.

## SOIL SCIENCE

Soil is a basic resource which is utilized for the production of most of the foods and fibers used by mankind. A general understanding of soils is needed by all farmers and other agricultural workers. In addition to those who require a general knowledge of soils there must be a group of thoroughly trained soil scientists prepared to deal with the many problems of soil-plant-water relations.

The soil science curriculum is designed to train students in the application of scientific principles to the problems of soil management, soil conservation, soil survey, and other aspects of agriculture related to soil science and crop production.

Graduates in soil science may become research workers in government, state, and private research laboratories, managers of farms and commercial greenhouses, specialists in soil fertility and plant nutrition for large agricultural corporations, and government soil surveyors and conservationists. As farmers, teachers in agricultural colleges, farm advisors, and land-use planners, they are influential in advancing education in agriculture and in contributing to the economic welfare of the community.

Basic training in chemistry, physics, botany, microbiology, and geology is required. In addition, all students will undertake courses dealing with the chemical characteristics of soils, plant nutrition, and the activities of soil microorganisms which influence the fertility of soil. They will study the physical properties of soils and the behavior of water in the soil. Also, they will learn how soils are formed, how they evolve, and how the characteristics of soils affect their productivity and adaptation to different crops.

Graduate study leading to the degrees of Master of Science and Doctor of

† Courses listed for junior year may be taken in senior year and vice versa.

‡ For students taking lower division work at Davis.

§ For students taking lower division work at Berkeley.

Philosophy in soil science is offered to qualified students. Any student who becomes interested in advanced research and university teaching should consult his faculty adviser regarding his undergraduate program.

### Majors

The student has a choice of four majors, as follows:

*General Soil Science.*—This major provides broad training in soil science and related physical and biological sciences. Students who do not wish to specialize in a particular phase of soil science may elect this major.

*Pedology and Soil Survey.*—Pedology is the study of the origin and development of soils. It is essential to the study of soil classification and to the applied field of soil survey. This major provides training in the techniques of soil surveying, mapping, classifying, and land-use planning.

*Plant Nutrition and Soil Fertility.*—This major is designed for students interested in plant nutrition and plant biochemistry who wish to direct their primary attention to the soil as a medium for plant growth. Students pursuing this major must at present take one or two semesters on the Berkeley campus since not all of the required courses are available at Davis.

*Soil Management and Conservation.*—This major provides training in the application of basic principles of soil science to practical agriculture. Integration of soil management concepts and practices with crop management, irrigation, farm management, and agricultural engineering are emphasized

### Curriculum in Soil Science

(Majors: General Soil Science, Pedology and Soil Survey, Plant Nutrition and Soil Fertility, Soil Management and Conservation)

1. General University requirements. (See page 49.)
2. College of Agriculture requirements. (See page 49.)
3. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Bacteriology .....	4
Botany (including plant physiology) .....	9
Chemistry .....	16
English and/or speech .....	6
Geology .....	3
Physics .....	8
 (b) <i>Agriculture</i>	
Crop science (agronomy, pomology, vegetable crops, viticulture) or plant ecology .....	3
Soil science courses required for major .....	20-27
 (c) <i>Electives</i> (restricted) must be selected from the list below:	
At least 18 units selected from major requirements listed under 5 and with approval of major adviser.....	24-18
Anthropology, art, classics, decorative art, dramatic art, economics, English, foreign languages, geography, history*, music, philosophy, political science*, psychology, sociology or speech .....	6
 4. Additional courses chosen by the student with approval of major adviser. (These electives may be used to satisfy course requirement under 1 and 2 above.).....	
	25-24

\* In addition to University requirements.



The Chemistry Building

5. Certain courses are required and where applicable may be used in partial satisfaction of 3 above:

*General Soil Science.*—Chemistry 109; Geochemistry 100; Geology 1; Mathematics 16A–16B or equivalent; Plant Nutrition 116. A total of 23 units of soil science including Soil Science 105.

*Pedology and Soil Survey.*—Engineering 1A; Geography 1 and 3; Geochemistry 100; Geology 1; Irrigation 135; Paleontology 1; Plant Nutrition 116. A total of 25 units of soil science including Soil Science 105 and 135.

*Plant Nutrition and Soil Fertility.*—Biochemistry 101; Chemistry 109; Mathematics 16A–16B or equivalent; Mathematics 13; Plant Nutrition 116; Plant Pathology 120. A total of 20 units of soil science.

*Soil Management and Conservation.*—Agricultural Economics 140; Engineering 1A or Agricultural Engineering 12 or 104; Irrigation 110, 135; an additional 5 units of crop science. A total of 25 units of soil science including Soil Science 105, 108 or 109, and 135.

#### Example of General Soil Science Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1		5	Agronomy 1	3	..
Chemistry 1A–1B	5	5	Bacteriology 1	..	4
English 1A–1B	3	3	Chemistry 5, 8	3	3
Geology 1	3	..	Military Science	2	2
Mathematics 16A–16B	3	3	Physics 2A–2B	3	3
Military Science	2	2	Physics 3A–3B	1	1
			Soil Science 1	3	..
			Elective (restricted)	..	3
	16	18		15	16

#### Example of Pedology and Soil Survey Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1		5	Bacteriology 1	..	4
Chemistry 1A–1B	5	5	Chemistry 5, 8	3	3
Engineering 1A	3	..	Geography 1	3	..
English 1A–1B	3	3	Military Science	2	2
Geology 1	3	..	Physics 2A–2B	3	3
Military Science	2	2	Physics 3A–3B	1	1
Paleontology 1		3	Soil Science 1	3	..
			Elective (restricted)	..	3
	16	18		15	16

#### Example of Plant Nutrition and Soil Fertility Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1		5	Agronomy 1	3	..
Chemistry 1A–1B	5	5	Bacteriology 1	..	4
English 1A–1B	3	3	Chemistry 5, 8	3	3
Geology 1	3	..	Military Science	2	2
Mathematics 16A–16B	3	3	Physics 2A–2B	3	3
Military Science	2	2	Physics 3A–3B	1	1
			Soil Science 1	3	..
			Elective (restricted)	..	3
	16	18		15	16

## Example of Soil Management and Conservation Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1	..	5	Agronomy 1	3	..
English 1A-1B	3	3	Bacteriology 1	..	4
Geology 1	3	..	Chemistry 1A-1B, 8	5	8
Military Science	2	2	Military Science	2	2
Physics 2A-2B	3	3	Soil Science 1	3	..
Physics 3A-3B	1	1	Vegetable Crops 1	..	2
Pomology 1	3	..	Elective (restricted)	3	..
Elective (restricted)	..	3			
	<hr/>	<hr/>		<hr/>	<hr/>
	15	17		16	16



## COLLEGE OF ENGINEERING\*

THE UNIVERSITY'S PROGRAMS in engineering education on the Berkeley, Davis, and Los Angeles campuses are designed to prepare students for all engineering functions, but place particular emphasis on design, development, and research. Mathematical analysis, the basic sciences, and design are stressed in preparing the student for a professional engineering career.

Engineering instruction on the Davis campus emphasizes the application of engineering principles to the problems of agriculture. The curriculum in engineering is a four-year undergraduate program leading to the degree of Bachelor of Science. Graduate programs leading to the degrees of Master of Science, Doctor of Philosophy, Master of Engineering, and Doctor of Engineering are available also.

### ADMISSION

As a general rule the Colleges of Engineering in the University will admit students only as beginning freshmen or in advanced standing at the junior or senior level. All applicants must satisfy the general requirements for admission to the University (see pages 16-29) and must take an engineering examination (see page 104). Students who attend a California junior college or other educational institution for one semester to make up high school subject deficiencies or prerequisites for the beginning engineering courses at the University will be considered for admission in freshman standing.

It is important that high school students who plan to study engineering at the University include the following subjects in their high school programs:

<i>Subject</i>	<i>Units</i>
Algebra†	2
Plane geometry†	1
Trigonometry†	$\frac{1}{2}$
Chemistry or physics (both are desirable)	1
Mechanical drawing	1

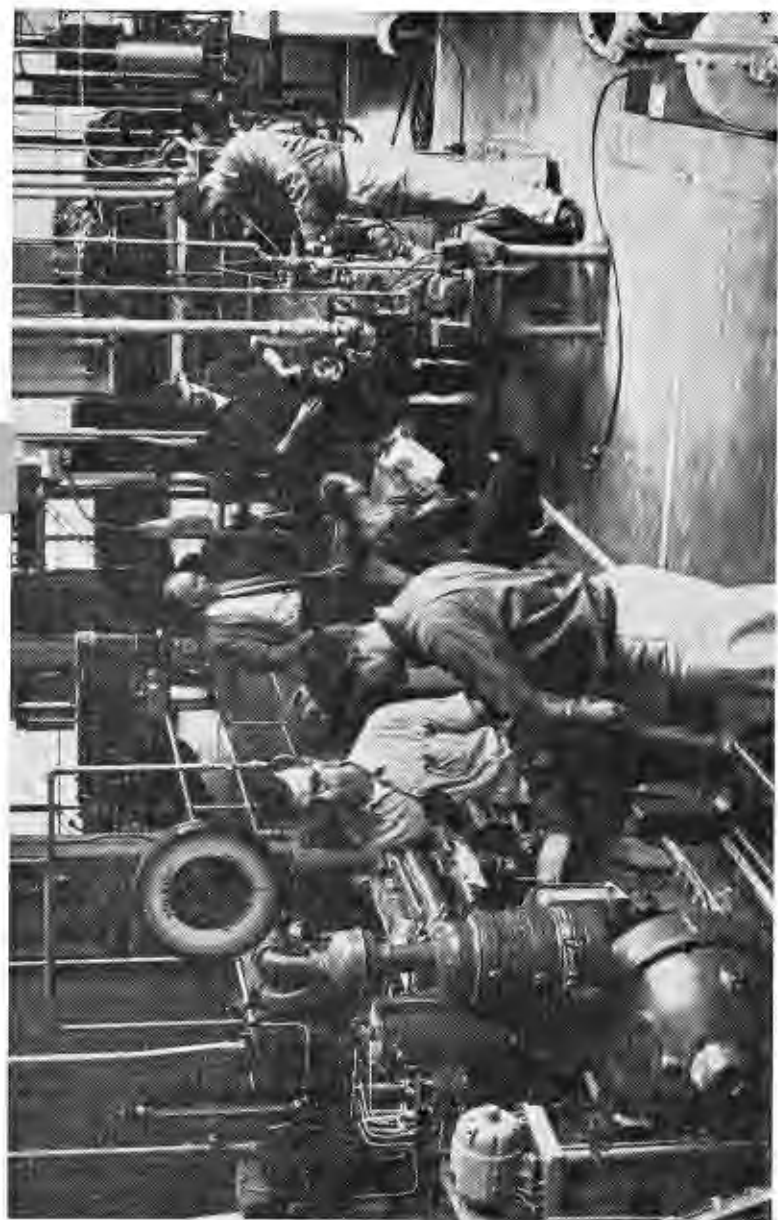
These subjects are prerequisite to certain basic courses in the freshman engineering program. A student who is admitted without all of this preparation will be required to make up equivalent work while in college. As a result, the student probably will be delayed in advancement to upper division status and in graduation.

The last dates for filing applications for admission to the University by students desiring to enroll in the College of Engineering are indicated on page 6 in the Calendar.

*Upper Division Status.*—Students who are admitted to the College of Engineering in lower division status will be advanced to upper division status only after they have completed the lower division program with satisfactory grades and have achieved a satisfactory score on the Upper Division Engineering Examination (taken in the last semester of the sophomore year). Students in the College of Engineering are not permitted to enroll in upper division engineering courses until they have been advanced to upper division status. Students admitted to the University in advanced standing, including those transferring from the California junior colleges or other educational institutions, will be advanced to upper division status in engineering at the time of admission provided they have completed the following minimum lower division subject and unit requirements and have achieved a satisfactory score on the Upper Division Engineering Examination:

\* The Department of Engineering at Davis established in 1959 is part of the College of Engineering, Berkeley.

† Or equivalent integrated courses covering the same subject material.



Power laboratory

<i>Subject</i>	<i>Units</i>
Mathematics .....	12
(including differential and integral calculus, and elements of differential equations)	
Chemistry .....	8
Physics .....	10
Nontechnical subjects* .....	6
Engineering† .....	10
(surveying or engineering measurements, graphics, properties of materials, statics)	
Unspecified subjects .....	10

(Three units may be nontechnical; the remainder are to be in technical and scientific subjects. They may include units, in addition to the number listed, in mathematics, chemistry, physics, and engineering. The student should select these subjects to satisfy the added lower division requirements of the curriculum which he wishes to enter at the University of California. Failure to meet these added specific requirements will not prevent his entrance at the junior level, but he may have to make up any deficiencies in these requirements during the junior year.)

Total 56

*Engineering Examinations.*—There are two engineering examinations. The Lower Division Engineering Examination is required of all applicants for admission to the College of Engineering prior to the junior year. This examination is an aptitude test and includes sections on technical vocabulary, mathematical reasoning, and scientific relationships. The Upper Division Engineering Examination must be passed satisfactorily by all continuing students prior to beginning the work of the junior year and by all upper division applicants prior to admission to the College of Engineering. This examination is an achievement test and includes sections on English, mathematics, chemistry, physics, and lower division engineering subjects. The examinations are the same as those required for admission to the College of Engineering at Berkeley or Los Angeles.

A list of the places and times for the examinations may be obtained from the Office of Admissions at Berkeley, Davis, or Los Angeles. Application blanks for these examinations should be obtained by the prospective student early in the semester previous to that in which he plans to enroll in the University. Both examinations will be given at Davis in November, 1960, and April, 1961 (see Calendar, page 6). A fee of \$5 is charged for the Upper Division Examination if taken with a group of three or more persons at a regularly scheduled time and location; otherwise the fee is \$10. There is no fee for the Lower Division Engineering Examination.

### REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

The degree of Bachelor of Science in the College of Engineering is awarded to those candidates who:

1. Satisfy the general University requirements in regard to Subject A, American History and Institutions, Military Science, and scholarship.
2. Satisfy the senior residence requirement. Students in the College of Engineering are required to take the final 30 units of work in residence in the College of Engineering, rather than the minimum required by the University.

\* Exclusive of military science, physical education, Subject A, or any course equivalent to matriculation subjects.

† Must include some units in each of the four subject areas indicated.

3. Satisfactorily complete the subjects and units prescribed in one of the engineering curricula.
4. Satisfy the requirement in English (see page 107).
5. Attain a grade C average in all courses of upper division level taken in satisfaction of technical subject requirements and technical electives in the program of study.

*Honors with the Bachelor's Degree.*—Upon the recommendation of the Committee on Graduation Matters, a student may receive honors with the bachelor's degree for outstanding scholarship in all work undertaken after admission to the upper division. A student who, in the judgment of the committee, displays marked superiority may be recommended for the special distinction of highest honors.

### FACULTY ADVISERS AND STUDY-LIST REQUIREMENTS

Upon admission to the College, each student is assigned to a faculty adviser and is under the guidance of the Assistant Dean of the College of Engineering and the Committee on Undergraduate Study. All study programs are arranged in conference with the adviser and must be approved by him. However, *the student is held responsible for planning his program and for the satisfactory completion of graduation requirements.* Questions regarding irregularities should be discussed with the adviser and settled at the earliest possible date.

A student who gives full time to University responsibilities is expected to enroll for the number of units required in his program of study. Students may not enroll for more than 19 units or less than 12 units without special approval by the Assistant Dean of the College of Engineering.

### CURRICULUM IN ENGINEERING, DAVIS

The curriculum in engineering on the Davis campus is concerned with the engineering phases of agricultural power and machinery, processing, and structures; food processing; and irrigation, drainage, and water resources. Graduates of this curriculum find employment with farm equipment manufacturers and in other industries related to agriculture; as teachers and research workers with state colleges and universities; in engineering or administrative positions with local, state, and federal agencies, including public utilities, irrigation districts, the United States Department of Agriculture, the Soil Conservation Service, the Bureau of Reclamation, and others; with government agencies and private enterprises in foreign countries; in the food and biochemical industries; and in farming and other agricultural enterprises involving a high degree of mechanization or the planning and managing of complex irrigation systems.

This curriculum is offered jointly by the College of Engineering, Berkeley, and the College of Agriculture, Davis. Currently, the freshman, sophomore, and senior years are available at Davis but the junior year must be taken at Berkeley. All four years will be available at Davis in 1961–1962.

The lower division program is essentially the same as that prescribed on the Berkeley campus for all engineering curricula. Its purpose is to provide the beginning student with the fundamentals in science, mathematics, and engineering which are essential as preparation for the professional studies of the upper division at Berkeley, Davis, or Los Angeles. The upper division program provides a basic education in the field of engineering with emphasis on agricultural applications. The curriculum has sufficient flexibility to accommodate students desiring an education in the broad, general field of engineering as applied to agriculture or in the specialized areas or interest described in the following paragraphs.

*Agricultural power and machinery* treats traction and stationary power units (internal combustion and electric), and field equipment used in crop production and related activities. The design and economic aspects of power and machinery units and the relationships of these units to soils and crops are considered. This area treats the basic procedures appropriate to the design and development of engineering systems and their integration into the over-all agricultural enterprise.

*Agricultural processing* deals with the transformation of raw agricultural products into different, more usable, or more valuable products, usually at the farm level. The basic aspects of drying, sorting, cleaning, handling, storage, size reduction, and heat and energy transfer, as well as the biological characteristics of the materials, are considered in the design of processing systems.

*Agricultural structures* considers the structure as a part of the over-all agricultural enterprise and is concerned with space and labor utilization and the economic value of the structure to the enterprise, as well as basic design features. The structure is also considered as a device for providing the optimum environment for certain agricultural enterprises such as animal production, product storage and conditioning, and crop production in greenhouses. Thus, the biological aspects and the various meteorological factors are recognized in the basic analysis and design of structures.

*Food processing* at the plant level includes activities such as canning, freezing, dehydration, and fermentation. These processes involve essentially all the operations of chemical processing, as well as some unique problems in microbiology and biochemistry. In addition to providing a strong engineering foundation, the program of study in this area includes extensive work in chemistry, biochemistry, and bacteriology. The program is planned particularly to meet the needs of those who will be engaged in process research and development, process design, and plant operation phases of the food and other biochemical industries.

*Irrigation, drainage, and water resources* concerns hydraulics, surface and ground water hydrology, structures and systems analysis, and soils and plants in relation to the development, utilization, and disposition of water resources. Emphasis is placed on planning, functional design, construction, and operation of irrigation and drainage systems as affected by the problems of agricultural production. Consideration is also given to water supply, water rights, water utilization and management, land preparation, and plant-soil-water relations.

### PROGRAM OF STUDY

134 Units

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A-*1B	5	5	Engineering 45, 35	3	3
Engineering 25, 10	4	3	Mathematics 14, 114	5	5
Mathematics 3A-3B	3	3	Physics 4B, 4C	4	4
Physics 4A	4	4	Nontechnical studies†	3	3
Nontechnical studies	3	..	Military Science	2	2
Military Science	2	2			
	17	17		17	17

\* Students interested in agricultural power and machinery, processing, and structures are encouraged to substitute for Chemistry 1B the following: Chemistry 8 (3 units) and at least 2 additional units of technical electives (Agronomy 1 or Soil Science 1 is suggested).

† It is recommended that students interested in irrigation, drainage, and water resources take Soil Science 1 or Irrigation 10 in the lower division as part of the technical electives requirement, deferring 3 units of nontechnical studies to the upper division.

JUNIOR YEAR†			SENIOR YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Engineering 100A-§100B.	4	4	Engineering 120 .....	3	3
Engineering 102, 103 ....	3	3	Engineering 190 .....	1	1
Engineering 105A-§105B.	3	3	Nontechnical studies .....	3	3
Engineering 130, 111 ....	4	..	Technical electives .....	14	9
Nontechnical studies .....	..	3			
Technical electives .....	3	3			
	17	16		17	16

*Requirement in English.*—Proficiency in written English is a requirement of the College of Engineering. Any student who does not receive a satisfactory score on the English portion of the Upper Division Engineering Examination, or whose instructors report that his use of English in subsequent course work is unsatisfactory, will be required to take remedial work in English composition. This supplementary course work will be assigned by the Assistant Dean of the College of Engineering and will be in addition to the normal program of study.

*Nontechnical Studies.*—This curriculum, in conformance with the general policies of the Colleges of Engineering, includes 18 units of study in the humanities and social sciences (exclusive of military science, physical education, Subject A, and any matriculation subjects). These nontechnical studies are intended to help the student gain an understanding and appreciation of the importance of human relations in our society. At least 6 units must be completed while the student is in the lower division and at least 9 units of upper division courses must be completed after the student has been advanced to upper division status in the College of Engineering. The nontechnical courses must be chosen from at least two of the following groups:

1. English and speech.
2. Foreign languages.
3. Business administration, economics, political science.
4. Anthropology, history, sociology and social institutions, psychology.
5. Life and natural sciences.
6. Fine arts and philosophy.

*Technical Electives.*—A minimum of 24 units of the technical electives must be devoted to an organized program of engineering study selected by the student with the approval of his adviser. These technical electives must be selected to provide at least 9 units in engineering courses (including 3 units of engineering design) and 3 units of agricultural or biological science. Suggested electives for the areas of specialization are as follows:

*Agricultural power and machinery, processing, and structures:* Agronomy 1 (or equal) or Soil Science 1; Engineering 112, 114, 115, 177; Engineering 106A or 131; one or more from Engineering 110, 116, 118, 151.

*Food processing:* Bacteriology 1; Biochemistry 101; Chemistry 8, 9, 110A, 110B; Engineering 151, 154, 154L; a course in food science and technology or an additional course in bacteriology.

*Irrigation, drainage, and water resources:* Engineering 121, 131, 135, 171, 175, 177, 185, 189; Soil Science 1 or Irrigation 10; Irrigation 100, 160, 170.

The student who wishes to combine two or more areas of interest or include other approved technical electives may arrange a suitable program with

† Students planning to take their junior year in 1960-1961 should consult the ANNOUNCEMENT OF THE COLLEGES OF ENGINEERING for corresponding junior course listings at Berkeley.

§ Students interested in irrigation, drainage, and water resources may substitute other technical electives for Engineering 100B and 105B.

the assistance of his adviser. Students who expect to undertake graduate study should elect additional courses in mathematics, the sciences, and basic engineering as early as possible in their undergraduate program. The student's entire upper division program should be planned, at least tentatively, early in the junior year. Careful attention should be given to course sequences so that prerequisites can be met.

#### **GRADUATE STUDY**

Students who are qualified scholastically and who expect to engage in teaching, research, or analytical design during their professional careers are encouraged to undertake graduate work. For admission and program requirements, consult the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION.

## COLLEGE OF LETTERS AND SCIENCE

THE COLLEGE OF LETTERS AND SCIENCE offers curricula which enable the student to pursue fundamental knowledge primarily for its own sake and to learn basic intellectual disciplines whereby he becomes aware of man's achievements, responsibilities, and environment. Such a liberal education is not without vocational value, since various worth-while career opportunities are open to letters and science graduates, but the emphasis is more upon the ends of living rather than the means. With a well-balanced cultural education including specialized knowledge in his major field, the graduate is prepared for a satisfying life whatever his chosen career.

To safeguard the liberal character of its instruction, each College of Letters and Science on the several campuses of the University publishes annually a Letters and Science List of Courses based on essentially uniform criteria of acceptability. The list for the Davis campus is somewhat distinctive in that it includes certain courses offered by the College of Agriculture (including Home Economics) and the School of Veterinary Medicine. (See pages 99-100.)

*The graduation requirements for the College of Letters and Science have recently been revised. The information given below refers to the new regulations. Students who are continuing under the old requirements, that is, those who entered previous to the fall semester, 1958, and who wish to graduate under the rules in effect at the time of their entrance, will need to consult the GENERAL CATALOGUE, DAVIS, 1958-1959, for a detailed listing of the old requirements. Pre-1958 students will be permitted to graduate under the new plan, however, provided they meet all the requirements; but no student will be allowed to combine plans.*

The College, in order to achieve its educational objectives, prescribes a breadth requirement and a major requirement. The breadth requirement is designed to provide a background of general information and culture. The major requirement enables the student to gain further intellectual depth and additional competence in his chosen field. Detailed information regarding these requirements is presented below.

The College offers the undergraduate degrees of Bachelor of Arts and Bachelor of Science. These degrees are conferred upon the completion of the general University and College requirements detailed below. They serve as a foundation for graduate studies leading toward graduate degrees, and toward teaching credentials obtainable on the Davis campus or elsewhere.

### FACULTY ADVISERS AND STUDY-LIST REGULATIONS

At registration every undergraduate student will report to a faculty adviser, by whom his study list must be approved. A special adviser is provided for each student who contemplates a major not offered on the Davis campus. The study list may total 12 units or more a semester without special permission in respect to quantity of work; but the maximum is 16 units for a freshman and for a transfer student in his first semester of residence at this University. Any request to take fewer than 12 units must be approved by the Dean of the College.

In addition to these study-list limits, two lower division courses in physical education, with degree credit totaling not more than 1 unit, may be included in a student's program in any semester or session. Not more than 4 units of credit in physical education activity courses (Physical Education 1 and 26) may be counted toward graduation.

A student should designate his major program as early as possible, but not later than the beginning of his junior year. As soon as he has designated it,



and has been accepted to pursue it, he will be assigned to a major adviser for that program.

The major may be changed only by permission of the Dean of the College and of the department to which the student petitions to transfer. When the change has been authorized, the Registrar will notify the departments concerned.

Candidates for a degree must attain at least a grade C average in upper division courses required for the major program, together with a grade C average for all courses required in the major program. Students who fail to attain an average of two grade points for each unit of work undertaken in a department may, at the option of the department, be denied the privilege of pursuing a major program in that department. A similar option may be exercised by committees in charge of interdepartmental and individual group majors.

No student is permitted to transfer from one major program to another after the start of the senior year, or to elect an individual group major after the third week of the third semester before graduation.

A student in his sophomore year who has been accepted to pursue a major program may, with the approval of his adviser, enroll in upper division courses required for that program provided he has completed the prerequisites for such courses.

Students who are admitted to senior standing in the College of Letters and Science (Davis) on the basis of credit from other institutions, or other Colleges within the University of California, must complete in residence at the University of California (Davis), subsequent to such admissions, 24 units of which at least 18 units of work are in upper division courses, including at least 12 units in their major program. Certain exceptions may be made in this requirement for any student in this category who enters immediately after a period of active service in the armed forces.

Only the following courses may be counted in satisfaction of a major program: (1) courses in resident instruction at the University of California or at another university (this includes summer session courses); (2) with the written permission of the Dean, courses in University Extension, University of California, with numbers having the prefix X, XB, or XL. Students who desire to satisfy the specific subject requirements for the degree of Bachelor of Arts or Bachelor of Science in the Summer Sessions or in University Extension, University of California, may use only those courses which are equivalent in subject matter and unit credit to courses offered in fall and spring sessions, listed as acceptable in meeting requirements for those degrees. No grade points are assigned for courses taken in University Extension.

*Status of Courses in Professional Curricula.*—The first year of certain designated professional curricula (for example, in the School of Medicine) is accepted as a year's work toward the A.B. degree. If this substitute is offered for a major in Letters and Science, all the courses required or included as part of the student's program in that curriculum become requirements for the degree.

### THE BACHELOR OF ARTS DEGREE

The Bachelor of Arts degree will be granted upon the completion of the following requirements:

(A) *Unit Requirement.*—The candidate must complete at least 120 units, of which 108 must be in courses chosen from the Letters and Science List of Courses, including 36 units in upper division courses. Not more than 6 units in the 300 and 400 courses nor, except for honor students, more than 30 units in the upper division courses of any one department will be counted toward the A.B. degree. Not more than 66 units of transfer credit will be counted toward the degree for students transferring from junior colleges. A 2.0 grade-point average is required for all work undertaken.

(B) *General University Requirements.*—The candidate must satisfy the general University requirements: Subject A; Military Science and Tactics, 8 units, 4 semesters (men); American History and Institutions.

(C) *Mathematics Requirement.*—The candidate must satisfactorily demonstrate his ability to use arithmetic, elementary algebra, and elementary plane geometry. He must (1) pass an examination in these subjects or (2) satisfactorily complete a university course in mathematics. The candidate will normally meet this requirement at or immediately following the time of his first registration and, except in the case of transfer students, must fulfill it by the end of the sophomore year.

(D) *Breadth requirements.*—The candidate must satisfy the following breadth requirements, and no course offered by him in partial satisfaction of any one of these may be applied toward the satisfaction of any other:

(a) *English Reading and Composition.*—The candidate must complete, normally in his freshman year, English 1A–1B. A student admitted to the College with advanced standing will be required to complete such a course unless his transcript indicates the previous completion of equivalent college level work.

(b) *Foreign Language.*—The candidate must complete, normally before the beginning of his junior year, the equivalent of 12 units in one foreign language, that is, course 3. A student who can present (by petition to the Dean) a valid reason for fulfilling this requirement in more than one language may be authorized to offer the equivalent of 8 units in each of two languages instead of 12 units in one language. A student electing to satisfy this requirement in a language previously studied in high school will be required to take, after his admission to the College, a placement examination, his achievement in which will determine the amount of additional course work, if any, he will be required to take in order to satisfy this requirement in that language.

(c) *Humanities, Social Science, and Natural Science.*—The candidate must complete 12 units in each of the following fields: (1) humanities, (2) social science, and (3) natural science. The requirement in natural science must include at least one course of not less than 3 units in a biological science and at least one course of not less than 3 units in a physical science; and must include at least one laboratory science course which either requires more than one unit of laboratory or has as its prerequisite a course requiring at least one unit of laboratory. The requirement of a laboratory science course will, however, be waived for any student who has had an advanced (eleventh or twelfth grade) high school year course with laboratory in chemistry, physics, or biology; but this waiver will not reduce the requirement of 12 units in college courses in natural science.

The requirements may be fulfilled by courses chosen from the following list:

#### BIOLOGICAL SCIENCES

Animal Husbandry 107

Anthropology 1

Bacteriology 1

Botany 1\*, 105, 108, 114, 116, 130

Entomology 1\*, 106, 112

Genetics 100, 100C, 103

Paleontology 111

Physiology 1, 11L\*

Pomology 110

Psychology 108, 150

Zoology 1A\*, 1B, 10, 25, 100, 106, 110, 112, 116, 133, 134, 140

\* Satisfy the laboratory science requirement.

## PHYSICAL SCIENCES

Chemistry 1A\*, 1B, 8

Geography 1, 3

Geology 2, 2L, 3, 3L

Mathematics 3A or 16A, 3B or 16B, 4A, 13, 36, 105

Mineralogy 6\*

Physics 2A, 2B, 3A†, 3B†, 4A, 4B\* 4C\*

## SOCIAL SCIENCES

Agricultural Economics 18, 120, 125

Anthropology 2, 102, 105, 110A-110B, 139

American Civilization 196 (not recommended for science students)

Economics 1A-1B, 100A-100B, 101, 110, 116, 121, 130A-130B, 133, 135, 190

Education 110

Geography 2, 100, 121, 123, 141, 143

‡History 17A-17B, 132, 136, 137, 145, 146, 151A-151B, 161A-161B, 174A-174B, 176A-176B, 179, 187A-187B, 188A-188B, 189A-189B

Home Economics 131, 136, 137

‡Political Science 1A-1B, 2, 3, 102A, 103, 105, 113, 124, 128A-128B, 144, 157A-157B, 161, 162, 163, 166, 181, 182

Psychology 1A-1B, 33, 130, 131, 145, 147, 168

Sociology 1, 2, 3, 120, 123, 126, 144, 150

## HUMANITIES

Art 1A, 1B, 1C, 1D, 2A, 10, 107, 119A-119B, 129, 154, 178, 183A-183B; §Art 2B, 3A-3B, 14A-14B, 101A-101B, 102A-102B

Dramatic Art 10A-10B, 20, 150, 158A-158B, 159, 160; §Dramatic Art 128, 190

English 30, 45, 46A-46B, 106G, 110, 114A, 116, 117J, 119, 125C, 125D, 125E, 137A-137B, 144A-144B, 147, 149, 151, 155, 158A-158B, 166, 177, 187, 191

French 109A-109B, 117, 118A-118B, 119A-119B, 122

German 100, 102, 103A-103B, 104, 109, 114, 118A-118B

||History 4A-4B, 131, 178A-178B

Music 4A-4B, 5A-5B, 27A-27B, 121A-121B, 122, 127A-127B, 128; §Music 41, 43, 44, 46A-46B, 108, 141, 143, 144

Philosophy 6A-6B, 11, 12A, 20A-20B, 103, 104, 105, 111, 112, 116, 117, 124, 135A-135B, 136C

||Political Science 118

Spanish 104A-104B, 105, 106A-106B, 108, 109, 111

Speech 1A-1B, 2A, 101, 102, 117, 130, 140; §Speech 141

Additions and deletions made subsequent to the publication of this list will be in the hands of the advisers.

(E) *The Major Requirement.*—The candidate must complete a major program which is a planned effort to explore a subject systematically, to assure that all students pursuing the major program acquire certain knowledge in common, and to encourage the student in independent study. Each major program must include not less than 30 nor more than 60 units, and must include at least 24 units in upper division courses. The types of major programs are the following:

(a) *Departmental Major.*—Departmental major programs consist of not less than 24 nor more than 30 units of upper division courses, together with

\* Satisfy the laboratory science requirement.

† The sequence Physics 3A-3B will satisfy the laboratory science requirement.

‡ Any combination of courses in history and political science used to satisfy the American History and Institutions requirement shall be counted as *three* units of social science and *three* units of humanities toward the breadth requirement.

§ A total of 4 units only of these courses may be counted toward the breadth requirement.

|| On American History and Institutions, see Social Sciences.

such lower division courses as the department deems necessary for a co-ordinated program. A department may prescribe comprehensive examinations for students majoring in that department, and unit credit may be given for passing the examination. Such unit credit will not, however, count toward the 24 units required in upper division courses.

(b) *Interdepartmental Major*.—Interdepartmental major programs are programs established by two or more departments. Such programs involving courses in three or more departments may require a maximum of 36 units in upper division courses.

(c) *Individual Group Major*.—Individual group majors may be established on petition of individual students. Where such programs involve courses in three or more departments, a maximum of 36 units in upper division courses may be required.

### THE BACHELOR OF SCIENCE DEGREE

The Bachelor of Science degree will be granted upon the completion of the following requirements:

(A) *Unit Requirement*.—The candidate must complete not less than 120 units, of which 108 must be in courses chosen from the College of Letters and Science List of Courses (see page 99), including not less than 36 units in upper division courses. The candidate must also complete not less than 60 units in natural science and numbered mathematics courses. Not more than 66 units of transfer credit will be counted toward the degree for students transferring from junior colleges. A 2.0 grade-point average is required for all work undertaken.

(B) *General University Requirements*.—The candidate must satisfy the general University requirements: Subject A; Military Science and Tactics, 8 units, 4 semesters (men); American History and Institutions.

(C) *English Requirement*.—The candidate must complete English 1A-1B.

(D) *Foreign Language Requirements*.—The candidate must complete course 3 of a foreign language or 8 units of one foreign language taken in college.

(E) *Humanities and Social Science Requirement*.—The candidate must complete 15 units of work chosen from the courses in these fields listed under the A.B. degree requirements above.

(F) *Mathematics Requirement*.—The candidate must satisfactorily demonstrate his ability to use arithmetic, elementary algebra, and elementary plane geometry. He must (1) pass an examination in these subjects or (2) satisfactorily complete a university course in mathematics. The candidate will normally meet this requirement at or immediately following the time of his first registration and, except in the case of transfer students, must fulfill it by the end of the sophomore year.

(G) *Major Requirement*.—The candidate must complete a departmental, an interdepartmental, or an individual group major program.

### ORGANIZED MAJORS AND PROFESSIONAL CURRICULA

To fulfill the major requirement for a degree, a student may select one of the organized programs listed below. It is possible to prepare other suitable programs. A student may therefore present a plan for a major program to the Executive Committee of the College. If the plan is approved, the committee will designate a member of the faculty to take charge of the student's special major and to approve his study lists and the completion of the major.

x Anthropology

x International Relations

To facilitate intercampus relations, the Dean of the College is authorized to designate a major, entitled "General Major" for those students enrolled on this campus for one semester only, and who are to graduate from another campus of the University. This will enable intercampus transfers to be resident here for one semester and continue with majors not as yet organized on this campus.

Departmental programs are described in detail under Courses of Instruction beginning on page 122.

### *Geological Sciences*

American Civilization	Geology	Physics
Art	German	Political Science
Biological Sciences	History	Premedical Curriculum (see Medical Science)
Botany	Mathematics	Psychology
Chemistry	Medical Sciences	Sociology
Dramatic Art and Speech	Microbiology	Spanish
Economics	Music	Zoology
English	Philosophy	
French	Physical Education	
	Physical Sciences	

Preprofessional training is offered in Pre dental Science (2 years), in Pre-medical (3 years), in Prenursing (2 years), in Prepharmacy (2 years), in Prephysical Therapy (2 years), and in Presocial Welfare.

Students who are interested in obtaining teaching credentials are referred to pages 116-121 of this bulletin.

### **American Civilization**

*Chairman and Adviser:* Mr. W. Turrentine Jackson.

The American civilization program is designed to give the students an understanding of their own civilization as a living culture. To this end they are directed to investigate its origin; its development; its economic, political, and social institutions; its philosophy; and its intellectual, scientific, and artistic achievements.

The program incorporates the course requirements of a social science major for the general secondary teaching credential; and with proper selection of electives, the course requirements of a teaching minor in English.

#### *The Major Program*

(A) Lower Division Courses.—No lower division courses are required in addition to those necessary to fulfill the breadth requirements of the College of Letters and Science. Students are advised to select courses, especially History 4A-4B, from the lower division sequences in the humanities and social sciences. Selection should be made in consultation with the adviser to make certain that the prerequisites for upper division courses have been fulfilled.

(B) Upper Division Courses.—The candidate must complete 36 upper division units, 24 of which must be selected from the courses listed below with a minimum of 6 units in each of the three groups:

- Group 1: Art 119B. The Art of the United States.  
Dramatic Art 150. American Drama.  
English 125E. The American Novel.  
English 137A-137B. Survey of American Literature.  
Music 128. Musical Literature: Music in the United States.  
Philosophy 135A. Contemporary Tendencies: British American.

- Group 2: Economics 110. Economic History.  
History 174A-174B. Recent History of the United States.

History 176A-176B. Social and Cultural History of the United States.

History 178A-178B. Great Issues in United States History.

History 179. Economic Growth of the United States.

History 180. The Westward Movement to 1850.

History 183. The Trans-Mississippi Frontier.

Group 3: Economics 121. Industrial Organization.

Economics 150. Labor Economics.

Geography 121. Geography of Anglo-America.

Political Science 113. American Political Theory.

Political Science 128A. Recent American Foreign Policy.

Political Science 157A-157B. American Constitutional Law.

Political Science 163. Political Parties.

Political Science 166. Public Policy and the Governmental Process.

Sociology 123. American Society.

The balance of 12 units may be selected in consultation with the adviser either from this list or from courses outside the list as they may seem appropriate. American Civilization 196, the Role of Natural Science in American Civilization, may count toward the 24 units but may not substitute for any part of the 6-unit minimum in each group.

#### *The Honors Program*

In addition to the basic 24 units described above, the student will complete the major requirements by taking American Civilization 194H once in the junior year and once in the senior year, American Civilization 197 in the last semester of the senior year, and an elective of his choice.

*American Civilization 194H.*—Special Study for Honor Students is designed to permit supplementary or advanced study with a member of the faculty. During the last semester of the senior year students will read in preparation for a comprehensive examination in American studies under the supervision of a faculty committee. The graduating student will register in American Civilization 197 for this purpose.

For additional information see page 133.

#### **Biological Sciences**

*Major Advisers:* Mr. M. Miller and Mr. T. Weier.

This program is designed for students desiring a basic understanding of the living world together with some specialized knowledge of both the animal and plant kingdoms. It features a balanced distribution of preparatory and advanced courses in botany, zoology, and related fields, and provides a wider coverage of the biological sciences than is possible with a departmental major in any one of them.

A biological sciences major may serve as a basis for graduate study leading to advanced degrees preparatory for academic and professional careers in teaching, research, or practice of medicine, dentistry, and associated fields. It incorporates most of the course requirements of the life science major for the general secondary teaching credential. A choice of two major programs is offered leading either to the A.B. or to the B.S. degree in biological sciences (see below). The latter is suggested for students with professional orientation, whereas the traditional A.B. degree is recommended for the general student.

#### *Bachelor of Arts Major Program*

(A) Lower Division Courses.—Required: Botany 1; Zoology 1A-1B; Chemistry 1A, 1B or 8; and an introductory course in entomology or bacteriology. Recommended: introductory courses in other life sciences; Geography 1A; Geology 2-2L; Mathematics 13; Physics 2A-2B, 3A-3B.

(B) Upper Division Courses.—Twenty-four units of upper division work in botany, zoology, and closely related fields taken in accordance with a plan approved by the major advisers. The program must include a course dealing with invertebrate animals, one with the vertebrates, a course in systematic botany, a course in plant morphology, and one course, either botanical or zoological, in each of the following fields: microtechnique, genetics, and/or evolution, and physiology.

#### *Bachelor of Science Major Program*

(A) Lower Division Courses.—Required: Botany 1; Zoology 1A-1B; Chemistry 1A, 1B or 8; Bacteriology 1; Physics 2A-2B, 3A-3B. Recommended: introductory courses in other natural science and mathematics courses, such as Anthropology 1; Entomology 1; Geography 1, 3; Geology 2-2L, 3-3L; Mathematics 13; Psychology 1A-1B.

(B) Upper Division Courses.—Thirty units in biological sciences, including at least one course in each of the following four categories: (1) plant morphology and taxonomy; (2) animal morphology and taxonomy; (3) physiology (plant or animal); (4) genetics and/or evolution. Not less than two courses in botany and two in zoology will be required. To complete the 30-unit requirement, the student may elect additional upper division courses in the above-mentioned groups and/or in other biological fields, such as microanatomy and cytology, embryology, comparative anatomy, biochemistry, ecology, paleontology, and microtechnique.

#### *The Honors Program*

Students on the honor list may enroll in an Honors Program of courses leading to honors with either bachelor's degree (see page 101). The program features two options: (1) 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, or (2) a comprehensive examination on completion of a special study course (197H).

For further information see page 107.

#### **Medical Sciences**

The requirements of the first year of the School of Medicine are accepted as fulfilling the major requirement, and the senior year of the College.

*Adviser:* Mr. M. Hildebrand.

*Preparation for the Major.*—The premedical curriculum outlined on page 97.

*The Major.*—Anatomy 101, 105; Biochemistry 101M; Physiology 101M.

#### **Physical Sciences**

*Chairman and Major Adviser:* Mr. H. Reiber.

*Major in Physical Sciences.*—This major 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. The requirements for the Bachelor of Arts or Bachelor of Science degree may be satisfied.

#### *The Major Program*

(A) Lower Division Courses.—Required: Chemistry 1A-1B, 5; Physics 4A, 4B, 4C; Mathematics 16A-16B.

(B) Upper Division Courses.—Twenty-four units of upper division work in chemistry, physics, and allied subjects taken in accordance with a plan approved by the major adviser. These must include Chemistry 8, 9, 109, or their equivalent, and a minimum of 6 upper division units in physics.

All units in chemistry in excess of 13 are counted as upper division units.



**Individual Group Majors**

A student desiring to elect other than an established departmental or inter-departmental major or a professional curriculum may petition for an individual group major adapted to his particular interests. The petition must be presented to the Dean for submission to the Executive Committee of the College for approval *not later* than the third week of the third semester before graduation. To insure proper breadth and depth, an individual group major involving two departments must consist of not less than 24 upper division units nor more than 30. Where three or more fields are involved in the individual group major program, the Executive Committee, at its discretion, may require a maximum of 36 upper division units in the major program. This plan should be prepared in consultation with a member of the department in which the student will do most of his work. It should describe the special educational aims of the major and indicate that it meets the University standards with respect to majors. On approval of the plan, an appropriate adviser will be designated to supervise the major program.

**PREPROFESSIONAL CURRICULA****School of Dentistry**

The School of Dentistry in San Francisco offers two curricula leading to the degree of Bachelor of Science and to the degree of Doctor of Dental Surgery. The student has the option, at the close of the second semester in the School of Dentistry, of registering in either one of two major curricula: (1) restorative dentistry, or (2) preventive dentistry. At the end of the sophomore year (fourth semester) a selected small group of students may enter the Honors Curriculum, which is designed to train outstanding students in the fields of dental research and teaching. In addition to these, there is a curriculum for the training of dental hygienists, leading to the degree of Bachelor of Science.

Classes are admitted to the School of Dentistry once a year, in September. Applications for admission in September, 1961, may be filed between January 1, 1960, and December 31, 1960. For further information write to the office of the Dean of the School of Dentistry.

Upon the satisfactory completion of six semesters of work the dental student will be eligible for the Bachelor of Science degree, and for the Doctor of Dental Surgery degree upon the completion of two additional semesters. The Bachelor of Science degree will be granted the student in the dental hygiene curriculum at the end of the fourth semester.

The dental student who wishes to qualify for the degree of Bachelor of Science in addition to the degree of Doctor of Dental Surgery must complete satisfactorily a special project and thesis in the field of his major interest under the supervision of a faculty committee, and receive passing grades in 4 units of special instruction selected by the committee.

**Admission to Dental Curricula**

All applicants for admission to the dental curricula must have completed at least 60 units of college work with a scholarship average satisfactory to the Admissions Committee, including the requirements (2)-(5) listed below. Students who have attended the University of California must have a grade C average or better in work undertaken in the University. In addition, all applicants must take a performance test, designed to test manual dexterity. This test is given on the San Francisco campus immediately following the end of the spring semester and during the Christmas recess and during the period between the fall and spring semesters. One test will be given in the Los Angeles area at a time and place to be announced. The dental aptitude test of the American Dental Association is also a requirement for admission. This test is usually given in October, January, and April. Applicants for admission

to the School of Dentistry must take one of the first two tests. For further information regarding this test, write to the Dean's office, Room 630 Medical Sciences Building, University of California, San Francisco Medical Center, San Francisco 22.

The School of Dentistry reserves the right to limit enrollment on the basis of scholarship, results of the performance and aptitude tests, recommendations, and interviews. At the present time, because of limited facilities and the large number of applications, it is not possible for the School of Dentistry to act favorably upon applications from persons who have not had the major portion of their high school and preprofessional education and residence in California or in one of the far western states. Exception to this is made only in cases of persons who are over 21 years of age and who have been residents of the state of California for over one year. Students from the far western states without dental schools who are interested in certification for education benefits under the Western Interstate Commission for Higher Education program may write to the Dean of the School of Dentistry for a pamphlet describing the program.

The student will find himself more adequately prepared for the dental curricula if he has taken in high school the following subjects: English, 3 units; history, 1 unit; mathematics, 3 units (algebra, plane geometry, and trigonometry); chemistry, 1 unit; physics, 1 unit; foreign language, 4 units in one language. Students who do not complete trigonometry and 4 units of foreign language in high school may find that they will need more than two years to complete their pre dental requirements at the college level.

#### Predental Curriculum

Adviser: Mr. R. L. Rudd.

#### REQUIREMENTS FOR FIRST AND SECOND YEARS

- (1) General University requirements.  
Subject A (see page 39).  
Military Science and Tactics (men)..... 8 units  
The requirements of American History and Institutions is prerequisite to the bachelor's degree. Although this requirement may be satisfied while enrolled in the School of Dentistry, it is preferable that it be completed in the predental program.
- (2) English or Speech (1A-1B)..... 6 units
- (3) Science ..... 28-32 units
  - (a) Chemistry  
Inorganic (1A-1B) ..... 10 units  
Organic lecture (8) ..... 3 units  
Organic laboratory (9) or quantitative analysis (5)..... 3 units
  - (b) Physics with laboratory (2A-2B and 3A-3B or 4A-4B).... 6-8 units
  - (c) Biology, including one full semester of vertebrate zoology, with laboratory (Zoology 1A-1B) ..... 6-8 units
- (4) Trigonometry (Mathematics C) ..... 3 units  
It is strongly recommended that this requirement be completed in high school.
- (5) Foreign language (in not more than one language)..... 12 units  
This may be counted from high school at the rate of 4 units for the first two years and 4 units for each year thereafter.
- (6) Social science and humanities..... 12 units  
Any accredited college courses in these fields may be counted in satisfaction of this requirement. The following subjects are recommended for the student's consideration: anthropology, economics, history, political science, psychology, sociology, history and appreciation of art or music, English or speech (in addition to the basic requirement), and philosophy.

Whenever scheduling permits, a student should include at least one year sequence in one of the subjects listed above.

If a student wishes to substitute mathematics in partial satisfaction of this requirement, he may include in his program a maximum of 3 units mathematics (in addition to the required trigonometry).

Applicants for admission to the School of Dentistry in 1961 who started their college work prior to 1958 may qualify for admission on *either* the above requirements or the requirements in effect in 1959 (see the ANNOUNCEMENT OF THE SCHOOL OF DENTISTRY, 1959-1960).

#### Admission to the Dental Hygiene Curriculum

(Open to Women)

Applicants for admission to the dental hygiene curriculum must have completed at least 60 units of college work with a scholarship average satisfactory to the Admissions Committee, including the requirements (2) to (9) listed below. Students who have attended the University of California must have a grade C average or better in work undertaken in the University. The dental hygiene aptitude test of the American Dental Hygienists' Association is required of all applicants. All applicants are urged to take the test given in October of the year preceding admission. The School of Dentistry reserves the right to limit enrollment if applications exceed the available facilities and to require interviews and additional aptitude tests if they are necessary in the selection of a class. The student will find herself more adequately prepared if she has taken in high school the following subjects: English, 3 units; history, 1 unit; mathematics, 2 units (algebra, plane geometry); chemistry, 1 unit; physics, 1 unit; foreign language, 4 units in one language.

##### (1) General University Requirements:

Subject A (examination in English composition).

American History and Institutions (required for the bachelor's degree). The examination in American History and Institutions may be taken in the School of Dentistry, but it is preferable to satisfy the requirement in the pre dental hygiene program. (See page 40.)

- |   |            |
|---|------------|
| (2) English or Speech (1A-1B) .....   | 6 units    |
| (3) Chemistry (1A, 8) .....   | 8 units    |
| (4) Biology (Zoology 1A-1B) .....   | 8 units    |
| (5) Psychology .....  | 6 units    |
| (6) Social science .....  | 12 units   |
| Courses in the fields of anthropology, economics, history, political science, and sociology may be used to satisfy this requirement.  |            |
| (7) Humanities .....  | 12 units   |
| Courses in the fields of history and appreciation of art or music, English or speech (in addition to the basic requirement), foreign language (in addition to requirement (8) below), and philosophy may be used to satisfy this requirement. |            |
| (8) Foreign language (in not more than one language) .....  | 12 units   |
| This may be counted from high school at the rate of 4 units for the first two years and 4 units for each year thereafter.   |            |
| (9) Electives to complete a total of 60 units .....   | 10-0 units |

Applicants for admission to the School of Dentistry in 1961 who started their college work prior to 1958 may qualify for admission on *either* the above requirements or the requirements in effect in 1959 (see the ANNOUNCEMENT OF THE SCHOOL OF DENTISTRY, 1959-1960).

**Medical Sciences**

Candidates for the degree of A.B. in the College of Letters and Science who plan to pursue the four-year curriculum leading to the M.D. degree in the School of Medicine, San Francisco, may reduce by one year the total time for attaining the two degrees, by offering the first year of the School of Medicine curriculum as the senior year in the College of Letters and Science. In order to do this, the student should register as a premedical student on entering the College of Letters and Science. He should then fulfill General University Requirements (B), the Mathematics Requirement (C), the Breadth Requirement (D) (see the Bachelor of Arts Degree), complete the premedical subjects required for admission to the School of Medicine, and attain full senior standing. Full senior standing for this purpose means the completion of at least 90 units toward the A.B. degree (at least 24 units after attaining junior standing), including at least 6 units of upper division courses (on the Letters and Science list). In order that the student may matriculate into the School of Medicine in his fourth college year, it is essential that he satisfy the above mentioned Letters and Science requirements (B), (C), (D) by the end of his junior year.

A student who has attained full senior standing in the premedical curriculum has thereby complied with the requirements for admission to the School of Medicine, and if he is admitted to the School of Medicine may register simultaneously as a senior in the College of Letters and Science. The curriculum of the first year of the School of Medicine will be accepted as the senior year (30 units) of the College of Letters and Science, and as fulfilling the major requirements for the A.B. degree.

Enrollment in the School of Medicine is limited. Candidates for admission must have demonstrated a high level of scholastic achievement, particularly in the required premedical subjects. In addition, they must show evidence of emotional stability and a sound motivation for the study of medicine. Two personal interviews are given each student to help make proper evaluations. Arrangements for personal interviews are made by the Dean's office after a formal application has been filed and credentials evaluated. In addition, each applicant must take the Medical College Admission Test and it is recommended that, if possible, the student take the test in the spring of the year prior to that in which he intends to apply (that is, approximately fifteen to sixteen months prior to the date of admission, unless it has been taken at least two years before that time.) The pursuit of the medical curriculum makes rigorous demands upon the physical stamina of the individual and consequently medical students must be in excellent health. Successful candidates must pass a physical examination before registering in the School of Medicine and the committee on admissions considers the applicant's health as one of the factors in determining his eligibility.

*California Applicants.*—The majority of places in each class are given to students from California. Applicants are screened carefully by the Committee on Admissions. In reaching a decision, the committee takes into consideration the applicant's legal residence, the location of his high school and of the institution in which he has taken premedical work, the legal residence of his parents, and, occasionally, other factors.

*Out-of-State Applicants.*—Approximately 10 per cent of the places may be filled with applicants in the following categories:

1. From other states: Preference will be given to applicants from the following Western states not having medical schools: Alaska, Arizona, Hawaii, Idaho, Montana, Nevada, New Mexico, and Wyoming.
2. From foreign countries: Ordinarily, not more than one applicant will be accepted from outside continental United States, Alaska, and Hawaii. This applicant must have completed at least one year of premedical or academic

work at the University of California, or at an equivalent institution in the United States, one semester of which must have been completed previous to February 15 of the year of admission. For this place, the committee will select an individual from a foreign country who is in the United States for the purpose of pursuing his medical education and who intends to return to his own country following graduation, preferably for teaching in a school of medicine, for public health or for related work. The attention of applicants for this place is called to the fact that completion of the premedical program in the University of California, or in some other institution, does not necessarily guarantee acceptance by a school of medicine.

It may happen that a student who has completed the premedical curriculum and attained full senior standing in the College of Letters and Science is not admitted to the School of Medicine. In order to qualify for the A.B. degree, such a student must select some other major subject, and complete the requirements of its program and the other requirements for the degree. It may be impossible for such a student to complete his chosen major program in one year unless he has already partly fulfilled its requirements before entering the senior year. It is therefore desirable that each premedical student should plan his program with this contingency in mind, and undertake in his junior year the part of the major program of his alternative choice that will make it possible for him to complete the program for the A.B. degree in one year if he is not admitted to the School of Medicine. This can be done without in any way interfering with the completion of the premedical requirements.

An applicant for admission to the School of Medicine who in any year is unsuccessful in gaining admission to the School on account of an inferior scholarship record, may, at the proper time, present a second application for admission. His success in being granted admission will depend on his scholarship rank as a member of the group of applicants for the new group.

An accepted applicant who finds it impossible to begin his work in the School of Medicine with the entering class, or a student who actually enters and begins his work, but finds it necessary to withdraw during his first year, loses his place in the list of applicants. If he desires to begin his work in a later year, he is required to reapply with the group of applicants for that year.

While it is virtually essential that a student register in the premedical curriculum if he wishes to proceed to the A.B. and M.D. degrees in the shortest possible time, such registration is not required for admission to the School of Medicine. Certain medical schools require an A.B. degree for admission; and the holder of an A.B. degree who has not been in the premedical curriculum may apply for admission to the University of California School of Medicine, provided he has completed work in the specific subjects required for admission. The minimum requirements in these subjects in terms of courses offered at Davis are: English 1A-1B (or Speech 1A-1B); Chemistry 1A-1B, 5, 8; Physics 2A-2B, 3A-3B; Zoology 1A-1B, 100, 100L; 8 units of a modern foreign language.

The Committee on Admissions to the School of Medicine is authorized to refuse admission to students who have a low academic record and to those of obvious physical, mental, or moral disability.

For further information concerning the School of Medicine, see the ANNOUNCEMENT OF THE SCHOOL OF MEDICINE, obtainable upon request from: The Dean, University of California School of Medicine, San Francisco 22.

#### **Premedical Curriculum**

*Adviser:* Mr. M. Hildebrand.

In order that entrance to the School of Medicine and attainment of the A.B. and M.D. degrees may not be delayed, the student should make sure that his program is arranged so as to satisfy the General University Requirements (B), the Mathematics Requirement (C), and the Breadth Requirement (D), by the end of the junior year, and all other premedical requirements by the

end of the spring semester just preceding the proposed date of entering the School of Medicine. A suggested program follows:

FIRST YEAR				SECOND YEAR			
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units		
Chemistry 1A-1B	5	5	Chemistry 5 or 8	..	3		
English 1A-1B	3	3	Foreign Language	4	..		
†Foreign Language	4	4	Military Science	2	2		
Military Science	2	2	Zoology 1A-1B	4	4		
*Electives	..	3	*Electives	6	6		
	14	17		16	15		

THIRD YEAR			
Course	Fall Units	Spring Units	
Chemistry 5 or 8	3	..	
Physics 2A-2B	3	3	
Physics 3A-3B	1	1	
Zoology 100	2	..	
Zoology 100L	2	..	
*Electives	3	12	
	14	16	

**Prepharmacy Curriculum**

Adviser: Mr. R. E. Kepner.

The University offers a six-year program leading to the Doctor of Pharmacy degree. The first two years (preprofessional) may be taken at any approved collegiate institution. The last four years must be taken at the School of Pharmacy on the San Francisco campus. Students who have completed the two-year prepharmacy curriculum cannot be assured of admission to the School of Pharmacy on the San Francisco campus. When the number of qualified applicants for the Doctor of Pharmacy curriculum exceeds the available facilities, selection will be made on the basis of scholarship as determined from the College record and by examination. A personal interview may be required. Applications for admission to the School of Pharmacy, San Francisco campus, must be filed between October 1 and March 1 preceding the September of proposed admission. Blanks may be obtained from the Office of the Director of Admissions, University of California Medical Center, San Francisco 22. For further information see the ANNOUNCEMENT OF THE SCHOOL OF PHARMACY, which may be obtained from the Dean, School of Pharmacy, University of California Medical Center, San Francisco 22.

Students enrolling at Davis may complete the subject requirements for entrance to the School of Pharmacy with the following program.

FIRST YEAR			SECOND YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1	..	5	History 17A-17B	3	3
Chemistry 1A-1B	5	5	‡Mathematics 16A-16B	3	3
‡Elective	3	..	Military Science	2	2
*Elective	3-4	3	Physics 2A-2B	3	3
English 1A-1B	3	3	Physics 3A-3B	1	1
Military Science	2	2	Zoology 1A-1B	4	4
	16-17	18		16	16

\* These electives should be chosen primarily from the courses used to satisfy the breadth requirement in humanities and social science.

‡ Foreign language: the School of Medicine requirement is 8 units of credit in a modern foreign language, and the requirement for the degree of Bachelor of Arts is 12 units in one language. These may be satisfied partly in high school.

A student who has completed all or part of the language requirement in high school may take Chemistry 5 or Chemistry 8 in the second year.

‡ Trigonometry and Intermediate Algebra are prerequisite to Mathematics 16A.

\* A year course chosen from foreign language, mathematics, social science, philosophy, or the fine arts and selected from the courses offered in satisfaction of the breadth requirements in the College of Letters and Science.

**Premedical Technology**

*Adviser:* Mr. D. M. Reynolds.

Students interested in this field should consult with Mr. D. M. Reynolds of the Department of Bacteriology.

**Prenursing and Prephysical Therapy**

*Adviser:* Mr. G. W. Salt.

Students interested in these fields should consult Mr. Salt for requirements.

**Prelegal**

*Adviser:* Mr. C. E. Jacobs.

Students interested in entering the profession of law should consult with Mr. Jacobs of the Department of History and Political Science.

**Presocial Welfare Curriculum**

*Adviser:* Mr. E. M. Lemert.

Students planning to enter the field of social work are referred to Mr. Lemert of the Department of Sociology (see page 243).

**Letters and Science List of Courses**

*Of the 120 units required for the degree of Bachelor of Arts, at least 108 units must be in courses chosen from the Letters and Science List of Courses. Any course not included in this list, but required, or accepted, as part of a major or as a prerequisite to a group major, shall, for any student in that major or group major, but for no others, be treated as if it were in the Letters and Science List of Courses.*

The following list refers to the courses as given in the departmental offerings for the fall and spring semesters, 1960-1961.

- Agricultural Economics 18, 100A, 100B, 120, 125.
- Agronomy 121, 131.
- American Civilization. All undergraduate courses.
- Animal Husbandry 101, 102, 105, 107, 110, 120, 121, 130.
- Animal Physiology 100.
- Anthropology. All undergraduate courses.
- Art. All undergraduate courses. A total of not more than 8 units from performance courses.
- Bacteriology. All undergraduate courses except 105A-105B.
- Biochemistry. All undergraduate courses.
- Botany. All undergraduate courses except 8, 107, 131, 155.
- Chemistry. All undergraduate courses.
- Decorative Art 6A, 6B, 7A, 7B.
- Dramatic Art. All undergraduate courses.
- Economics. All undergraduate courses.
- Education 110.
- English. All undergraduate courses.
- Entomology 1, 106, 112, 127.
- French. All undergraduate courses.
- Genetics. All undergraduate courses.
- Geography. All undergraduate courses.
- Geology. All undergraduate courses.
- German. All undergraduate courses.

History. All undergraduate courses.  
Home Economics 112A, 112B, 131, 136, 137.  
Latin. All undergraduate courses.  
Mathematics. All undergraduate courses.  
Military Science and Tactics. All 8 units of lower division courses.  
Music. All undergraduate courses. A total of not more than 8 units from performance courses.  
Philosophy. All undergraduate courses.  
Physics. All undergraduate courses.  
Physiology 1, 1L.  
Plant Pathology 124.  
Political Science. All undergraduate courses.  
Pomology 110.  
Poultry Husbandry 107, 108.  
Psychology. All undergraduate courses.  
Sociology. All undergraduate courses.  
Spanish. All undergraduate courses.  
Speech. All undergraduate courses.  
Veterinary Science 124, 140, 140L.  
Zoology. All undergraduate courses, except 104.

#### HONORS

An honor list shall be prepared each semester and shall be made public. The honor list shall include the names of: (1) students who have completed at least 12 units and have a grade average of at least B for all work undertaken in the College; (2) other students specially approved for inclusion in the honor list by the Committee on Honors, either upon recommendation by departments of instruction, or upon such other basis as the Committee on Honors may determine.

Honor students may take the special courses of Honors Programs subject to the approval of the instructor. Special courses in an Honors Program may not be taken by a student whose name is not on the honor list of the College except with the permission of the Dean of the College.

At the discretion of the Dean, an honor student may make study-list changes involving special courses of Honors Programs under suspension of the regulations fixing the time during which such changes are ordinarily permissible and under suspension of the rules requiring fees for such changes. He is expected to report promptly to the Dean concerning proposed changes.

Honor students shall have the privilege (subject to the approval of the instructor concerned) of taking each semester one course not submitted in satisfaction of the breadth requirements, or the requirements of the major program in which they shall be marked "passed" or "failed." In calculating grade-point standing, units gained in this way shall not be counted.

Honor students who have senior standing and have attained at least a grade B average in the junior year at the University of California shall have the following additional privileges:

- (1) The study-list total may be less than 12 units.
- (2) The number of upper division units which may be taken in one department may exceed 30.
- (3) With the consent of the department or committee supervising the major program, requirements concerning specific courses or sequences in the major program may be set aside.

Except as specifically provided, all existing regulations for students in the College shall apply to honor students.



**HONORS WITH THE BACHELOR'S DEGREE**

Honors at graduation are conferred upon (1) those students who have completed to the satisfaction of the department or major committee concerned, an Honors Program, and (2) those students who have completed with distinction a regular program but who have not been enrolled in or completed an Honors Program.

Any honor student may, upon the recommendation of his adviser, enroll in an Honors Program established for his major at any time not later than the first semester of his senior year. In special cases, a student who is not an honor student may enroll in such a program by permission of the Dean.

Students enrolled in Honors Programs shall have all the privileges of honor students, and shall be included in the honor list.

Students enrolled in an Honors Program are eligible for three kinds of honors with the bachelor's degree:

- (1) Honors, for completing an Honors Program to the satisfaction of the department or major committee concerned.
- (2) High Honors, for completing an Honors Program with distinction.
- (3) Highest Honors, for completing an Honors Program with great distinction.

Students who are not enrolled in an Honors Program, but who qualify for honors at graduation upon recommendation of the department, the Committee on Honors, and the Executive Committee of the College of Letters and Science, are not eligible for High or Highest Honors.

A list of students receiving Honors, High Honors, or Highest Honors is published in the annual *Commencement Program*.

## SCHOOL OF VETERINARY MEDICINE\*

THE SCHOOL OF VETERINARY MEDICINE offers a two-year curriculum leading to the degree of Bachelor of Science and a two-year graduate curriculum leading to the degree of Doctor of Veterinary Medicine.

### Admission to the School of Veterinary Medicine

Candidates for admission to the School of Veterinary Medicine must complete:

1. American History and Institutions; Subject A; Military or Naval Science; and mathematics, 6 units§, as required.

2. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Chemistry (general, inorganic, organic, and analytical) ..	16
English composition and additional English or speech . . .	6
Physics (mechanics, heat, light, electricity) . . . . .	6
Social sciences, foreign languages, philosophy, psychology, fine arts, literature, and/or additional English, speech, and mathematics† . . . . .	12
Zoology . . . . .	8
3. Additional courses chosen by the student with approval of the major adviser . . . . .	12
	60

At least 60 units of credit in one of the colleges of the University of California, or in an accredited institution, including the prescribed subjects listed in the preveterinary curriculum above (except that minor shortages may be waived by the admissions committee of the School of Veterinary Medicine).

Students are frequently required to take more than a minimum 60 units in order to demonstrate scholastic achievement.

The preveterinary curriculum offers a well-balanced basic training in natural science and the humanities which will not only prepare the candidate for the courses in the School of Veterinary Medicine, but also to meet the varied problems of his chosen profession. This course of study can be completed on any of the campuses of the University, or at any junior college or four-year college offering the prescribed courses.

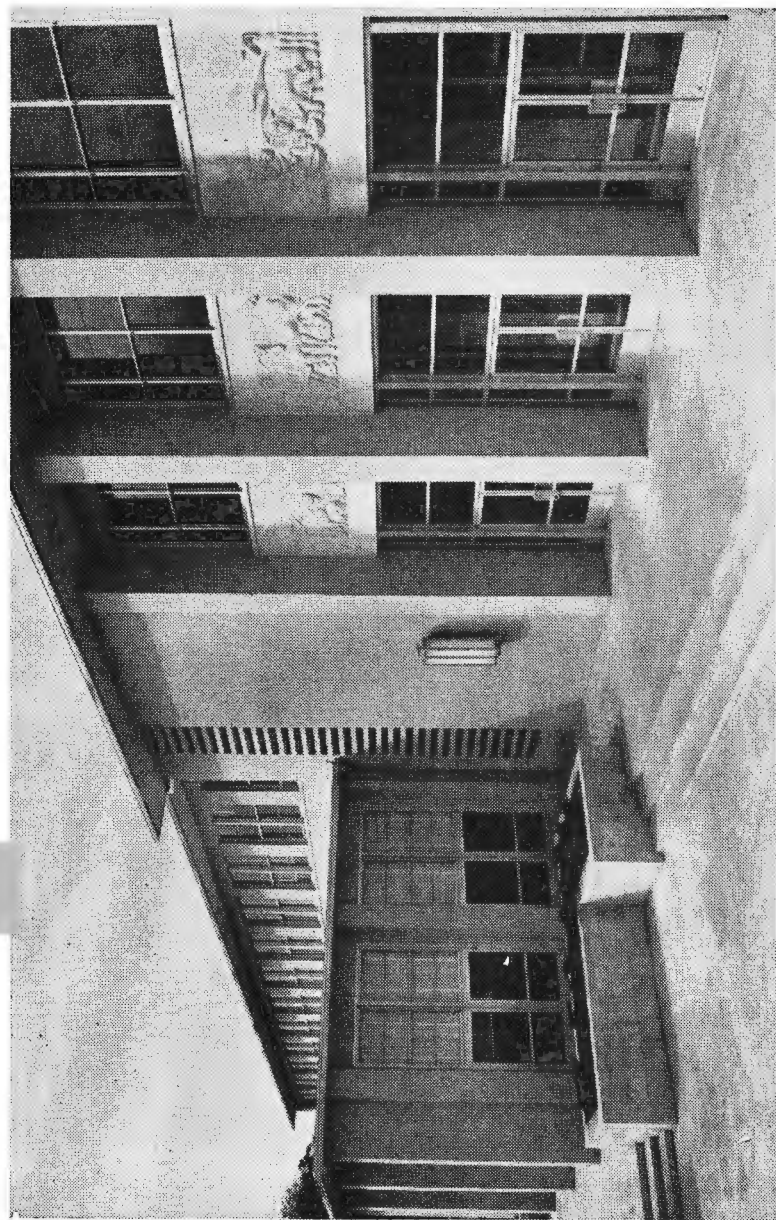
*Enrollment in the School is limited, with the candidates being selected in major part on the basis of scholarship. In addition, applicants must have had sufficient animal experience to justify their desire to work with animals. The student should plan his program in such a way that in the event that he fails to enter the School of Veterinary Medicine, he can complete the requirements for the bachelor's degree in some other curriculum without loss of time.*

Students are admitted to the School of Veterinary Medicine in the fall of each year. The necessary application blanks may be obtained after January 1 from the Registrar, University of California, Davis, and filed with him before

\* Prospective students should consult the ANNOUNCEMENT OF THE SCHOOL OF VETERINARY MEDICINE, obtainable without charge from the Registrar, University of California, Davis.

† Mathematics beyond trigonometry.

§ May be completed in high school—trigonometry is prerequisite to physics at the University.



Main entrance to Haring Hall, showing reading room on the left

February 28. All the requirements need not be completed at that time, but the student must supply a transcript showing work in progress.

Students who hold a recognized baccalaureate degree and are admitted to the School of Veterinary Medicine will register as graduate students studying directly for the degree of Doctor of Veterinary Medicine.

*Admission in Advanced Standing.*—An applicant for admission in advanced standing may be accepted under the following conditions:

1. He must furnish evidence that he was eligible for admission to the first semester 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 semester or semesters 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.

### **Selection of Applicants**

Enrollment in the School of Veterinary Medicine is limited. Candidates for admission are selected primarily on scholarship with particular emphasis being placed on the preveterinary requirements. Animal experience and personal qualifications must also be considered satisfactory. A personal interview may be required; if so, the Chairman of the Committee on Admissions will notify those concerned. Eligible applicants will not be considered until after the last date for filing applications.

For the information of those applicants who may be concerned with residence requirements, the following statements relative to residency are offered:

1. Not more than five applicants in each class whose legal residence is other than that of California will be accepted. The Committee on Admissions, however, is not obligated to select any out-of-State applicants.
  - a. These five out-of-State applicants will ordinarily be selected from the bordering western states of Arizona, Hawaii, Nevada, and Oregon. To be considered an applicant from one of these places mentioned, the student must be a legal resident of that state.
  - b. An exceptional candidate from anywhere in the world will be considered.
2. To be considered a bona fide California applicant a student must have been a legal resident of the state prior to the beginning of his preveterinary work. An exception to this rule may be made in the case of individuals whose legal residence in California has been clearly established on another basis than for the purpose of completing the preveterinary curriculum.
3. The Western Interstate Commission for Higher Education was established to provide a greater measure of educational opportunity in the health science fields for students in the western states. Students from Alaska, Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington, and Wyoming should contact the commission in their state as soon as they consider applying to the School of Veterinary Medicine.

It is necessary to limit enrollment in the School. The basic reason is the supply of clinical material. Registration of students in excess of material and facilities available has been tried at other veterinary schools. It resulted in so many students necessarily being assigned to limited numbers of cases that accreditation of the schools attempting it became jeopardized.

Minimum requirements for accreditation are outlined by the American Veterinary Medical Association and the Agricultural Research Service, United States Department of Agriculture, the largest employer of veterinarians in this country.

The two final years of the curriculum in Veterinary Medicine are admin-

istered by the Graduate Division, Northern Section. Upon completion of the requirements for the degree of Bachelor of Science, application must be filed for admission to the Graduate Division through the Dean of the School of Veterinary Medicine. Further information is given in the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION, which may be obtained from the Associate Dean of the Graduate Division, Room 268A Hunt Hall.

### Requirements for the Degree of Bachelor of Science

The degree of Bachelor of Science with a major in veterinary science is granted, upon the recommendation of the faculty of the School of Veterinary Medicine, to students who:

1. Satisfy the general University and School of Veterinary Medicine requirements, including:
  - (a) *Subject A.* The Subject A examination in English composition is required of every undergraduate student at the time of his first registration in the University. Students admitted with advanced standing may satisfy this requirement with a grade of C or better in one or more courses in English composition.
  - (b) *American History and Institutions.* The student may meet this requirement by the passing of an examination in American History and Institutions or by the completion of courses prescribed by the University.
  - (c) *Residence in the University during the final undergraduate year* in the School of Veterinary Medicine and completion of at least the final 24 units of credit.
  - (d) *Attain at least twice as many grade points as units of credit* in courses undertaken at this University.
  - (e) *File notice for candidacy* with the Registrar on dates as prescribed by the University Calendar.
  - (f) *Complete at least 124 units of University work.* Not more than 4 of these units may be in lower division physical education courses, and at least 36 of these units must be in upper division courses (courses numbered 100-199).
2. Complete, in the School of Veterinary Medicine, the following 76 units of prescribed courses. This total may be reduced in the case of students with advanced standing.

	<i>Units</i>
(a) Animal Husbandry .....	2
(b) Botany .....	2
(c) Embryology .....	2
(d) Genetics .....	3
(e) Histology .....	4
(f) Veterinary Science .....	63
	76

### Requirements for the Degree of Doctor of Veterinary Medicine

A. The candidate for the degree of Doctor of Veterinary Medicine must have completed the requirements for the bachelor's degree in one of the colleges or schools of the University of California or at another college or university of approved standing.

B. He must give satisfactory evidence of possessing a good moral character.

C. He must have studied veterinary medicine for the equivalent of eight semesters of sixteen weeks each. The last two years must have been spent in the University of California School of Veterinary Medicine. He must have

completed the required work, have fulfilled satisfactorily all special requirements, and have received throughout the entire veterinary course a satisfactory grade as determined by the faculty of the School and by the Graduate Council of the Northern Section.

### Graduate Study

For information on work leading to higher degrees other than the D.V.M., see the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION, which may be obtained from the Associate Dean of the Graduate Division, Room 268A Hunt Hall.

### PLAN OF STUDY

#### Preveterinary Curriculum

The following schedule of study need not be rigidly adhered to but it satisfies the requirements without conflicts. This schedule also satisfies most of the requirements of the first two years of the animal science curriculum. For details of other curricula including animal science, the student should consult the College of Agriculture section of this bulletin.

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Military Science .....	2	2	Military Science .....	2	2
Chemistry 1A, 1B .....	5	5	Chemistry 5, 8 .....	3	3
English 1A, 1B .....	3	3	Physics 2A, 2B .....	3	3
Elective .....	5	5	Zoology 1A, 1B .....	4	4
			Elective .....	3	3
	15	15		15	15

#### Veterinary Curriculum

The completion of the first two years of the curriculum of the School of Veterinary Medicine satisfies the requirements for the degree of Bachelor of Science. The courses are primarily preclinical sciences but are closely correlated with and are basic to the work in the clinical sciences of the last two years.

The following are the schedules for the first two years of the School of Veterinary Medicine, corresponding to the junior and senior years of undergraduate study. The graduate curriculum in the School of Veterinary Medicine is given under the third and fourth years.

FIRST YEAR			SECOND YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Animal Husbandry 124 ...	2	..	Botany 8 .....		2
Genetics 100 .....	..	3	Veterinary Science 121,		
Veterinary Science 100,			124 .....	10	6
101 .....	0	5	Veterinary Science 122A,		
Veterinary Science 110,			122B .....	5	5
101L .....	1	2	Veterinary Science 123A,		
Veterinary Science 120,			123B .....	4	4
140 .....	10	6	Veterinary Science 125 ...		2
Veterinary Science 140L..	..	3			
Zoology 107 .....	..	..			
*Zoology 100 .....	2	..			
	19	19		19	19

\* Students are encouraged to take the laboratory course in embryology, Zoology 100L.

THIRD YEAR		
Course	Fall Units	Spring Units
Veterinary Medicine 201, 202 .....	3	3
Veterinary Medicine 203, 205 .....	4	5
Veterinary Medicine 208, 206 .....	3	3
Veterinary Medicine 210, 220 .....	2	4
Veterinary Medicine 230, 221 .....	4	4
Veterinary Medicine 260, 250 .....	2	1
Veterinary Medicine 254 .. .		0
	18	20

FOURTH YEAR		
Course	Fall Units	Spring Units
Veterinary Medicine 207, 204 .....	4	5
Veterinary Medicine 223, 235 .....	4	2
Veterinary Medicine 224, 240 .....	2	5
Veterinary Medicine 251A- 251B .....	5	5
Veterinary Medicine 256A- 256B .....	1	1
Veterinary Medicine 270A- 270B .....	0	0
Veterinary Medicine 225 ..	1	..
Veterinary Medicine 245 ..	2	..
	19	18

x Engineering Science

x Mechanical Engineering



## GRADUATE DIVISION, NORTHERN SECTION

THE UNIVERSITY OF CALIFORNIA offers opportunities for graduate study in academic and professional fields on its campuses at Davis, Berkeley, San Francisco, Mount Hamilton, Los Angeles, and Riverside, and at the Scripps Institution of Oceanography at La Jolla. Graduate study and research in the University's centers of instruction at Berkeley, Davis, Mount Hamilton, and San Francisco are administered by the Council of the Graduate Division, Northern Section, which maintains offices on the Berkeley campus under the Dean of the Graduate Division. The work offered on the campuses at Los Angeles, Riverside, and La Jolla is administered by the Graduate Division, Southern Section, with offices at Los Angeles. An Associate Dean of the Graduate Division, Northern Section, is resident on the Davis campus in Room 268A Hunt Hall.

The University endeavors to publish full information for the guidance of graduate students. Failure of students to acquaint themselves fully with the organization and regulations of the University may cause complications for which the student is expected to assume the responsibility. For information concerning all matters pertaining to the Graduate Division, including the list of available fellowships and the requirements for higher degrees, see the ANNOUNCEMENT OF THE GRADUATE DIVISION, NORTHERN SECTION, which may be obtained from the Associate Dean of the Graduate Division. Special announcements for the information and guidance of graduate students are published from time to time in the *University Calendar* and on the bulletin boards. Students should consult the bulletin boards regularly.

Requests for information affecting the status of graduate students, not contained in the official University bulletins, should be addressed to the Office of the Graduate Division, 268A Hunt Hall.

### Organization of Graduate Study and Research

Graduate study and research is offered at Davis in:

Agricultural Chemistry	Home Economics
Agricultural Economics	Horticulture
Agricultural Engineering	Irrigation
Agronomy	Mathematics
Animal Husbandry	Microbiology
Animal Physiology	Nutrition
Botany	Physics
Chemistry	Plant Pathology
Comparative Biochemistry	Plant Physiology
Comparative Pathology	Poultry Science
Comparative Pharmacology and Toxicology	Preveterinary Medicine
Education	Range Management
English	Soil Science
Entomology	Vegetable Crops
Food Science	Veterinary Medicine
Genetics	Veterinary Science
History	Zoology

The School of Veterinary Medicine offers a curriculum leading to the degree of Doctor of Veterinary Medicine (see page 112).

For complete information concerning opportunities for graduate study and research, students should confer with the department concerned.

## Curricula for Teacher Education

Curricula leading to teaching credentials valid in the secondary schools of California are offered in the following fields:

Agriculture	Mathematics
Art	<del>Mechanical Engineering</del>
<del>Engineering Science</del>	Music
English	Physical Education
Foreign Languages	Physical Science
Homemaking	Social Studies
Life Sciences	Speech Arts

### GENERAL REQUIREMENTS

The student must satisfy the following general requirements in order to complete a curriculum leading to a recommendation for a teaching credential. He must also fulfill the specific requirements of the credential for which he applies.

*Oral English.*—The student must prove that he has a command of spoken English adequate to the purposes of instruction.

*Health Certificate.*—The student is required to have a medical examination and to obtain a satisfactory certificate of health from a physician. Every new student must have with him at the time of registration, a certificate testifying to successful vaccination against smallpox within the last seven years. A form for this purpose is provided by the University.

*Citizenship.*—Each applicant for a credential must be a citizen of the United States. This is a requirement of the California State Department of Education. Noncitizens who have filed their first papers are eligible to apply for short-term credentials. Failure to complete the naturalization process within six months of the date of eligibility will result in the revocation of the credential. After a foreign student has become naturalized he may apply for a long-term credential.

*Oath of Allegiance.*—The State Department of Education also requires each applicant for a credential to take an oath of allegiance.

*The Constitution of the United States.*—The State Department of Education requires the completion of a course on the provisions and principles of the Constitution of the United States. This requirement may be satisfied by completing one of the following courses: Political Science 1A, 1B, 102, 105, 113, 128A, 157A–157B, 162, 163, 166; or one of the following sequences: History 17A–17B, 171A–171B, 172A–172B, 174A–174B, 176A–176B, 178A–178B, 179, 180, 183; or by passing an examination in American History and Institutions.

*Admission to Graduate Standing.*—Upon graduation, each prospective candidate for a teaching credential must file a formal application for admission to graduate standing with the Dean of the Graduate Division, Northern Section, 250 Sproul Hall, University of California, Berkeley 4. This application must be filed preferably twelve weeks before the beginning of graduate residence, and in no case later than July 15 for the fall semester and December 15 for the spring semester. The application must be accompanied by a bank draft or money order for the \$5† application fee, which is payable to The Regents of the University of California. The transferring graduate student must furnish a transcript of his college or university work to both the Dean

† Veterans who expect to enroll under the provisions of Public Law 894 or Public Law 16 are not required to remit this fee with their applications. If the applicant is accepted and registers in the University, the fees will be paid by the government.

of the Graduate Division and the Chairman of the Department of Education when he files his preliminary application.

## SPECIFIC REQUIREMENTS

### SPECIAL SECONDARY CREDENTIALS

The student who desires to teach agriculture or home economics in the secondary schools may obtain the special secondary credential in vocational agriculture or homemaking, or the general secondary teaching credential, or both. At least two semesters of graduate work is required to fulfill the requirements in vocational agriculture, and one semester in homemaking.

In some schools it is an advantage to hold both a special vocational credential and a general secondary credential. An applicant qualifying for the special credential may use agriculture or home economics as the major and may secure the general secondary credential by completing a minor and meeting the other requirements as outlined below.

*\*The Special Secondary Credential in Vocational Agriculture.*—The University of California cooperates with the Bureau of Agricultural Education of the State Department of Education in offering the graduate training for the special vocational agriculture credential. Students desiring admission to the graduate training for the special credential must apply for and receive "cadet" appointments from the Chief of the Bureau of Agricultural Education in addition to applying for admission to the Graduate Division. Appointments are made only after personal interviews. Since supervised teaching comprises a major part of this training, students must spend one semester of this fifth year in directed teaching centers.

*The Special Secondary Limited Credential in Agriculture.*—This credential authorizes the holder to teach the agricultural subjects named in the credential in secondary schools and requires 8 semester units of work in each of the subjects named. It does not authorize the holder to teach vocational agriculture in departments organized under the Federal and State Vocational Acts. Fifteen semester hours of professional work in education, including 4 semester units of directed teaching in agriculture, are required.

*The Special Secondary Credential in Homemaking.*—The University of California cooperates with the Bureau of Homemaking Education of the State Department of Education in offering the training required for this credential. The undergraduate courses comprising the general major in home economics satisfy the subject-matter requirements for this credential.

Normally one semester of graduate work devoted primarily to supervised teaching and instruction in professional methods is required to complete credential requirements.

### GENERAL ELEMENTARY CREDENTIALS

This credential authorizes the holder to teach any or all subjects in all grades, kindergarten through eighth grade, with the exception of classes in special education.

Candidates for this credential must satisfy the following specific requirements, in addition to the general requirements stated above:

1. Forty semester hours of general education with a minimum of 6 semester hours in each of the following four areas:

\* A special summer session for high school teachers of vocational agriculture will be offered on the Davis campus beginning July 3, 1961, and ending August 11, 1961. This session will offer courses in education and agriculture for students who are candidates for teaching credentials and for teachers of agriculture and farm advisors who desire graduate training. Courses will also be offered for teachers who desire to complete requirements for administrative, supervisory, and general credentials.

- a) Science and mathematics.
  - b) The practical arts and the fine arts—art, music, homemaking, health education, physical education, industrial arts, and similar fields.
  - c) Social studies.
  - d) The communicative arts—language, literature, speech arts, and similar fields. These requirements are fulfilled by the general education requirement for the bachelor's degree.
2. A bachelor's degree from one of the academic colleges of the University or its equivalent.
  3. Two semesters of graduate work.
  4. A scholarship record of 2.5 or better in upper division courses and 2.75 or better in postgraduate courses.
  5. Completion of the following:
    - a) A minimum of 24 semester hours of professional work in education, affording adequate preparation for teaching the statutory elementary school subjects and the subjects in which the applicant is required by law to be proficient. This work shall include:
      - 1) Eight semester hours of elementary education courses including:
        - (a) Four semester hours of methods of teaching basic elementary school subjects.
        - (b) Two semester hours in principles of elementary education or elementary curriculum.
        - (c) Two semester hours of child psychology, or child growth and development.
      - 2) Eight semester hours of directed teaching.
      - 3) Other appropriate professional courses in education.
    - b) The completion of a two-semester-hour course, or the passing of an examination on the provisions and principles of the Constitution of the United States.

The above course requirement in directed teaching will be met during the 1960-1961 school year by internship in an elementary school.

6. Other courses recommended for this credential are:

Psychology 1A	Education 110
English 1A, 1B	Home Economics 131
Music 10 or equivalent	History 189A or 189B
Art 6A or 2A or 2B	Education 115
Physical Education 1 and 26	Education 163
Geography 1A or Sociology 1 or Anthropology 2	

#### GENERAL SECONDARY CREDENTIALS

This credential authorizes the holder to teach any or all subjects in all grades of any junior college†, senior high school, four-year high school, junior high school, and the seventh and eighth grades of elementary schools with the exception of classes organized under the provisions of the Federal and State Vocational Educational Acts where special credentials in specific vocational subjects are required.

Candidates for recommendation for this credential must satisfy the following specific requirements, in addition to the general requirements stated above.

1. Forty semester hours of general education with a minimum of 6 semester hours in each of the following four areas:

† Preference is given to holders of the master's or doctor's degree in appointment to junior college faculties.

- a) Science and mathematics.
- b) The practical arts and the fine arts—art, music, homemaking, health education, physical education, industrial arts, and similar fields.
- c) Social studies.
- d) The communicative arts—languages, literature, speech arts, and similar fields.

Courses offered in fulfillment of the general education requirement for the bachelor's degree may also be applied toward the fulfillment of major and minor requirements, provided the courses are within the same subject field as the major and minor.

2. One major\* and one minor\* in teaching fields commonly taught in California senior or four-year high schools, or a major in a field not commonly taught, and two minors in acceptable teaching fields.
3. Complete the following 22 units in education:

Introduction to Educational Psychology—Education 110.....	3
Tests and Measurements—Education 115.....	3
Introduction to Guidance and Counseling—Education 163.....	3
Principles of Secondary Education—Education 170.....	2
Introduction to Teaching—Education 320A.....	1
Audio-Visual, Radio, and Other Instructional Aids—Education 320B	2
Supervised Teaching—Education 320C.....	3
Methods of Teaching—Education 320E.....	2
Practicum in Supervised Teaching—Education 323.....	2-4

(Psychology 1A or its equivalent is prerequisite to all education courses.) In addition to the required courses in education, it is recommended that all candidates for the general secondary credential complete either Child Development—Home Economics 131, 3 units, or Adolescent Development—Home Economics 136, 3 units.

The following sequence of courses is recommended:

Junior year—Education 320A, Home Economics 131 or 136.

Senior year—Education 110, 170.

Graduate year—(first semester)—Education 115, 163; (second semester)—Education 320B, 320C, 320E, 323.

4. Two graduate semesters of not less than 24 units including 6 semester hours in subject fields commonly taught in junior and senior high schools, and 6 semester hours in education courses.
5. A scholarship record of 2.5 or better in upper division courses, and 2.75 or better in postgraduate courses.

#### TEACHING MAJORS AND MINORS FOR THE GENERAL SECONDARY CREDENTIAL

In many instances the departmental major fulfills subject matter requirements for the teaching major. Prospective teachers are advised to consult counselors in the Department of Education and the authorized subject representatives of the proposed teaching fields as early as possible after undertaking University work. The beginning of the freshman year in undergraduate status is not too early for such consultations.

In the program for the bachelor's degree, the student is permitted a number of electives. A wise selection insures an adequate background of preparation for teaching. Helpful guidance in this choice may be obtained from the subject representatives.

\* See page 120.

**College of Agriculture**

*Agriculture.* Subject Representatives: Sidney S. Sutherland, Elwood M. Juergenson.

Major: See pages 51, 52.

Minor: A minimum of 20 units in agricultural subjects. Students should consult with subject representatives.

*Homemaking.* Subject Representative: Arline Johnson.

Major: See pages 66-68.

Minor: A minimum of 20 units in home economics.

**College of Letters and Science**

*Art.* Subject Representative: Roland C. Petersen.

Major: See Art, page 143.

Minor: 20 units in the field of art. Not less than 9 units in this total should be in upper division courses (except as recommended by the Department of Art).

*English.* Subject Representative: Gwendolyn B. Needham.

Major: See English, page 171.

Minor: 20 units including English 1A-1B, 46A-46B, and at least 9 units of upper division courses including English 106L and two courses chosen from English 125C-125D, 117J, 137A-137B. English 300 should be taken in the senior or postgraduate year.

*Foreign Languages.*

*French.* Subject Representative: Merle L. Perkins.

Major: See French, page 186.

Minor: Four semester French courses in the lower division, or their equivalents. Usually these will consist of French 1, 2, 3, 4. At least 12 units of upper division work in French, including a full year course in conversation and composition.

*German.* Subject Representative: Siegfried B. Puknat.

Major: See German, page 187.

Minor: Four semester German courses in the lower division, or their equivalent. Usually these will consist of German 1, 2, 3, 4. At least 12 units of upper division work in German, including a full year course in conversation and composition.

*Spanish.* Subject Representative: Daniel S. Keller.

Major: See Spanish, page 190.

Minor: 18 to 22 units in the lower division, or their equivalents. Usually these will consist of Spanish 1, 2, 3, 4, 25A-25B. Spanish 4 may be omitted with a grade of B or better. At least 12 units of upper division work.

*Life Sciences.* Subject Representatives: Milton A. Miller, T. Elliot Weier.

Major: See Biological Sciences, page 98.

Minor: Botany 1; Chemistry 1A-1B; Physics 2A-2B; Zoology 1A-1B. At least 8 units of advanced work in zoology and botany.

*Mathematics.* Subject Representative: Albert C. Burdette.

Major: See Mathematics, page 210.

Minor: 20 units of mathematics including courses 1, 7, 16A-16B, and not less than 6 units of upper division mathematics. Not more than 3 units from courses C and D may be counted toward the minor.

*Music.* Subject Representative: Jerome W. Rosen.

Major: See Music, page 218.

Minor: Music 10, 4B, 5A-5B, 27A-27B, at least one course in musical performance, and 9 units of upper division work, including Music 108, 112A or 112B, 127 or 128.

*Physical Education.* Subject Representatives: Charles R. Kovacic, Willard S. Lotter, James L. Sells, Marya Welch.

Major: See Physical Education, page 223.

Minor: 20 units of physical education. Students should consult with representatives of the department as early as possible in their university programs.

*Physical Science.* Subject Representative: Harold G. Reiber.

Major: See page 99.

Minor: Chemistry 1A-1B and 8; Physics 2A-2B and 3A-3B; Chemistry or Physics—3 upper division units; a laboratory course in botany, zoology, or physiology.

*Social Studies.* Subject Representatives: Kenneth Thompson, C. Bickford O'Brien.

Major: A degree in one of the social sciences or an interdepartmental major may be offered (see page 96; and the course section of this bulletin under the headings of Anthropology and Geography, Economics, History and Political Science, and Sociology). Students should consult with subject representatives in arranging their programs.

Minor: 20 units in the social sciences, of which 9 shall be in upper division courses.

*Speech Arts.* Subject Representatives: Theodore J. Shank, John T. Goldthwait.

Major: See Dramatic Art and Speech, page 171.

Minor: 20 units in dramatic art or speech including Speech 1A or 2A or 140 or 141; and Dramatic Art 10A or 10B or 128.

### INTERNSHIPS

A limited number of students can be accommodated in an internship program leading to either the general elementary or general secondary credential. The program entails enrollment in a pre-service summer session, a year of teaching under supervision in an approved school, and enrollment in a post-service summer session.

Interested students should consult with the appropriate supervisors of student teaching in the Department of Education as early as possible in the spring semester.

## COURSES OF INSTRUCTION

The course offerings listed in this bulletin are subject to  
change without notice

### EXPLANATORY NOTE

THE CREDIT VALUE of each course in semester units is indicated for each semester by a number in parentheses following the title. A semester unit is one hour of the student's time at the University, weekly, during one semester, in lecture or recitation, together with the time necessary in preparation therefor; or a longer time in laboratory or other exercises not requiring preparation. The semester in which the course is given is shown as follows: I, first semester (September to January); II, second semester (February to June); Yr., throughout the first and second semesters. Information concerning class hours will be found in the SCHEDULE AND DIRECTORY.

*Year courses.*—A course designated by a double number (for example, Home Economics 1A-1B) is continued through two successive semesters, ordinarily from September to June; occasionally, however, the first part of a year course may begin in February. The student should use the first number in registering for the course during its first semester, and the second number during its second semester. The first half of such a course is prerequisite to the second half unless there is an explicit statement to the contrary. The instructor makes a final report on the student's work at the end of each semester. Unless otherwise noted, the student may take the first half only and receive final credit for it.

### CLASSIFICATION AND NUMBERING

Courses are classified and numbered as follows:

(1) *Undergraduate courses.* These are of two kinds, lower division and upper division.

(a) *Lower division courses* (numbered 1-49, or sometimes indicated by letters if in subjects usually given in a high school). A lower division course is one open to freshmen and to sophomores; such courses do not count as upper division work in any department.

(b) *Upper division courses* (numbered 100-199). An upper division course is one which is open only to those students who have completed a lower division course, or courses, in that department; or is an elementary course in a subject of such difficulty as to require the maturity of upper division students. The prerequisites for courses should be noted carefully. Students will not be permitted to register in upper division courses unless they have completed the courses named as prerequisites, or, if no courses are definitely named as prerequisites, until they have attained junior standing in the University. Accepted professional training, however, will be regarded as sufficient preparation for upper division courses in the field in which the student has been trained.

Special study courses for individual advanced undergraduates, usually numbered 199, should be restricted to senior honor students having an adequate background in the subject proposed for special study. This would normally require a sound background in upper division courses in the field of 199 course study.

The maximum number of units per student in any and all 199 courses in any one semester shall be limited to five.

Departments may offer special *honors courses* (marked H) in reading and



research, with credit to be determined by the instructors in charge, according to the performance of the individual students, subject to such general restrictions as may be imposed by the department, the College, or the Committee on Courses of Instruction of the Academic Senate. The work of the student in an honors course may consist of additional work in connection with other courses of instruction, or may be independent of such courses.

(2) *Graduate courses* (numbered 200-299). As a condition for enrollment in a graduate course the student must submit to the instructor in charge of the course satisfactory evidence of preparation for the work proposed; adequate preparation normally consists of the completion of at least 12 units of upper division work basic to the subject of the graduate course, irrespective of the department in which such basic work may have been completed.

(3) *Professional teacher-training courses* in the Department of Education and courses in other departments that are specially intended for teachers or prospective teachers (numbered 300-399).

(4) *Certain professional courses* in departments other than the Department of Education (numbered 400-499).

Courses are further classified as follows:

*Resident courses.*—Courses of resident instruction are given either during regular sessions or summer sessions or (by special arrangement) as 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. All such work is in the form of upper division or graduate extra-session courses, and these courses must be approved in advance by the Committee on Courses of Instruction. Moreover, in pursuance of existing regulations, students must register in advance for all such work, and this registration must be approved by the proper faculty before the work is undertaken.

*University Extension courses.*—In the curricula leading to the A.B. and B.S. degrees, credit is allowed for courses in University of California Extension that bear numbers prefixed by X, XB, XD, XL, XR, XSB, or XSF. Such courses are rated, with respect to the general and specific requirements for the bachelor's degree, on the same basis as courses taken in residence at collegiate institutions of approved standing.

For information concerning University Extension courses, apply to the Director, University Extension, University of California, Berkeley 4, California.

## AGRICULTURAL CHEMISTRY

(Committee Office, 237 Food Technology Building)

### Committee in Charge:

Maynard A. Amerine, Ph.D., *Professor of Enology.*  
Lawrence J. Andrews, Ph.D., *Professor of Chemistry.*  
Richard A. Bernhard, Ph.D., *Assistant Professor of Food Science and Technology.*

Clinton O. Chichester, Ph.D., *Associate Professor of Food Science and Technology (Chairman of the Executive Committee).*

Eric E. Conn, Ph.D., *Associate Professor of Plant Biochemistry.*

~~John P. Conrad, Ph.D., *Professor of Agronomy, Emeritus.*~~

Luther D. Davis, Ph.D., *Professor of Pomology.*

Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*

~~Harold Goss, Ph.D., *Professor of Animal Husbandry.*~~

Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*

James F. Guymon, Ph.D., *Professor of Enology.*

John L. Ingraham, Ph.D., *Assistant Professor of Enology.* *Enzymology*

Lloyd L. Ingraham, Ph.D., *Associate Professor of Biochemistry.*

Eugene L. Jack, Ph.D., *Professor of Food Science and Technology.*

Walter G. Jennings, Ph.D., *Assistant Professor of Food Science and Technology.*

Raymond M. Keefer, Ph.D., *Professor of Chemistry.*

Richard E. Kepner, Ph.D., *Professor of Chemistry.*

Max Kleiber, Sc.D., *Professor of Animal Husbandry.*

George L. Marsh, M.S., *Professor of Food Science and Technology.*

Thomas A. Nickerson, Ph.D., *Associate Professor of Food Science and Technology.*

Edgar P. Painter, Ph.D., *Professor of Chemistry.*

Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*

Herman J. Phaff, Ph.D., *Professor of Food Science and Technology.*

Harlan K. Pratt, Ph.D., *Associate Professor of Vegetable Crops.*

Harold G. Reiber, Ph.D., *Professor of Chemistry.*

Lloyd M. Smith, Ph.D., *Assistant Professor of Food Science and Technology.*

Clarence Sterling, Ph.D., *Professor of Food Science and Technology.* *Science & Tech.*

George F. Stewart, Ph.D., *Professor of Poultry Husbandry.* *Food Technology and Science*

Paul K. Stumpf, Ph.D., *Professor of Plant Biochemistry.*

Aloys L. Tappel, Ph.D., *Associate Professor of Food Science and Technology.*

Nikita P. Tarassuk, Ph.D., *Professor of Food Science and Technology.*

David H. Volman, Ph.D., *Professor of Chemistry.*

A. Dinsmoor Webb, Ph.D., *Professor of Enology.*

John R. Whitaker, Ph.D., *Assistant Professor of Food Science and Technology.*

Masatoshi Yamaguchi, Ph.D., *Lecturer in Vegetable Crops.*

Herbert A. Young, Ph.D., *Professor of Chemistry.*

Frederick P. Zscheile, Jr., Ph.D., *Professor of Agronomy.*

### GRADUATE COURSES

**290. Seminar in Agricultural Chemistry.** (1) I and II. Mr. Jennings  
One seminar is offered during each semester. One weekly meeting is held.

**299. Research in Agricultural Chemistry.** (1-6) I and II. The Staff  
The research work will ordinarily be under the direction of a member of the group who is in the field in which the student's preparation has been found to be adequate.

## AGRICULTURAL ECONOMICS

(Department Office, 118 Academic Office Building)

- Daniel B. DeLoach, Ph.D., *Professor of Agricultural Economics.*  
 Trimble R. Hedges, Ph.D., *Professor of Agricultural Economics.*  
 George L. Mehren, Ph.D., *Professor of Agricultural Economics (Chairman of the Department, Berkeley-Davis).*  
 James M. Tinley, Ph.D., *Professor of Agricultural Economics.*  
 Edwin C. Voorhies, B.S., *Professor of Agricultural Economics, Emeritus.*  
 Jerry Foytik, Ph.D., *Associate Professor of Agricultural Economics.*  
 Benjamin C. French, Ph.D., *Associate Professor of Agricultural Economics (Vice-Chairman of the Department). Lecturer*  
 Gordon A. King, Ph.D., *Associate Professor of Agricultural Economics.*  
 Chester O. McCorkle, Jr., Ph.D., *Associate Professor of Agricultural Economics.*  
 †J. Herbert Snyder, Ph.D., *Associate Professor of Agricultural Economics.*  
 Harold O. Carter, Ph.D., *Assistant Professor of Agricultural Economics.*  
 Gerald W. Dean, Ph.D., *Assistant Professor of Agricultural Economics.*  
 J. Edwin Faris, Jr., Ph.D., *Assistant Professor of Agricultural Economics.*  
 Curtis C. Harris, Jr., Ph.D., *Assistant Professor of Agricultural Economics.*  
 Allen B. Richards, Ph.D., *Assistant Professor of Agricultural Economics.*  
 H. Russell Shaw, Ph.D., *Assistant Professor of Agricultural Economics.*  
 Stephen H. Sosnick, Ph.D., *Assistant Professor of Agricultural Economics.*



- Douglas D. Caton, Ph.D., *Lecturer in Agricultural Economics.*  
 Warren K. Taylor, LL.B., *Lecturer in Business Law.*

*Letters and Science List.*—Agricultural Economics 18, 100A, 100B, 120, 125.

*Departmental Major Advisers.*—Mr. Dean, Mr. Harris, Mr. Richards, Mr. Sosnick.

*The Major.*—See pages 49–51.

### LOWER DIVISION COURSES

- 1. The Agricultural Industry.** (3) I. Mr. Voorhies  
 Comparison of agriculture with other industries: population, production, improvements, trends, etc. Historical sketch of the development of agriculture. Types of farming and their geographical distribution. Movements of agricultural products. Institutional aids to agriculture.
- 18. Business Law: Introduction.** (3) I. Mr. Taylor  
 Sophomore standing required. Not open to students with credit for Business Administration 18.  
 Introduction to law, contracts, sales, and agency.
- 49. Field Practice.** (1–6) I and II. Mr. Carter  
 Field trips to observe economic aspects of production, processing, handling, or marketing of California agricultural products. Various areas and problems—such as management, tenure, financing, taxation, labor practices, market functions, transportation—will be emphasized on the different trips.

### UPPER DIVISION COURSES

To graduate with a major in agricultural economics or agricultural business management a student must have at least a C average in all upper division courses taken in the major field.

† Absent on leave, fall semester, 1960–1961.

- 100A. Economic Analysis in Agriculture. (3) I.** Mr. Shaw  
 Prerequisite: Economics 1A-1B, and one course in statistics.  
 The application of economic principles to problems of agriculture: economic structure and aspects of American agriculture; analysis of demand, supply, and production of agricultural products with particular reference to the individual firm.
- 100B. Economic Analysis in Agriculture. (3) II.** Mr. Harris  
 Prerequisite: course 100A or equivalent.  
 The application of economic principles to the problems of agriculture: economic pricing of agricultural output and productive services, including multiple products, multiple markets and multiple time periods; regional specialization, location and trade; determinants of economic change; effects of economic organization.
- 106. Analysis of Agricultural Economic Data. (3) II.** Mr. Carter  
 Lectures and laboratory.  
 Prerequisite: Mathematics 13 or equivalent, Mathematics 16A or equivalent, or consent of the instructor.  
 Evaluation and treatment of economic data in agriculture with emphasis on methods of analyzing relations among economic variables.
- 110. Agricultural Finance. (3) I.** Mr. Voorhies  
 Prerequisite: Economics 1A or 1B.  
 Farmers' credit needs, methods of financing the agricultural industry, and the agencies supplying agricultural credit.
- 111. Managerial Accounting. (3) II.** Mr. Richards  
 Prerequisite: Economics 11A or equivalent.  
 Study of the use of accounting techniques in the management of agricultural businesses. Techniques covered include budgeting, systematic data, processing, normal and standard cost accounting, analysis of financial statements, and quantitative analysis of alternative courses of action.
- 115A-115B. Agricultural Business Management. (3-3) I and II.**  
 I. Mr. DeLoach; II. Mr. Foytik.  
 Prerequisite: Economics 1A or 1B or 11A or equivalent course (economic principles or elementary accounting), or consent of the instructor. Course 115A is not a prerequisite to 115B.  
 Application of management principles and practices to agricultural business; the economic and institutional aspects of organization and management of business firms; planning and control; industrial regulations; facilities planning; public activity in control and regulation of agricultural processing and marketing.
- \*120. Agricultural Policy. (3) II.** \_\_\_\_\_  
 Prerequisite: Economics 1A-1B.  
 The evolution of agricultural policy in the United States. Historical and analytical treatment of principal farmer movements, legislative provisions for the betterment of agriculture, and current policy problems.
- \*125. Comparative Agriculture. (3) II.** \_\_\_\_\_  
 Prerequisite: Economics 1A or 1B.  
 The agriculture of the principal countries of the world, with special reference to the influence of food supply upon the development of man.

\* Not to be given, 1960-1961.



An engineering class discusses models of farm structures.



The fine arts are playing an increasing role at Davis.

The University Band rehearses.





The Student Health Center, situated near the residence hall area.

The reference reading room of the Davis library.





**Robbins Hall, new home of the Botany and Entomology departments.  
At the entrance is the Freeborn Ash, planted on Arbor Day, 1960.**



**Range Management student  
observes grass rooting-depth  
studies.**



**130. Agricultural Marketing. (3) I. Mr. Sosnick**

Prerequisite: Economics 1A or 1B.

Survey of determinants of agricultural markets and trade. Organization and operation of agricultural markets. Cooperative marketing. Costs of marketing. Government in marketing. Changes in agricultural marketing and markets.

**135. Cooperation in Agriculture. (3) I. Mr. Tinley**

Types of cooperative agencies; scope and objectives of agricultural cooperation, functions, supply, services, insurance, irrigation, production, consumption, marketing; problems of organization, pooling management, member relations, financing, taxation, market control, demand creation, cost control; economic effects; legal, political, social aspects.

**140. Fundamentals of Farm Management. (4) I and II.**

I. Mr. Hedges; II. Mr. McCorkle.

Lectures and laboratory.

Prerequisite: junior standing.

Farm firm organization and resources; applying economic and technological principles in decision-making; analytical techniques and management control; problems in organizing and managing the farm business.

**145. Land Economics and Farm Appraisal. (3) II. Mr. Snyder**

Lectures and laboratory. One field trip is required.

Prerequisite: Economics 1A or 1B.

Appraisal of agricultural land, land utilization in relation to problems of development and valuation, use and appraisal of land and water resources, land and water policies.



Courses 160 to 180 are senior courses designed for those who have completed courses 100A, 100B, 106 and the appropriate survey course in the 120-145 series. A student not having this preparation but who desires a course in the 160-to-180 series may be admitted with the consent of the course instructor.

**160. Economic Analysis in Agricultural Marketing. (3) I. Mr. King**

An analytical treatment of agricultural marketing: the marketing firm in its economic context; location of agricultural production, processing, and trade; demand analysis; economic analysis of market organization; government in marketing; the marketing system and the general economy.

**165. Economic Analysis in Agricultural Business Management. (3) II.**

Mr. French

An analytical treatment of agricultural business management; procurement; production; processing; costing and pricing; planning and control; business analysis.

**170. Economic Analysis in Farm Management. (3) I. Mr. Faris**

An analytical treatment of farm management: farm organization, administration and management; costs and returns; combination of resources; enterprise combination; problems and principles of size; financial analysis; capital structure; relation of nonfarm influences to farm management.

**176. Economic Analysis in Resource Development and Use. (3) II.**

Mr. Snyder

An analytical treatment of resource use problems; economic productivity; rent and distribution theory; land use patterns; determinants of intensities and types of land use; resource conservation; land valuation; land tenure problems and policies.

**180. Economic Analysis in Agricultural Policy.** (3) I. Mr. Caton  
An analytical treatment of agricultural policy; economic appraisal of types of policies and policy problems; production, marketing and price; land; credit; markets, relations to national economic policy.

**198. Directed Group Study.** (1-5) I and II.  
Prerequisite: consent of the instructor. The Staff (Mr. French in charge)  
Directed group study of selected topics in agricultural economics for advanced undergraduates.

**199. Special Study for Advanced Undergraduates.** (1-5) I and II.  
The Staff (Mr. French in charge)  
Prerequisite: senior standing and approval of the department.  
Limited to majors in agricultural economics with a B average or higher.

#### GRADUATE COURSES

**250. Institutional Setting for Agricultural Business.** (3) I. Mr. Sosnick  
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.

**252. Administrative Organization and Behavior.** (3) I. Mr. Hedges  
Evaluation of the role of administration in the individual agricultural business firm; nature and theory of administration; contribution of the behavioral sciences; use of administrative tools in the organization and operation of the firm.

**253. Quantitative Analysis of Operational Problems.** (3) II. Mr. Richards  
Introduction to quantitative techniques used in analyzing operational problems of the business firm; statistical quality control; inventory control; waiting line problems; programming techniques as applied to transportation, product mix, and related production problems.

**256. Pricing and Business Forecasting.** (3) I. Mr. King  
Appraisal of price-forming mechanisms for market structures encountered by agriculture-related industries; price theory for product and factor markets; price policies for the firm; business fluctuations; forecasting prices and sales for the individual firm.

**257. Production Planning.** (3) II. Mr. French  
Analysis of cost and production relationships; statistical, economic, and engineering methods of cost measurement and analysis; problems of investment, location, scale of operations, diversification, and integration.

**260. Seminar in Management Policy Formation.** (3) II. Mr. Foytik  
Intensive study of business problems encountered by agricultural business firms and of the formulation of policies by top-management. Actual cases are stressed to illustrate decision-making for particular functions and for enterprises as a whole. Student papers will be required.

**299. Special Study for Graduate Students.** (1-4) I and II.  
The Staff (Mr. King in charge)  
Any properly qualified graduate student who wishes to pursue a special field of study may do so if his proposed program of study is acceptable to the members of the staff with whom he works.

**AGRICULTURAL EDUCATION**

(Department Office, 272 Academic Office Building)

- Sidney S. Sutherland, M.S., *Professor of Agricultural Education, Supervisor of Teacher Training—Vocational (Chairman of the Department)*.  
 Frederick L. Griffin, M.S., *Professor of Agricultural Education, Emeritus*.  
 Elwood M. Juergenson, Ph.D., *Associate Professor of Agricultural Education*.  
 Robert L. Johnson, Ph.D., *Assistant Professor of Agricultural Education*.  
 Orville E. Thompson, Ph.D., *Assistant Professor of Agricultural Education*.



- Arline Johnson, M.S., *Lecturer in Agricultural Education, Supervision of Teacher Training—Home Economics*.  
*Departmental Major Advisers*.—Mr. Juergenson, Mr. Thompson.  
*Credentials Counselors*:  
*Special Secondary—Agriculture*.—Mr. Juergenson.  
*Special Secondary—Home Economics*.—Miss Johnson.  
*The Major*.—See pages 51–52.

## UPPER DIVISION COURSES

- 160. Vocational Education.** (2) I and II. Mr. Thompson  
 Philosophy and organization of vocational education of less than college grade, with particular reference to educational principles for agriculture, commerce, homemaking, and industry.
- †**161. Problems in Vocational Education.** (2) I and II. Mr. Juergenson  
 Vocational surveys, junior employments, occupational analysis, trade tests, apprentice training, vocational education for adults, foremanship courses, corporation schools, current legislation, etc.
- 187. Extension Education in Agriculture and Home Economics.** (2) II.  
 Lectures and laboratory or field trip. Mr. Johnson  
 Prerequisite: junior or senior standing.  
 A study of the techniques of teaching agriculture and home economics as developed in the United States through the Agricultural Extension Service. Laboratory practice in extension methods such as program planning, demonstrations, discussions, use of bulletins, the press, visual aids. Field study of organization and programs.
- 188. Technical Journalism.** (3) I. Mr. Johnson  
 Lectures and laboratory.  
 Prerequisite: junior or senior standing.  
 Principles and techniques of presenting and interpreting technical information in agriculture and home economics to lay groups. Preparation and use of news and feature articles, circulars, radio and television scripts, and feature exhibits.
- 189. Adult Education.** (2) I and II. Mr. Sutherland  
 Prerequisite: Education 110 (may be taken concurrently).  
 Principles of adult education. Application of the principles of group leadership and group dynamics to the teaching of adults and to extension education in agriculture and home economics.
- 198. Directed Group Study.** (1–5) I and II.  
 The Staff (Mr. Sutherland in charge)

† Open only to apprentice teachers and graduate students.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.  
The Staff (Mr. Sutherland in charge)

## GRADUATE COURSE

290. **Vocational Education Seminar.** (2) I and II. Mr. Thompson  
For graduate students whose major interest is in vocational education, vocational guidance, or closely related problems.

## SUPERVISED TEACHING COURSES

- 20B. **Audio-Visual, Radio, and Other Instructional Resources.** (2) I and II.

I. Mr. Johnson; II. Mr. Juergenson.

Lectures, conferences, demonstrations, and school experience. Introduction to the materials and methods of audio-visual-radio education. Preparation of teaching materials; collecting, organizing, processing, and evaluating audio-visual materials.

- ‡320C. **Supervised Teaching.** (3) I and II.

Prerequisite: course 320A. Course 320E must be taken concurrently.

Sec. 1. Agriculture. Mr. Juergenson

Sec. 2. Homemaking. Miss Johnson

Directed teaching for candidates for the special credentials in agriculture and homemaking and for the general secondary and general elementary credentials.

- ‡320E. **Methods of Teaching.** (2) I and II.

Lectures, conferences, and laboratory.

All students enrolled in 320E must enroll in 320C concurrently.

Sec. 1. Agriculture. Mr. Juergenson

The principles and methods of teaching agriculture in the secondary schools of California in accordance with the provisions of the Federal and State Vocational Education Acts.

Sec. 2. Homemaking. Miss Johnson

Planning for teaching; basis for selection and organization of materials, their use and evaluation; teaching methods and classroom aids. Practices in class and department management. Relation of department programs to school and community.

- ‡323. **Practicum in Supervised Teaching.** (2-4) I and II.

Prerequisite: course 320C may be taken concurrently or experience as a teacher and consent of the instructor.

Sec. 1. Agriculture. Mr. Juergenson

Sec. 2. Homemaking. Miss Johnson

An opportunity to obtain more extended and varied experience under supervision. One hundred hours of work, including preparation and attendance at the professional methods section under course 320E is the minimum requirement.

←—————→

## AGRONOMY

(Department Office, 131 Hunt Hall)

† Robert W. Allard, Ph.D., *Professor of Agronomy.*

Fred N Briggs, Ph.D., *Professor of Agronomy.*

‡ Open only to apprentice teachers and graduate students. Courses 320C, 320E and 323 are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the semester in the public schools. Thus teaching assignments in the fall semester, 1960, will begin on or about August 31 and end January 29. For the spring semester, 1961, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

Agricultural Education 320A. Introduction to Teaching. (1) I and II. Mr. Juergenson

A limited number of juniors and seniors will be admitted. Lectures, conferences, and field work. Observations and participation in some form of public school work.

X AGRICULTURAL ENGINEERING

For courses in Agricultural Engineering see "Engineering" on page 163.

X FREDERICK T. Addicott Ph.D., Professor  
of Agronomy,  
1/1/61

~~John K. Cotter, Ph.D., Lecturer in Agronomy~~

1/61

RAY C. HUFFAKER, Ph.D., Lecturer in Agronomy

1/61

Paulden F. Knowles, Ph.D., *Professor of Agronomy.*

Horton M. Laude, Ph.D., *Professor of Agronomy.*

R. Merton Love, Ph.D., *Professor of Agronomy (Chairman of the Department).*

Maurice L. Peterson, Ph.D., *Professor of Agronomy.*

Francis L. Smith, Ph.D., *Professor of Agronomy.*

Ernest H. Stanford, Ph.D., *Professor of Agronomy.*

Frederick P. Zscheile, Jr., Ph.D., *Professor of Agronomy.*

John P. Conrad, Ph.D., *Professor of Agronomy, Emeritus.*

Ben A. Madson, B.S.A., *Professor of Agronomy, Emeritus.*

† Duane S. Mikkelsen, Ph.D., *Associate Professor of Agronomy.*

Charles W. Schaller, Ph.D., *Associate Professor of Agronomy.*

† William A. Williams, Ph.D., *Associate Professor of Agronomy.*

Robert S. Loomis, Ph.D., *Assistant Professor of Agronomy.*

Wyman E. Nyquist, Ph.D., *Assistant Professor of Agronomy.*

~~Douglas P. Ormrod, Ph.D., *Assistant Professor of Agronomy.*~~

Dale G. Smeltzer, Ph.D., *Assistant Professor of Agronomy.*

*resigned  
8/1/60*



Beecher Crampton, M.S., *Lecturer in Agronomy.*

X *Departmental Major Advisers.*—Mr. Laude, Mr. Smeltzer, Mr. Stanford.

*The Major.*—See pages 71–76.

#### LOWER DIVISION COURSE

##### 1. Introduction to Agronomy. (3) I.

*Laude*  
Mr. ~~Smeltzer~~ †

Lectures and laboratory.

The principles and practices of field crop production and soil management; a survey of the production and uses of field crops including pastures and other forages, cereals, edible legumes, oil, fiber, sugar, and green manure crops; laboratories and field trips to familiarize the student with production methods, plants and seeds, processing, and quality of field crops.

#### UPPER DIVISION COURSES

##### 111. Small Grains, Corn, Sorghum, and Beans. (3) II.

Mr. Schaller

Lectures and laboratory.

Prerequisite: course I or consent of the instructor.

Adaptation, distribution, culture, utilization, processing and factors determining quality of wheat, oats, barley, rye, rice, corn, sorghum, and field beans.

##### 112. Forage Crops. (3) II.

*Williams*  
Mr. ~~Peterson~~, Mr. Crampton

Lectures and laboratory.

Prerequisite: course I or consent of the instructor.

Crop-ecological principles in the establishment and management of such forages as irrigated pasture, hay, range, and silage; aspects of forage quality which affect feeding value to livestock. Multiple use capabilities of grasslands are stressed.

##### 113. Cotton, Sugar Beets and Miscellaneous Crops. (3) I.

Mr. Knowles

Lectures and laboratory.

Prerequisite: course I or consent of the instructor.

Adaptation, distribution, culture, utilization, processing and other factors determining quality of cotton and other fiber crops, sugar crops, oil crops, and miscellaneous crops.

† Absent on leave, 1960–1961.

‡ Absent on leave, fall semester, 1960–1961.

- 115. Range Improvement.** (3) II. Mr. Williams, Mr. Crampton  
Lectures and laboratory.  
Prerequisite: ~~a course in plant physiology and a course in plant ecology.~~ →  
A critical study of the interrelations of the primary factors involved in grassland improvement and utilization: climate, soil, vegetation, animals. Theories and current research on the effects of manipulation of these factors. Systematic relationships of grasses, legumes, forbs, and browse.
- 121. Principles of Plant Breeding.** (3) II. Mr. Knowles  
(Formerly course 114.)  
Lectures and laboratory.  
Prerequisite: Genetics 100.  
An introduction to plant breeding with emphasis on the genetic and cytological basis for plant improvement.
- 131. Physiology of Crop Plants.** (3) I. Mr. Loomis  
Prerequisite: course 1 or consent of instructor; Botany 7.  
Physiological processes of agronomic plants and their modification by environment. Selected aspects of vegetative and reproductive growth of crop plants and factors affecting the quality of crop products.
- 198. Directed Group Study.** (1-5) I and II. The Staff (Mr. Love in charge)  
Prerequisite: consent of the instructor.  
Directed group study of selected topics in agronomy for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff  
Prerequisite: 6 upper division units of agronomy.

## RELATED COURSES

- Weed Control (Botany 107)  
Water-Soil-Plant Relationships (Irrigation 100)  
Irrigation Principles and Practices (Irrigation 110)  
Elementary Statistics (Mathematics 13)  
Applied Statistical Methods (Mathematics 105)  
Diseases of Crop Plants (Plant Pathology 125A-125B)  
Introduction to Soil Science (Soil Science 1)  
Soil and Plant Relations (Soil Science 108)  
Soil Fertility (Soil Science 109)

Other courses related to agronomy are given in the departments of Agricultural Economics, Agricultural Engineering, Animal Husbandry, Botany, Genetics, and Soils and Plant Nutrition.

## GRADUATE COURSES

- \*205. Design of Field Experiments.** (2) I. Mr. Nyquist  
Lectures and laboratory.  
Prerequisite: Mathematics 105.  
The planning and analysis of field and related experiments with emphasis on the biological interpretation of results.  
Offered in alternate years.
- 206. Chemical and Physical Methods in Biological Research.** (3) I and II. Mr. Zscheile  
Lectures and laboratory.  
Prerequisite: Chemistry 5 and 9 or their equivalents.  
Advanced laboratory techniques and instrumental methods of analytical chemistry in biological research. Includes an introduction to laboratory research methods, preparation of samples, principles and operation of research instruments and laboratory practice in methods of plant analysis.

\* Not to be given, 1960-1961.



- 221. Advanced Plant Breeding.** (3) II. Mr. Stanford  
Lectures and laboratory.  
Prerequisite: course 121 or equivalent.  
Advanced topics in plant breeding. Genetic diversity and centers of origin of cultivated plants, mating systems in plants, polyploidy, host-pathogen relationships, role of mutagenesis in plant breeding and other topics of current interest.
- 222. Quantitative Genetics and Plant Improvement.** (3) I. Mr. Allard  
(Formerly course 130.)  
Lectures and laboratory.  
Prerequisite: course 121 or consent of the instructor; Mathematics 105.  
A survey of the genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in alternate years.
- 290. Seminar in Agronomy.** (1) I and II. Mr. Peterson  
Prerequisite: graduate standing.  
Technical topics of current interest in agronomy will be discussed. Students will prepare and present reports to the seminar.
- 299. Research in Agronomy.** (1-6) I and II. The Staff  
Original research involving plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops or of range and pasture plants.

## AMERICAN CIVILIZATION

(Committee Office, 178 Academic Office Building)

### Committee in Charge:

- Joseph A. Baird, Jr., Ph.D., *Associate Professor of Art.*  
—, *Associate Professor of English.*  
Arthur Child, Ph.D., *Professor of Philosophy.*  
Warren S. Gramm, Ph.D., *Assistant Professor of Economics.*  
W. Turrentine Jackson, Ph.D., *Professor of History.*  
Clyde E. Jacobs, Ph.D., *Associate Professor of Political Science.*  
Kenneth Kammeyer, Ph.D., *Instructor in Sociology.*  
John R. Owens, Ph.D., *Assistant Professor of Political Science.*  
Theodore J. Shank, Ph.D., *Assistant Professor of Dramatic Art.*  
James H. Shideler, Ph.D., *Professor of History.*  
Richard G. Swift, M.A., *Assistant Professor of Music.*  
T. Elliot Weier, Ph.D., *Professor of Botany.*  
Robert A. Wiggins, Ph.D., *Associate Professor of English.*

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Group Major Advisers.*—Mr. Baird, Mr. Owens, Mr. Wiggins.

*The Major Program.*—See description, page 97.

*The Major with Honors.*—See description, page 98.

### UPPER DIVISION COURSES

- 194H. Special Study for Honors Students.** (3) I and II. The Staff  
Prerequisite: enrollment limited to honors students in American civilization.

**196. The Role of Natural Science in American Civilization. (3) II.**

Mr. Weier

Prerequisite: junior standing. History 4A-4B and a laboratory course in science are desirable.

A study of selected problems of natural science in relation to American civilization, past and present.

**197H. Special Study for the Comprehensive Examination for Honors**

Students. (3) I and II.

The Staff

Prerequisite: completion of all other major requirements for the A.B. degree in American civilization.

Study for a written and oral examination by an interdepartmental committee, the members to be chosen from the student's instructors in American civilization courses.

**199. Special Study for Advanced Undergraduates. (1-3) I and II. The Staff**

## RECOMMENDED COURSES

**Group A: Art 119B. The Art of the United States.**

Dramatic Art 150. American Drama.

English 125E. The American Novel.

English 137A-137B. Survey of American Literature.

Music 128. Musical Literature: Music in the United States.

Philosophy 135A. Contemporary Tendencies: British-American.

**Group B: Economics 110. Economic History.**

History 174A-174B. Recent History of the United States.

History 176A-176B. Social and Cultural History of the United States.

History 178A-178B. Great Issues in United States History: Ideas and Interpretations.

History 179. Economic Growth of the United States.

History 180. The Westward Movement to 1850.

History 183. The Trans-Mississippi Frontier.

**Group C: Economics 121. Industrial Organization.**

Economics 150. Labor Economics.

Geography 121. The Geography of Anglo-America.

Political Science 113. American Political Theory.

Political Science 128A. Recent American Foreign Policy.

Political Science 157A-157B. American Constitutional Law.

Political Science 163. Political Parties.

Political Science 166. Public Policy and the Governmental Process.

Sociology 123. American Society.

**ANIMAL HUSBANDRY**

(Department Office, 128 Animal Science Building)

Harold H. Cole, Ph.D., *Professor of Animal Husbandry.*Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*Paul W. Gregory, Sc.D., *Professor of Animal Husbandry.*Max Kleiber, Sc.D., *Professor of Animal Husbandry.*Sylvester W. Mead, M.S., *Professor of Animal Husbandry.*William C. Weir, Ph.D., *Professor of Animal Husbandry.*Harold Goss, Ph.D., *Professor of Animal Husbandry, Emeritus.*Carroll E. Howell, M.S., *Professor of Animal Husbandry, Emeritus.*William M. Regan, Sr., M.A., *Professor of Animal Husbandry, Emeritus.*James F. Wilson, M.A., LL.D., *Professor of Animal Husbandry, Emeritus.*

†James M. Boda, Ph.D., *Associate Professor of Animal Husbandry.*  
 Floyd D. Carroll, Ph.D., *Associate Professor of Animal Husbandry.*  
 Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*  
 Hubert Heitman, Jr., Ph.D., *Associate Professor of Animal Husbandry.*  
 Robert C. Laben, Ph.D., *Associate Professor of Animal Husbandry.*  
 Glen P. Lofgreen, Ph.D., *Associate Professor of Animal Husbandry.*  
 James H. Meyer, Ph.D., *Associate Professor of Animal Husbandry (Chairman of the Department).*  
 Wade C. Rollins, Ph.D., *Associate Professor of Animal Husbandry.*  
 G. Eric Bradford, Ph.D., *Assistant Professor of Animal Husbandry.*  
 Robert G. Loy, Ph.D., *Assistant Professor of Animal Husbandry.*  
 Magnar Ronning, Ph.D., *Assistant Professor of Animal Husbandry.*  
 Glenwood M. Spurlock, Ph.D., *Assistant Professor of Animal Husbandry.*



Moses T. Clegg, Ph.D., *Assistant Professor of Veterinary Medicine.*

*Letters and Science List.*—Animal Husbandry 101, 105, 107, 110, 120, 130.

*Departmental Major Advisers.*—Mr. Bradford, Mr. Cupps, Mr. Heitman, Mr. Laben, Mr. Ronning, Mr. Spurlock.

*The Major.*—See pages 59–62.

#### LOWER DIVISION COURSES

**7. Introduction to Animal Husbandry.** (3) I. Mr. Cole

A survey of the sources of the world's supply of animal products, the distribution of domestic animals in the United States and factors influencing this; the origin, characteristics, and adaptation of the more important breeds and the influence of environment upon their development.

**8. Type Evaluation in Livestock Selection.** (1) I. Mr. Meyer  
 Laboratory.

Prerequisite: course 7.

The animal form in relation to its various functions.

#### UPPER DIVISION COURSES

**\*101. Animal Biochemistry.** (3) I. \_\_\_\_\_

Prerequisite: Chemistry 8.

The chemistry of animal food constituents, tissues, hormones, and excretory products; chemistry of enzymes and digestion; the fate of foodstuffs in metabolism; survey of fundamentals of blood chemistry.

**\*102. Animal Biochemistry Laboratory.** (3) I. \_\_\_\_\_

Lectures and laboratory.

Prerequisite: course 101 (may be taken concurrently).

**103. Feeds and Feeding.** (3) II. Mr. Weir

Prerequisite: Chemistry 8.

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; the balancing of rations. Not open for credit to animal husbandry majors.

**105. Elements of Animal Nutrition.** (3) II. Mr. Meyer

Prerequisite: course 101.

A study of the fundamental principles of animal nutrition. Includes a survey of the role of carbohydrates, proteins, lipids, minerals, vitamins and

\* Not to be given, 1960–1961.

† Absent on leave, 1960–1961.

water in nutrition; methods used in evaluation of feeds; nutrient requirements for productive function.

**106. Animal Nutrition Laboratory. (3) II.** Mr. Lofgreen  
Lectures and laboratory.

Prerequisite: a course in biochemistry or quantitative analysis and a course in nutrition or in feeds and feeding.

A study of nutrition through animal experimentation, including studies of deficiency symptoms, nutritional balances and measures of the usefulness of feeds.

**107. The Genetics of Animal Breeding. (3) II.** Mr. Rollins  
Lectures and laboratory.

Prerequisite: Genetics 100.

The application of modern genetics to livestock improvement; the principles underlying inbreeding, outbreeding, assortative mating, mass selection, progeny testing, and family selection.

**109. The Composition and Use of Feedstuffs. (2) I.** Mr. Ronning  
Lectures and laboratory.

Prerequisite: course 105.

The composition of feedstuffs and its relation to the feeding of livestock; preparation of balanced rations; study of feedlot and range and pasture feeding of livestock; discussion of new developments in livestock feeding.

**110. Physiology of Domestic Animals. (5) I.** Mr. Boda  
Lectures and laboratory.

Prerequisite: Chemistry 8; Zoology 1A-1B.

The physiology of the neuromuscular, central nervous, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems.

**111. Advanced Type Evaluation in Livestock Selection. (2) II.**  
Laboratory. Mr. Heitman, Mr. Bradford

Prerequisite: course 8.

Studies of recognized type standards in livestock with a critical evaluation of the bases for the criteria used in establishing these standards. Correlation of type of the live animal with the quality of the carcass.

**112. Milk Production. (3) I.** Mr. Mead  
Lectures and laboratory.

Prerequisite: course 103 or 105.

A study of the basic principles involved in the breeding, feeding, and management of dairy cattle and a survey of dairying in California.

**113. Sheep Production. (3) I.** Mr. Bradford  
Lectures and laboratory.

Prerequisite: courses 103 or 105, 107 and 110.

Application of principles of nutrition and genetics to production of sheep and wool; characteristics and adaptability of breeds; management of flocks under range and farm conditions; marketing of wool and lambs.

**114. Advanced Dairy Cattle Production. (3) II.** Mr. Laben  
Lectures and laboratory.

Prerequisite: courses 103 or 105, 107 and 110.

The principles of milk production and sources of variation in milk yield. Current literature on ruminant nutrition, dairy breeding and genetics, reproductive physiology, milk secretion, and dairy herd management.

- 115. Horse Production. (3) II.** Mr. Loy  
Prerequisite: course 103 or 105.  
Care, feeding, management, and problems of production of all classes of horses. Developing successful breeding programs. The use of horses for power and pleasure.
- 116. Advanced Type Evaluation in Dairy Cattle. (2) II.** Mr. Cupps  
Laboratory.  
Prerequisite: course 8.  
Studies of recognized type standards in dairy cattle with a critical evaluation of the bases for the criteria used in establishing these standards.
- 117. Swine Production. (2) II.** Mr. Heitman  
Lectures and laboratory.  
Prerequisite: courses 103 or 105, 110; Genetics 100.  
The relation of nutrition, heredity, physiology, climatology and economics to feeding, breeding and management of swine; pork products and consumer demands; marketing.
- 118. Meat Production. (3) II.** Mr. Spurlock  
Lectures and laboratory.  
Prerequisite: courses 7, 8, 103 or 105 (may be taken concurrently); Genetics 100.  
Improvement of meat type through selection for heritable traits; comparative reproductive and feed efficiency; environmental adaptability and distribution; management for growth and fattening for meat. Not open for credit to animal husbandry majors.
- 119. Beef Cattle Production. (2) I.** Mr. Carroll  
Lectures and laboratory.  
Prerequisite: courses 103 or 105, 107 and 110.  
Improving performance through selection for heritable traits; reproduction problems; climatic adaptability; growth characteristics; effect of fattening on carcass composition; beef quality as affected by age, finish, and type.
- 120. Metabolism and Food Utilization. (3) I.** Mr. Kleiber  
Prerequisite: course 105 or equivalent.  
Physical, chemical and physiological principles in animal nutrition especially bioenergetics and biokinetics. Energy transformations (chemical energy, work and heat) in animals. Metabolic paths, pools, turnover rates and precursor-product relationships involved in the formation of animal products.
- 121. Physiology of Reproduction. (3) II.** Mr. Cupps  
Lectures and laboratory.  
Prerequisite: course 110.  
The physiological mechanisms related to reproduction, breeding efficiency and fertility with special reference to domestic animals.
- 124. Introduction to Animal Breeds and Management. (2) I.** Mr. Cole, Mr. Ronning  
Prerequisite: first-year standing in the School of Veterinary Medicine.  
The characterization and uses of important breeds and species of animals from the standpoint of veterinary medicine; animal management with an emphasis on western regional practices. Livestock, poultry and fur bearing animals will be considered.

**125. Nutritional Principles of Livestock Feeding. (2) I.** Mr. Lofgreen  
Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor.

The application of principles of nutrition to the solution of problems in animal feeding. Nutritive requirements for maintenance and productive functions, nutritional disorders, composition and use of feedstuffs.

**130. Physiology of the Endocrine Glands. (3) II.** Mr. Clegg  
Prerequisite: course 110 or equivalent.

Control of endocrine secretion and the physiological effects of the hormones with emphasis on endocrine problems relating to domestic animals.

**198. Directed Group Study. (1-3) I and II.** The Staff (Mr. Meyer in charge)  
Prerequisite: consent of the instructor.

Group study of selected topics relating to livestock production.

**199. Special Study for Advanced Undergraduates. (1-5) I and II.**  
The Staff (Mr. Meyer in charge)

#### RELATED COURSES

**Principles of Pathology and Control of Diseases of Domestic Animals**  
(Veterinary Science 111)

**Poultry Pathology Laboratory** (Veterinary Science 112)

#### GRADUATE COURSES

**290. Seminar in Animal Husbandry. (1) I and II.**  
The Staff (Mr. Meyer in charge)

Reports and discussions of topics of interest in the fields of animal husbandry, animal nutrition, animal physiology or animal genetics.

**299. Research in Animal Husbandry. (1-6) I and II.** The Staff

Research may be undertaken in the fields of animal husbandry, animal nutrition, animal physiology, or animal genetics.

## ANIMAL PHYSIOLOGY

(Adviser's Office, 130 Poultry Husbandry Building)

### *Members of the Animal Physiology Group:*

Ursula H. Abbott, Ph.D., *Assistant Professor of Poultry Husbandry.*

Arthur L. Black, Ph.D., *Associate Professor of Biochemistry.*

†James M. Boda, Ph.D., *Associate Professor of Animal Husbandry.*

Floyd D. Carroll, Ph.D., *Associate Professor of Animal Husbandry.*

Moses T. Clegg, Ph.D., *Assistant Professor of Veterinary Medicine.*

Harold H. Cole, Ph.D., *Professor of Animal Husbandry.*

Charles E. Cornelius, D.V.M., Ph.D., *Assistant Professor of Veterinary Medicine.*

Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*

Frederic W. Hill, Ph.D., *Professor of Poultry Husbandry.*

Louis W. Holm, Ph.D., *Professor of Physiology.*

Logan M. Julian, D.V.M., Ph.D., *Associate Professor of Veterinary Science.*

Jiro J. Kaneko, D.V.M., Ph.D., *Assistant Professor of Clinical Pathology.*

Clarence F. Kelly, M.S., *Professor of Agricultural Engineering.*

Max Kleiber, Sc.D., *Professor of Animal Husbandry.*

Charles R. Kovacic, Ed.D., *Professor of Physical Education.*

~~David S. Kronfeld, D.V.S.C., B.S.C., Lecturer in Veterinary Medicine.~~

† Absent on leave, 1960-1961.

Frederick W. Lorenz, Ph.D., *Professor of Poultry Husbandry (Chairman of the Group)*.

Robert G. Loy, Ph.D., *Assistant Professor of Animal Husbandry*.

Frank X. Ogasawara, Ph.D., *Assistant Professor of Poultry Husbandry*.

Stuart A. Peoples, M.D., *Professor of Comparative Pharmacology*.

Lauren E. Rosenberg, Ph.D., *Professor of Zoology*.

George W. Salt, Ph.D., *Associate Professor of Zoology*.

Arthur H. Smith, Ph.D., *Associate Professor of Poultry Husbandry*.

Wilbur O. Wilson, Ph.D., *Professor of Poultry Husbandry*.

Instruction in Animal Physiology is not organized as a single administrative unit in the University, but the relevant courses are offered by a number of departments, and are coordinated by the Group in Animal Physiology. An undergraduate major is offered within the animal science curriculum.

*Letters and Science List*.—Animal Physiology 100.

*Group Major Adviser*.—Mr. Lorenz.

*The Major*. See pages 59–62.

#### UPPER DIVISION COURSES

##### \*100. General Physiology. (4) I.

Mr. Smith

Lectures and laboratory.

Prerequisite: Chemistry 1A–1B, 8; Physics 2A–2B; Physiology 1, 1L, or Zoology 1A–1B, or Botany 1. Recommended: biochemistry; mammalian physiology; Animal Husbandry 110; Mathematics 16A–16B.

Lectures and laboratory on the physical and chemical processes of cells and tissues.

Offered in fall semester of odd-numbered years.

##### 120A. Comparative Physiology. (3) I. The Staff (Mr. Clegg in charge)

Prerequisite: systemic physiology (Animal Husbandry 110 or Veterinary Science 140) which may be taken concurrently. Recommended: Zoology 106.

A description and comparison of the diverse ways in which a wide variety of animals perform physiological functions with special reference to integrative mechanisms and reproduction.

Offered in alternate years.

##### 120B. Comparative Physiology. (3) II. The Staff (Mr. Boda in charge)

Prerequisite: systemic physiology (Animal Husbandry 110 or Veterinary Science 140) which may be taken concurrently. Recommended: Zoology 106. Course 120A is not prerequisite to 120B.

A description and comparison of the diverse ways in which a wide variety of animals perform physiological functions with special reference to respiration, circulation, digestion, and excretion.

Offered in alternate years.

##### 199. Special Study for Advanced Undergraduates. (1–5) I and II.

Mr. Lorenz

#### GRADUATE COURSE

##### 243. Use of Isotopes as Tracers in Biological Research. (2) I.

(Formerly course 143.)

The Staff (Mr. Black in charge)

Discussion of the use of isotopes as tracers in biological systems.

##### 243L. Laboratory in Use of Isotopes as Tracers in Biological Research.

(2) I.

The Staff (Mr. Black in charge)

Laboratory.

\* Not to be given, 1960–1961.

Laboratory practice in handling radioisotopes and their application in biological research.

290. **Seminar in Animal Physiology.** (1) I and II.

The Staff

Discussion and critical evaluation of advanced topics and current trends in research.

#### RELATED COURSES

**Mammalian Physiology** (Animal Husbandry 110, Veterinary Science 140, 140L)

**Metabolism and Food Utilization** (Animal Husbandry 120, Poultry Husbandry 150)

**Physiology of Reproduction** (Animal Husbandry 121)

**Physiology of the Endocrine Glands** (Animal Husbandry 130)

**General Cytology** (Botany 130)

**Kinesiology** (Physical Education 103A-103B)

**Introductory Physiology** (Physiology 1, 1L, see Zoology)

**Avian Physiology** (Poultry Husbandry 107, 108)

**Environmental Physiology of Domestic Animals** (Poultry Husbandry 149)

**Physiological Chemistry** (Veterinary Science 101, 101L)

**Intermediary Metabolism of Animals** (Veterinary Science 105, 275, Bacteriology 103, Biochemistry 150A, 150B)

**Experimental Physiology** (Veterinary Science 265)

0-1-4-0

## ANTHROPOLOGY AND GEOGRAPHY

(Department Office, 344 Academic Office Building)

David L. Olmsted, Ph.D., *Associate Professor of Anthropology (Chairman of the Department)*.

Martin A. Baumhoff, Ph.D., *Assistant Professor of Anthropology.*

Howard F. Gregor, Ph.D., *Assistant Professor of Geography.*

Kenneth Thompson, Ph.D., *Assistant Professor of Geography.*

———, *Assistant Professor of Anthropology.*



\* Herbert B. Schultz, Ph.D., *Lecturer in Geography.*

The department encourages individual group majors combining anthropology and geography with each other or with other appropriate disciplines. For assistance in preparing such majors, students should consult the departmental advisers whose names follow:

*Departmental Advisers:* Anthropology: Mr. Olmsted  
Geography: Mr. Thompson

#### ANTHROPOLOGY

*Letters and Science List.*—All undergraduate courses in anthropology are included in the Letters and Science List of Courses (see page 106).

#### LOWER DIVISION COURSES

1. **Physical Anthropology.** (3) I.

Mr. Baumhoff

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.



Anthropology 124. Comparative Religion. (3) II.

Mr. Olmsted

Prerequisite: course 2 or consent of the instructor.

An anthropological analysis of the origins, elements, forms, and symbolism of religion; functional interpretation with stress on ethnographic materials.

Anthropology 128. Kinship and Social Organization. (3) II

Mr. Baumhoff

Prerequisite: course 2.

Kinship systems and their significance in the organization of social life. Theories of kinship, marriage regulations, and kinship role patterns.

Animal Physiology 291. Seminar in General  
Physiology. (1) II. The Staff (Mr.  
Smith in charge)

Discussion of selected topics concern-  
ing the physical and chemical processes  
of cells and tissues.

x Daniel J. Crowley, Ph.D., Assistant  
Professor of Anthropology  
(see also ART) 1/61

x FRITZ J. GRUNDBACHER, Ph.D., Assistant in Anthropology  
7/1/60

**2. Cultural Anthropology. (3) II.**

Mr. Olmsted

The study of the prehistory and growth of culture; the diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion.

UPPER DIVISION COURSES

**102. Ethnology. (3) I.**

Mr. Olmsted

Prerequisite: course 2, or consent of the instructor.

Major theories of culture; survey of principal culture types and their distribution; discussion of ethnological problems.

**103. Culture Growth. (3) II.**

Mr. Baumhoff

Prerequisite: consent of the instructor.

Comparative prehistory and archaeology; development and attainments of Mesopotamian, Egyptian, Indus, Chinese, Peruvian, and Mexican civilizations.

**\*105. The American Indian. (3) II.**

Mr. Baumhoff

Prerequisite: course 2, or consent of the instructor.

An introductory survey of the Indians of North and South America; origins, languages, civilizations, and history.

**110A. Elementary Linguistic Analysis. (3) I.**

Mr. Olmsted

Phonetics, phonemics, morphophonemics, morphemics, tactics.

**110B. Language and Culture. (3) II.**

Mr. Olmsted

Prerequisite: course 110A.

Linguistic prehistory, historical linguistics and reconstruction. Dialect geography. The relations of language and other cultural systems.

**\*139. Peoples of Africa. (3) I.**

Mr. Olmsted

Prerequisite: course 2, or consent of the instructor.

Peoples and cultures of Africa: survey and comparative analysis of representative societies and cultures in the area.

**195. Field Course in Archaeological Method. (2) I.**

Mr. Baumhoff

Prerequisite: consent of instructor.

Lectures, museum preparation, and week-end excavations. Enrollment limited to twenty students. With consent of the instructor, may be repeated without duplication of credit.

**196. Archaeological Method. (2) II.**

Mr. Baumhoff

Prerequisite: course 195 and consent of the instructor.

Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. Enrollment limited to eighteen students. With consent of the instructor, may be repeated without duplication of credit.

**199. Special Study for Advanced Undergraduates. (1-3) I and II.**

Investigation of special problems. The Staff (Mr. Olmsted in charge)

**GEOGRAPHY**

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

\* Not to be given, 1960-1961.

## LOWER DIVISION COURSES

- 1. Introduction to Physical Geography.** (3) I and II. The Staff  
A study of the basic physical elements of geography (especially climate, landforms, soils, and natural vegetation), and their integrated patterns of world distribution.
- 2. Introduction to Cultural Geography.** (3) I. Mr. Thompson  
A study of the basic cultural elements of geography (especially population distribution, general settlement and land-use patterns, and economies) and their correlation with the physical elements. Delimitation of the major geographic regions of the world.
- 3. Introduction to Climate and Weather.** (2) I. Mr. Schultz  
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.

## UPPER DIVISION COURSES

- 121. The Geography of Anglo-America.** (3) II. Mr. Gregor  
Prerequisite: courses 1 and 2 or consent of the instructor.  
A geographical survey of the major natural and economic regions of the United States, Canada, and Alaska.
- 123. The Geography of Europe.** (3) I. Mr. Thompson  
Prerequisite: courses 1 and 2 or consent of the instructor.  
A study of the geographic conditions and their relation to the economic, social, and political problems of Europe, excluding the USSR.
- 131. Geography of California.** (3) I. Mr. Gregor  
A study of the geographical regions of California: landforms, climate, and other physical characteristics; agricultural, mineral, and other resources; and patterns of settlement, population, transportation, and economy.
- 141. Economic Geography.** (3) II. Mr. Gregor  
A geographical analysis of the distribution and production of the world's major agricultural and mineral raw materials.
- 143. Political Geography.** (3) II. Mr. Thompson  
Areal differentiation of the natural and cultural phenomena that affect the world's political organization.
- 161. The Conservation of Natural Resources.** (3) II. Mr. Gregor  
The general principles of conservation and their application, especially in the United States.
- 199. Special Study for Advanced Undergraduates.** (1-3) I and II.  
Investigation of special problems. The Staff (Mr. Thompson in charge)

## PROFESSIONAL COURSE

- 300. Problems in Teaching Geography.** (1) II. The Staff  
Prerequisite: course 1 or 2.  
Problems in establishing, organizing, and conducting courses in geography and regional study. Designed primarily for prospective elementary and secondary school teachers of the social sciences.

\* Daniel J. Crowley, Ph D, Assistant  
Professor of ART 1/1/60

X William T. Brown, M. A., ASSISTANT IN ART. <sup>needed in studies</sup> (see also Anthropology) 2/8/60

X Joel ISAACSON, M. A., Assistant IN ART.

**ART**

(Department Office, 323 Academic Office Building)

Richard L. Nelson, M.A., *Professor of Art (Chairman of the Department)*.Joseph A. Baird, Jr., Ph.D., *Associate Professor of Art*.Seymour Howard, Ph.D., *Assistant Professor of Art*.Ralph M. Johnson, M.A., *Assistant Professor of Art*.Roland C. Petersen, M.A., *Assistant Professor of Art*.Wayne Thiebaud, M.A., *Assistant Professor of Art*.\* *Letters and Science List*.—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).*Departmental Major Advisers*.—Mr. Howard, Mr. Johnson, Mr. Nelson, Mr. Petersen.*Preparation for the Art Major*.—Courses 2A-2B, 3A-3B, and 6 units chosen from courses 1A, 1B, 1C, and 1D.*The Major*.—A student may elect a major emphasizing Appreciation and Practice of Art or History of Art.

I. Appreciation and Practice of Art. Twelve units of Group A courses under two different artists, 2 units of Group B, 4 units of Group C, and 6 units chosen from Group A, B, or C.

II. History of Art. Required: 12 units of Group C of which 6 units must be in an historical sequence such as 154A-154B; Art 190; and 9 additional units of any courses in Group A, B, or C. Students planning to do advanced work in History of Art are urged to develop their knowledge of foreign languages (especially French and German) as early as possible.

*Transfer Students*.—Transfer students who have fulfilled unit requirements elsewhere are: (a) required to take an examination in order to qualify for Group A courses, and (b) are requested to present examples of their work done in other institutions before being admitted to classes and before credit can be given toward the major for work done elsewhere.

Students who qualify will be advised to take course 195 in order to acquaint themselves with the methods expected for this department's advanced courses. The department will recommend for graduation only students with at least a grade C average in the major.

## LOWER DIVISION COURSES

1A. History of Ancient Mediterranean Art. (3) I. Mr. Howard

From the Stone Age to the end of the Roman Empire.

Field trips are included.

1B. History of Medieval, Renaissance, and Modern Art. (3) II. Mr. Baird

Emphasis on Painting.

Field trips are included.

1C. History of Medieval, Renaissance, and Modern Art. (3) II.

Emphasis on Architecture and Sculpture.

Mr. Howard

Field trips are included.

1D. History of Oriental Art. (3) I.

Mr. Baird

The art of India, China, and Japan.

Field trips are included.

2A-2B. Elementary Form and Color. (2-2) I and II.

Laboratory.

Mr. Johnson, Mr. Petersen, Mr. Thiebaud

Beginning each semester.

2A: Form in composition using black and white media.

2B: Introduction to color in composition.

Field trips are included.

**3A-3B. Intermediate Form and Color. (2-2) I and II.**

Laboratory.

Mr. Johnson, Mr. Petersen

Beginning each semester.

Prerequisite: course 2A-2B.

3A: Color and form in composition.

3B: Form in composition using the human figure as subject.

Field trips are included.

**10. Introduction to Art. (2) I and II.**

Mr. Nelson

Open to nonmajors.

The understanding and appreciation of painting, sculpture, architecture, and industrial art. Consists of illustrated lectures.

**14A. Sculpture. (2) I.**

Mr. Johnson

Introduction to basic elements of three-dimensional construction and relief in clay and plaster.

**14B. Sculpture. (2) II.**

Mr. Johnson

Prerequisite: course 14A.

Introduction to space design, using the human figure as a motif, with construction in clay, plaster, wood and stone.

**16. Descriptive Drawing and Rendering. (2) I.**

Mr. Nelson

Lectures and laboratory.

Methods of objective drawing and of space description; rendering in various media.

**17. Problems in Illustration. (2) I.**

Mr. Howard

Lectures and laboratory.

An introduction to methods of rendering and illustrating in various media, with emphasis on pen or brush and ink. Special attention is given to problems of interpretation of subject and of reproduction in publications.

**UPPER DIVISION COURSES**

**Group A: Appreciation and Practice**

Prerequisite: courses 2A-2B, 3A-3B.

The various courses in Group A differ in content, use of materials, type of subject matter, etc., depending upon the individual aims of the artists in charge. All courses in this group may be repeated indefinitely without duplication of credit, and part A is not prerequisite to part B.

The subject matter will range from still-life and landscape to life classes, figure and mural compositions.

The materials used will range from charcoal and *sumi* to water color, gouache, egg tempera, oil, mixed technique, and fresco painting.

**101A-101B. Advanced Drawing and Painting. (2-2) Yr.**

Mr. Thiebaut

Laboratory.

Prerequisite: courses 2A-2B, 3A-3B. Course 101A is not prerequisite to 101B.

Representational composition based upon out-of-door subjects in any medium.

**102A-102B. Advanced Drawing and Painting. (2-2) Yr.**

Mr. Petersen

Laboratory.

Prerequisite: courses 2A-2B, 3A-3B. Course 102A is not prerequisite to 102B.

Art 12. Ceramics. (2) II. Mr. Howard  
Laboratory.

An introduction to ceramic forms  
and ceramic sculpture.



Art 141. Sculpture: Methods and Materials.

(2) I. Mr. Johnson

Laboratory.

Prerequisite: course 14B; or consent of the instructor.

Advanced three-dimensional design featuring the use of stone, wood, metal, and plaster.

Art 142. The Human Figure in Sculpture.

(2) II. Mr. Johnson

Laboratory.

Prerequisite: courses 14B, 3B; or consent of the instructor. Recommended: courses 107, 141.

Design exercises in three dimensions and relief, featuring the human figure as subject matter.

Art 150. The Art of Primitive Peoples. (3) II.

Mr. Crowley

A study of primitive art in relation to stylistic and cultural developments.

Composition with the human figure as a basic motif. Paintings in various media including oil, tempera, gouache, and wax.

Field trips are included.

**129. Graphic Arts. (2) II.**

Mr. Petersen

Laboratory.

Prerequisite: course 2A-2B.

Methods of engraving, etching, aquatint, dry point, and lithography.

X

X

**Group B: Theory and Criticism**

**107. The Human Figure in Art. (2) II.**

Mr. Nelson

Prerequisite: courses 2A-2B, 3A-3B.

Problems of light, color, and space that involve the human figure and its environment.

**Group C: History of Art**

Open to nonmajors. General prerequisite: upper division standing and consent of the instructor.

**119A. The Art of Latin America. (3) I.**

Mr. Baird

Emphasis on the architecture, sculpture, and painting of Mexico from pre-conquest to contemporary times. The arts of the American southwest, Inca and colonial architecture of Peru, and the modern architecture of Brazil.

**119B. The Art of the United States. (3) II.**

Mr. Baird

A survey of three centuries of American art, with emphasis on colonial, nineteenth-century, and modern architecture, and on painting and sculpture from 1850 to the present in the United States.

Field trips are included.

**154A. History of Greek Art. (3) II.**

Mr. Howard

Prerequisite: course 1A or consent of the instructor.

From the Archaic period to the late Hellenistic period.

Offered in alternate years.

**154B. History of Roman Art. (3) II.**

Mr. Howard

Prerequisite: course 1A or consent of the instructor.

Course 154A is not prerequisite to 154B.

From the Republic through the beginning of the Christian Era.

Offered in alternate years.

**178. Baroque Art. (3) I.**

Mr. Baird

Painting, sculpture, architecture, and the art of the garden from the formative stages of the Baroque style to the Rococo.

Field trips are included.

**183A. European Painting in the Nineteenth Century. (3) I.**

Mr. Howard

Field trips are included.

**\*183B. European Painting in the Twentieth Century. (3) II.**

Mr. Baird

Field trips are included.

**190. Museum Methods and Connoisseurship. (3) II.**

Mr. Baird

Lectures and laboratory.

Prerequisite: one semester art history or consent of the instructor.

An introduction to problems of media and connoisseurship; methods of preservation and authentication in the graphic arts: drawing, etching, engraving and lithography. Museum trips; visiting lecturers.

\* Not to be given, 1960-1961.

## Special Study Courses

195. **Special Study in Appreciation and Practice of Art.** (2) I and II.  
Lectures and laboratory. The Staff  
Prerequisite: 8 units of appreciation and of practice work or equivalent, taken at another university. Admission only by consent of instructor. May not be repeated for credit.
198. **Directed Group Study.** (1-4) I and II.  
Mr. Nelson, Mr. Petersen, Mr. Howard
199. **Special Study for Advanced Undergraduates.** (1-4) I and II.  
Mr. Nelson

## GRADUATE COURSES

201. **Advanced Practice in Selected Painting and Drawing Techniques.**  
(3) I and II. The Staff  
Lectures and laboratory.  
Original works produced for group discussion and criticism. May be repeated for credit.
220. **Seminar in Art.** (3) I and II. The Staff  
Seminar in the practice of painting and drawing. Original works produced for group discussion and criticism. Topics of a contemporary and historical nature. May be repeated for credit.
298. **Special Study for Graduate Students.** (1-6) I and II. The Staff

**BACTERIOLOGY** 2-2-1-0

(Department Office, 1076C Haring Hall)

- Robert E. Hungate, Ph.D., *Professor of Bacteriology (Chairman of the Department)*.  
Mortimer P. Starr, Ph.D., *Professor of Bacteriology*.  
Courtland S. Mudge, Ph.D., *Professor of Bacteriology, Emeritus*.  
Allen G. Marr, Ph.D., *Associate Professor of Bacteriology*.  
Donald M. Reynolds, Ph.D., *Associate Professor of Bacteriology*.  
Monica Riley, Ph.D., *Assistant Professor of Bacteriology*.



- John L. Ingraham, Ph.D., *Assistant Professor of Enology*.  
Herman J. Phaff, Ph.D., *Professor of Food Science and Technology*.  
Reese H. Vaughn, Ph.D., *Professor of Food Science and Technology*.  
George K. York, II, Ph.D., *Assistant Professor of Food Science and Technology*.

*Letters and Science List.*—All undergraduate courses in bacteriology except course 105A-105B are included in the Letters and Science List of Courses (see page 106).

*The Major in Microbiology.*—To permit a broader training than possible within the usual major in bacteriology, a major in microbiology is offered. This permits a proper balance of studies in bacteriology with the auxiliary chemical and biological sciences.

A major in microbiology is appropriate for those students contemplating a career in medical technology.

*Major Advisers.*—Mr. Marr, Mr. Reynolds.

*The Major Program*

(A) Lower Division Courses.—Required: Bacteriology 1; Botany 1; Chemistry 1A-1B, and 8; Physics 2A-2B; Zoology 1A. Recommended: Chemistry 9; Mathematics 16A-16B; elementary courses in German and French.

(B) Upper Division Courses.—Required: Bacteriology 100 and at least 5 units of other upper division courses in bacteriology; Chemistry 5, Biochemistry 101, 101L. In addition, at least 5 units from the following list with the approval of the major adviser (in special cases, substitutions may be permitted): Bacteriology 103, 104, 105B, 199; Botany 114, 119; Chemistry 109; Genetics 100; Veterinary Science 124; Zoology 110.

All students majoring in microbiology are required to take a comprehensive final examination during the final semester of the senior year. The examination carries no credit value.

All courses required for the major must be completed with at least a grade of C.

*Honors and Honors Program* (see page 107).—The honors program comprises course 194H, an acceptable thesis, and superior performance on the regular departmental comprehensive examination.

*Graduate Study*.—The 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 personnel of the departments of Biochemistry, Botany, Food Science and Technology, and Chemistry, the Enology Laboratory, and the School of Veterinary Medicine. For detailed information regarding graduate study in microbiology address the Graduate Adviser in Microbiology, Department of Bacteriology.

#### LOWER DIVISION COURSE

1. **Introduction to Microbiology.** (4) II. Mr. Reynolds  
Lectures and laboratory.  
Prerequisite: Chemistry 1A; one course in botany, zoology, or physiology (Botany 1, Zoology 1A or 10, Physiology 1, or equivalent).  
A general introduction to microbiology.

#### UPPER DIVISION COURSES

A grade of C or higher in introductory bacteriology is required for admission to upper division courses.

100. **Advanced Bacteriology.** (5) I. Mr. Marr  
Lectures and laboratory.  
Prerequisite: course 1; Chemistry 8; Physics 2B.  
Microscopy, cytology and growth of microorganisms, effects of the physico-chemical environment, and microbial genetics.
103. **Microbial Metabolism.** (2) I. Mr. Hungate  
Prerequisite: course 1; Biochemistry 101.  
A survey of the metabolic activities of microbes.
104. **Advanced General Microbiology.** (4) I. Mr. Starr  
Lectures and laboratory.  
Prerequisite: course 1; Chemistry 8.  
Intensive study of selected groups of microbes, techniques of enrichment culture, ecology, and principles of classification.
- 105A. **Food and Industrial Microbiology.** (2) I.  
Mr. Vaughn, Mr. York, Mr. Ingraham  
Prerequisite: course 1; Chemistry 1A-1B, 8.  
Microbiology of food fermentations (including the vinous fermentation but not brewing), food processing, food spoilage and the disposal of wastes.

For laboratory to accompany this course, students should register in Food Technology 105A.

**105B. Food and Industrial Microbiology.** (2) II.

Mr. Ingraham, Mr. Phaff, Mr. Reynolds

Prerequisite: course 1; Chemistry 1A-1B, 8. Course 105A is not prerequisite to 105B.

Microorganisms and their activity in relation to industrial processes such as baking, brewing, production of industrial alcohol, yeast, solvents, vitamins, enzymes, antibiotics, and other drugs. For laboratory to accompany this course, students should register in Food Technology 105B.

**194H. Special Study for Honors Students.** (3) I and II. The Staff  
Laboratory.

Prerequisite: course 100 and at least one additional upper division course in microbiology; consent of instructor.

Open to honors students. Designed to provide experience in preparation of an honors thesis.

**199. Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff  
Prerequisite: consent of the instructor based on adequate preparation of the student in allied fields.

Investigation of special problems.

GRADUATE COURSES

**202. Seminar in Bacteriology and Microbiology.** (1) I and II.

Mr. Starr, Mr. Hungate

**\*203. Selected Topics in Microbial Metabolism.** (2) II. Mr. Marr

Prerequisite: course 103.

Lectures and discussions. Metabolic pathways of microbes, comparative biochemistry, and enzymology.

May be repeated once for credit.

**204. Microbial Biochemistry.** (3) I. Mr. Marr

Lectures and laboratory.

Prerequisite: course 103.

Discussions of aspects of microbial biochemistry including manometry, spectrophotometry, chromatography, use of radioactive tracers, and isolation and purification of enzymes.

Enrollment limited to 5 students selected by consultation with the instructor during the registration period.

**205. Bacterial Taxonomy.** (2) I. Mr. Starr

Principles of classification. Nomenclatural systems and codes. Evolution and phylogeny of bacteria and other microorganisms. Determinative methods, manuals and schemes.

**299. Special Study and Research in Microbiology.** (1-6) I and II. The Staff

RELATED COURSES

**Comparative Morphology of Nonvascular Plants** (Botany 114)

**Mycology** (Botany 119)

**Dairy Bacteriology** (Dairy Industry 142)

**Food and Industrial Microbiology Laboratory** (Food Technology 105A-105B)

\* Not to be given, 1960-1961.

Bacteriology 207. Bacterial Genetics. (3)

Mrs. Riley

Prerequisite: course 1; Biochemistry 1

Recommended: Genetics 100.

The mechanisms for transmission of hereditary traits in microorganisms, with emphasis on bacteria and bacteriophage.

limited

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Biochemistry 201L. General Biochemistry  
Laboratory. (5) I. Mr. Chaykin  
Lectures and laboratory.

Prerequisite: course 101 (may be  
taken concurrently); Chemistry 5.

Laboratory methods and procedures in  
biochemistry. Designed for graduate  
students who desire an intensive and  
comprehensive training in modern biochem-  
ical techniques.

Yeasts and Related Organisms (Food Science and Technology 216)  
 Intermediary Metabolism (Biochemistry 150A-150B)  
 Enzymology (Biochemistry 210)  
 Biochemical Mechanisms (Biochemistry 205)  
 Soil Microbiology and Soil Biochemistry (Soils and Plant Nutrition 111)  
 Immunology (Veterinary Science 126)  
 Medical Microbiology (Veterinary Science 127)  
 Protozoology (Zoology 110)

## BIOCHEMISTRY

(Department Office, 265 Hoagland Hall)

Paul K. Stumpf, Ph.D., *Professor of Plant Biochemistry (Chairman of the Department)*.

Eric E. Conn, Ph.D., *Associate Professor of Plant Biochemistry*.

Lloyd L. Ingraham, Ph.D., *Associate Professor of Enzyme Chemistry*.

Sterling Chaykin, Ph.D., *Assistant Professor of Animal Biochemistry*.

*Departmental Major Adviser.*—Mr. Stumpf.

The department does not offer an undergraduate major in this subject. For graduate study the Department of Biochemistry cooperates with the Group in Comparative Biochemistry for work leading to the M.S. degree and Ph.D. degree in comparative biochemistry.

### UPPER DIVISION COURSES

101. **General Biochemistry.** (3) I. Mr. Conn

Prerequisite: Chemistry 8 or 112A. Recommended: an 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.

101L. **General Biochemistry Laboratory.** (3) I. Mr. Chaykin

Lectures and laboratory.

Prerequisite: course 101 (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.

150A. **Intermediary Metabolism.** (3) I. Mr. Chaykin, Mr. Conn, Mr. Stumpf

Prerequisite: course 101 or equivalent. Recommended: Chemistry 150A.

Comparative biochemistry of respiration, oxidative phosphorylation and metabolism of carbohydrates and lipids.

150B. **Intermediary Metabolism.** (3) II. Mr. Chaykin, Mr. Conn, Mr. Stumpf

Prerequisite: course 101 or equivalent. Recommended: Chemistry 150B.

Comparative metabolism of amino acids, proteins, porphyrins, and nucleic acids.

### GRADUATE COURSES

205. **Biochemical Mechanisms.** (2) I. Mr. Ingraham

Prerequisite: courses 101; Chemistry 109 or 110A-110B or equivalent, 131.

Bond structures of biochemical interests. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.



**210. Enzyme Chemistry. (3) II.**

Mr. Ingraham, Mr. Stumpf

Prerequisite: course 101 or equivalent; Chemistry 109 or 110A-110B.  
 Recommended: Chemistry 112A-112B.

Chemical and physical-chemical properties of coenzymes and enzymes; their role in biochemical processes.

**210L. Enzyme Chemistry Laboratory. (3) II.**

Mr. Ingraham

Laboratory.

Prerequisite: courses 101L and 210 (210 may be taken concurrently); or consent of instructor.

Experimental methods of enzyme chemistry.

**222. Plant Biochemistry. (2) II.**

Mr. Conn, Mr. Stumpf

Prerequisite: course 101 or equivalent.

The chemistry of important plant constituents, and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

**290. Seminar in Biochemistry. (1) I and II.**

The Staff

**299. Research in Biochemistry. (1-6) I and II.**

The Staff

## RELATED COURSES

**Metabolism and Food Utilization** (Animal Husbandry 120)

**Use of Isotopes as Tracers in Biological Research** (Animal Physiology 143)

**Microbial Metabolism** (Bacteriology 103)

**Chemistry of Natural Products** (Chemistry 150A-150B)

**The Natural Coloring Matters** (Food Technology 120)

**Intermediary Metabolism of Animals** (Veterinary Science 105)

## GRADUATE COURSES

**Selected Topics in Microbial Metabolism** (Bacteriology 203)

**Microbial Biochemistry** (Bacteriology 204)

**Plant Cell Metabolism** (Botany 211)

**Physical Biochemistry** (Chemistry 213)

**BIOLOGICAL SCIENCES**

(Committee Office, 249 Animal Science Building)

*Committee in Charge:*

Robert E. Hungate, Ph.D., *Professor of Bacteriology.*

Milton A. Miller, Ph.D., *Professor of Zoology (Chairman of the Committee).*

T. Elliott Weier, Ph.D., *Professor of Botany.*

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Major Advisers.*—Mr. Hungate, Mr. Miller, Mr. Weier.

*The Major Program.*—See description, page 98.

*Honors and Honors Program* (see page 107).—The Honors Program comprises courses 194H, 195H, or 197H. These courses are in addition to the 24-unit requirement in upper division courses.

## UPPER DIVISION COURSES

**194H. Special Study for Honors Students. (2-4) I and II.**

The Staff (Mr. Miller in charge)

Prerequisite: enrollment limited to honors students.

Independent research and/or reading on selected topics.

x Paul A. Castelfranco, Ph.D., Lecturer in Botany. 2/1/61

x JOE L Key, Ph.D. Lecturer in Botany

**195H. Honors Thesis.** (1) I and II.

The Staff (Mr. Miller in charge)

Prerequisite: course 194H.

Preparation of comprehensive thesis incorporating studies undertaken in course 194H.

**197H. Special Survey of the Biological Sciences.** (3) I and II.

The Staff (Mr. Miller in charge)

Prerequisite: enrollment limited to honors students in their final undergraduate semester.

Studies designed to integrate the fields of biological sciences followed by a written and oral comprehensive examination. Study and examination under the supervision of an appropriate interdepartmental committee.

**BOTANY**

(Department Office, 143 Robbins Hall)

Vernon I. Cheadle, Ph.D., *Professor of Botany.*Alden S. Crafts, Ph.D., *Professor of Botany (Chairman of the Department).*Herbert B. Currier, Ph.D., *Professor of Botany.*Katherine Esau, Ph.D., *Professor of Botany.*C. Ralph Stocking, Ph.D., *Professor of Botany.*T. Elliot Weier, Ph.D., *Professor of Botany.*Ernest M. Gifford, Jr., Ph.D., *Associate Professor of Botany.*John M. Tucker, Ph.D., *Associate Professor of Botany.*Kenneth Wells, Ph.D., *Assistant Professor of Botany.*Floyd M. Ashton, Ph.D., *Lecturer in Botany and Assistant Professor of Agricultural Botany.*\* Chester L. Foy, Ph.D., *Lecturer in Agricultural Botany.*\* ~~Oliver A. Leonard, Ph.D., *Lecturer in Botany.*~~

3-1-61

Jack Major, Ph.D., *Assistant Professor of Agricultural Botany.**Letters and Science List.*—All undergraduate courses except Botany 8, 107, and 155 are included in the Letters and Science List of Courses (see page 106).*Departmental Major Adviser.*—Mr. Wells.*The Major Program*

The courses in botany are organized on levels of increasing specialization corresponding to the elementary, intermediate, and the advanced stages of instruction. Requirements for the major are: Chemistry 1A, 8; the elementary course, Botany 1; the intermediate courses, Botany 7, 108, 114, and 116; of the additional required 13 upper division units, with the approval of the major adviser, 6 units may be elected from the upper division courses in allied fields.

German, French, Physics 2A-2B, 3A-3B, and elementary courses in other biological sciences are recommended.

Students wishing to prepare for employment as seed analysts should confer with the major adviser about recommended course selections in other departments.

*Honors and Honors Program* (see page 107).—The honors program comprises 8 units of the following: courses 105, 110, 119, 120A, 120B, 121A, 121B, or 130; course 194H, to be taken during the senior year.*Graduate Study.*—Graduate programs leading to M.A., M.S., and Ph.D. degrees are offered in cytology, plant physiology, anatomy, taxonomy, ecology, mycology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

## LOWER DIVISION COURSES

**1. General Botany.** (5) I and II.

Lectures and laboratory. Mr. Weier, Mr. Stocking, Mr. Tucker, Mr. Wells  
An introduction to the morphology, physiology, and genetics of flowering plants; brief survey of the plant kingdom including fungi causing plant diseases.

**7. Introduction to Plant Physiology.** (4) II.

Mr. Stocking  
Prerequisite: course 1; Chemistry 1B or 8 (may be taken concurrently).  
The fundamental activities of plants, such as absorption, transpiration, synthesis of foods, respiration, growth, movement, and reproduction.

**8. Poisonous Plants.** (2) II.

Mr. Tucker  
Lectures and laboratory.  
Identification, distribution, toxic principles, nature of injury and animals affected, and plant control measures.

## UPPER DIVISION COURSES

In addition to requirements specifically noted, the prerequisite for all upper division courses is Botany 1.

**Morphology and Taxonomy****105. Plant Anatomy.** (4) II.

Miss Esau  
Lectures and laboratory.  
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) II.

Mr. Ashton  
Lectures and laboratory.  
Prerequisite: Chemistry 1B or 8.  
Introduction to the physiological and chemical principles underlying control of weeds; principles of preventive, cultural, and biological weed control; identification of common weeds.

**108. Systematic Botany of Flowering Plants.** (3) II.

Mr. Tucker  
Lectures and laboratory.  
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.

**114. Comparative Morphology of Nonvascular Plants.** (4) II.

Mr. Gifford, Mr. Wells  
Lectures and laboratory.  
Prerequisite: course 1, Bacteriology 1, or equivalent.  
Introduction to structure and reproduction of the algae and fungi with special emphasis on distribution and ecology; field trips.

**116. Comparative Morphology of Vascular Plants.** (4) I.

Mr. Gifford  
Lectures and laboratory.  
Introduction to structure, reproduction, and evolution of the major groups of living and extinct vascular plants; special emphasis given to seed plants.

**117. Plant Ecology.** (3) II.

Mr. Major  
(Formerly course 110.)  
Lectures and laboratory.  
Prerequisite: course 7. Recommended: course 108 and a course in soil science.

Study of individual plants, species, and vegetation in relation to environment, and of modification of the environment by vegetation.

**119. Mycology. (4) I.**

Mr. Wells

Lectures and laboratory.

Prerequisite: course 1; Chemistry 1A. Recommended: Chemistry 8.

Introduction to structure, relationships, life cycles, and nutritional and environmental requirements of selected species of fungi.

## RELATED COURSES

Pathogenic Fungi (Plant Pathology 124)

Fruit Morphology (Pomology 110)

~~Plant Physiology and Plant Biochemistry~~~~120A-120B. Plant Physiology. (2-2) Yr.~~

Mr. Currier

Prerequisite: course 7 or consent of the instructor, Chemistry 8. Recommended: Biochemistry 101 or Chemistry 101.

The cell as a physicochemical system, water relations, mineral nutrition, translocation; plant metabolism including enzymes, photosynthesis, respiration, and various aspects of growth.

**121A-121B. Plant Physiology Laboratory. (2-2) Yr.**

Mr. Currier

Laboratory.

Prerequisite: course 120A-120B (may be taken concurrently).

Laboratory methods and procedures in plant physiology. Experiments selected to follow subject matter sequence of course 120A-120B.

**Cytology and Genetics****130. General Cytology. (4) I.**

Mr. Weier

Lectures and laboratory.

Prerequisite: Genetics 100.

Structure and function of the plant and animal cell as a unit: cytoplasm and cytoplasmic inclusions, the somatic nucleus, chromosome structure and activity during mitosis and meiosis, development of gametes and their activity during fertilization.

## RELATED COURSES

Cytogenetics (Genetics 101)

Cytogenetics Laboratory (Genetics 101L).

**General Courses****155. Plant Microtechnique. (3) I.**

Mr. Gifford, Mr. Weier

Lectures and laboratory.

Prerequisite: course 116 or 105, or equivalent.

Introduction to theory and 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.

**194H. Special Study for Honors Students. (3) I and II.**

The Staff

Laboratory.

Prerequisite: open only to majors of senior standing in the honors program.

Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a thesis.

**199. Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff

GRADUATE COURSES

**203. Seminar in Plant Physiology.** (1) I and II.

Mr. Crafts, Mr. Currier, Mr. Stocking

Survey and discussion of recent developments in the field of plant physiology at the graduate level.

**208. Seminar in Plant Morphology.** (1) I and II.

Miss Esau, Mr. Cheadle, Mr. Gifford, Mr. Tucker, Mr. Weier

Survey and discussion of recent developments in the field of plant morphology at the graduate level.

**210. Cell Physiology-Protoplasmatics.** (3) II.

Mr. Currier

Lectures and laboratory.

Prerequisite: courses 120A-120B, 121A-121B. Recommended: course 105 and/or course 130.

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, effect of poisons. Microscopic techniques are stressed.

Offered in alternate years.

**\*211. Plant Cell Metabolism.** (3) I.

Mr. Stocking

Lectures and laboratory.

Prerequisite: consent of the 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.

Offered in odd-numbered years.

**212. Physiology of Herbicidal Action.** (3) I.

Mr. Crafts

Lectures and laboratory.

Prerequisite: courses 107, 120A-120B, 121A-121B.

Lectures and laboratory exercises on the fundamental processes of absorption, translocation, and physiological action of herbicides. Greenhouse studies on toxicants applied through the soil and applied to foliage. Greenhouse culture, toxicity rating, autoradiography, and chromatography.

Offered in alternate years.

**231. Advanced Microtechnique.** (3) II.

Mr. Weier, Mr. Gifford

Lectures and laboratory.

Prerequisite: one of the following: course 105, 116, 130; Zoology 107. Recommended: course 155 or Zoology 104.

Autoradiography, thin sectioning, freeze drying, micrurgy, Feulgen staining, cytospectrophotometry, and similar techniques. Laboratory work involving techniques of special interest to the student.

**291. Seminar in Plant Morphology.** (1) I and II.

The Staff

Survey and discussion of recent developments in the field of plant morphology.

**299. Research in Botany.** (1-6) I and II.

The Staff

\* Not to be given, 1960-1961.

x ~~John L. Cotter, Ph. D., Lecturer in~~  
7-60 → 1-61  
x J. DAVID DAVIS, M.S., Assistant in ~~Chemistry~~ Chemistry  
2/1/61 #61

## CHEMISTRY

(Department Office, 32 Chemistry Building)

Lawrence J. Andrews, Ph.D., *Professor of Chemistry (Chairman of the Department)*.

Raymond M. Keefer, Ph.D., *Professor of Chemistry*.

Richard E. Kepner, Ph.D., *Professor of Chemistry*.

Edgar P. Painter, Ph.D., *Professor of Chemistry*.

Harold G. Reiber, Ph.D., *Professor of Chemistry*.

David H. Volman, Ph.D., *Professor of Chemistry*.

Herbert A. Young, Ph.D., *Professor of Chemistry*.

Thomas L. Allen, Ph.D., *Associate Professor of Chemistry*.

Robert K. Brinton, Ph.D., *Associate Professor of Chemistry*.

Albert T. Bottini, Ph.D., *Assistant Professor of Chemistry*.

Charles P. Nash, Ph.D., *Assistant Professor of Chemistry*.

John E. Warren, Ph.D., *Assistant Professor of Chemistry*.

✕ *Letters and Science List*.—All undergraduate courses in chemistry are included in the Letters and Science List of Courses (see page 106).

*Major Subject Advisers*.—Mr. Keefer, Mr. Kepner.

### CHEMISTRY MAJOR PROGRAMS

Students who are interested in chemistry as a profession should elect the program leading to the Bachelor of Science degree which meets the standards recommended by the American Chemical Society for professional training in chemistry. Those students desiring a less intensive program in chemistry or wishing to emphasize biochemistry 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*

(A) Lower Division Courses.—Chemistry 1A–1B, 5; Physics 4A, 4B, 4C; Mathematics 3A, 3B, 4A, 4B; and a reading knowledge of German.

(B) Upper Division Courses.—Chemistry 105, 110A–110B, 111, 112A–112B and 6 units of any additional courses in chemistry (one of which must include laboratory work) except Chemistry 101 and 109.

#### *Bachelor of Arts Major Program*

(A) Lower Division Courses.—Chemistry 1A–1B, 5; Physics 2A, 2B, 3A, 3B; Mathematics 16A–16B.

(B) Upper Division Courses.—Twenty-four units in chemistry, biochemistry, or physics, including Chemistry 110A–110B, 112A, and 112B or 112C.

*Honors and Honors Program* (see page 107).—The honors program comprises 4 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. Prospective candidates for advanced degrees in chemistry may specialize in agricultural, biological, inorganic, organic, or physical chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry.

### LOWER DIVISION COURSES

#### 1A. General Chemistry. (5) I and II.

The Staff (I. Mr. Keefer in charge; II. Mr. Allen in charge)



Lectures and laboratory.

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-semester standing. Admission will be determined (when necessary) on the basis of the student's high school grades and his proficiency in arithmetic and first-year algebra.

**1B. General Chemistry (Qualitative Analysis).** (5) I and II.

The Staff (I. Mr. Brinton in charge; II. Mr. Volman in charge)

Lectures and laboratory.

Prerequisite: course 1A.

**5. Quantitative Analysis.** (3) I and II. I. Mr. Nash; II. Mr. Brinton

Lectures and laboratory.

Prerequisite: course 1B with grade of C or higher.

A short course dealing with the principles and methods of quantitative analysis.

**8. Short Survey of Organic Chemistry.** (3) I and II.

I. Mr. Reiber; II. Mr. Andrews

Prerequisite: course 1A or 1B with a grade of C or higher.

An introductory study of the compounds of carbon.

**9. Methods of Organic Chemistry.** (3) I.

Mr. Painter

Lectures and laboratory.

Prerequisite: course 1B with a grade of C or higher and course 8, which should be taken concurrently.

An experimental study of the physical properties and chemical reactions of the common classes of organic substances.

UPPER DIVISION COURSES

**101. General Biochemistry.** (3) II.

Mr. Painter

Prerequisite: course 8 or 112A with a grade of C or higher, or consent of the instructor.

The chemistry of carbohydrates, fats, proteins, amino acids, nucleic acids, and related compounds in plant and animal tissues. The role of these compounds in life processes.

**105. Advanced Quantitative Analysis.** (3) II.

Mr. Brinton

Lectures and laboratory.

Prerequisite: course 5.

**109. Physical Chemistry, Brief Course.** (3) II.

Mr. Young

Prerequisite: course 5; one year of college physics; Mathematics 16A or equivalent.

Graduate students of high standing may, under exceptional circumstances, be admitted without the prerequisite course in chemistry.

Special topics in physical chemistry.

**110A. Physical Chemistry.** (3) I.

Mr. Volman

Prerequisite: course 5; Mathematics 4A or 16B; one year of college physics.

The general principles of physical chemistry and elementary thermodynamics.

**110B. Physical Chemistry.** (3) I and II.

I. Mr. Warren; II. Mr. Keefer

Prerequisite: course 110A.

A continuation of course 110A.

Chemistry 126. Nuclear Chemistry. (3) II.

Mr. Warren

Prerequisite: course 110B.

Natural and artificial radioactivity;  
nuclear structure and transformations;  
interaction of nuclear radiations with  
matter; distribution of nuclei in nature.

Chemistry 126L. Nuclear Chemistry Laboratory. (1) II.

Mr. Warren

Laboratory.

Prerequisite: course 126 (may be taken  
concurrently).

Application of chemical techniques in  
the study of nuclear reactions.

- 111. Physical Chemistry.** (3) I and II. Mr. Nash  
Lectures and laboratory.  
Prerequisite: course 110B (may be taken concurrently) or course 109 and Mathematics 16B.  
Physicochemical measurements and laboratory experiments illustrating some of the important principles of physical chemistry.
- 112A. General Organic Chemistry.** (5) II. Mr. Reiber  
Lectures and laboratory.  
Prerequisite: course 1B with a grade of C or higher.  
A course with some emphasis on modern theoretical concepts designed primarily for majors in chemistry. With course 112B, a broader coverage of organic chemistry than courses 8 and 9.
- 112B. General Organic Chemistry.** (5) I. Mr. Kepner  
Lectures and laboratory.  
Prerequisite: course 112A or 8 and 9.  
A continuation of course 112A.
- 112C. General Organic Chemistry.** (3) I. Mr. Kepner  
Prerequisite: course 112A or 8 and 9; and consent of instructor.  
Equivalent to the lecture part of 112B. Intended primarily for graduate students in fields other than chemistry. Except in very unusual circumstances undergraduates will enroll in 112B rather than 112C.
- 124. Advanced Inorganic Chemistry.** (3) I. Mr. Allen  
Lectures and laboratory.  
Prerequisite: course 105, and 109 or 110B.  
Selected groups of inorganic compounds are studied with the aid of modern physicochemical concepts.
- X **130. Qualitative Organic Analysis.** (3) II. Mr. Bottini  
Lectures and laboratory.  
Prerequisite: courses 5 and 112B or 112C.  
The application of physical and chemical techniques to the qualitative identification of organic compounds.
- 131. Advanced Organic Chemistry.** (3) I. Mr. Bottini  
Prerequisite: course 109 or 110A; 112B or 112C.  
Selected topics of preparative organic chemistry including enolate condensations and reactions of organometallic compounds. Application of current knowledge of reaction mechanisms, bond energies and molecular structure to problems of organic synthesis.
- 150A. Chemistry of Natural Products.** (2) I. Mr. Painter  
Prerequisite: courses 109 and 112B or consent of the instructor.  
Structure, reactions, and physical properties of carbohydrates, lipids and related compounds. Mechanisms of type reactions involving the major functional groups.
- 150B. Chemistry of Natural Products.** (2) II. Mr. Painter  
Prerequisite: courses 109 and 112B or consent of the instructor. Course 150A is not a prerequisite to 150B.  
Structure, reactions, and physical properties of proteins, amino acids, nucleic acids, and related nitrogen compounds.
- 194H. Undergraduate Research.** (2-5) I and II. The Staff  
Prerequisite: course 110B (may be taken concurrently).  
Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff

Prerequisite: consent of the instructor based upon adequate preparation in chemistry, mathematics, and physics.

Investigation of special problems to be selected according to the preparation and needs of the individual.

## GRADUATE COURSES

\*204. **Chemical Kinetics.** (3) II.

Mr. Keefer

A consideration of important classes of chemical reactions in gaseous and condensed phases. Experimental methods, and application of theory.

Offered in alternate years.

205. **Quantum Chemistry.** (3) I.

Mr. Allen

The quantum theory and its chemical applications.

Offered in alternate years.

213. **Physical Biochemistry.** (3) II.

Mr. Volman

The application of physical-chemical principles to selected topics of biological interest.

Offered in alternate years.

214. **Physical Chemistry—Thermodynamics.** (3) I.

Mr. Young

Prerequisite: open to graduate students who have satisfactory foundation in physical chemistry, physics, and mathematics.

The principles of thermodynamics, with examples of their application to chemistry.

Offered in alternate years.

215. **Statistical Thermodynamics.** (3) II.

Mr. Nash

Prerequisite: course 214.

A development of statistical thermodynamics with applications to selected topics of chemical interest.

Offered in alternate years.

220A. **Organic Chemistry.** (3) II.

Mr. Kepner

Selected topics of current interest concerning the structure and synthesis of the more complex organic compounds with emphasis on heterocyclic systems.

Offered in alternate years.

\*220B. **Organic Chemistry.** (3) II.

Mr. Bottini

Selected topics of current interest concerning the structure and synthesis of the more complex organic compounds with emphasis on acyclic and homocyclic systems.

Offered in alternate years.

223. **Physical Organic Chemistry.** (3) I.

Mr. Andrews

Modern concepts of substitution, elimination, and addition reactions, rearrangements and stereochemistry.

290. **Seminar.** (1) I and II.

Mr. Kepner

Prerequisite: consent of instructor.

The subjects covered will vary from year to year and will be announced at the beginning of each semester.

299. **Research.** (2-9) I and II.

The Staff

The laboratory is open to qualified graduate students who wish to pursue

\* Not to be given, 1960-1961.

+ HENRY P. GRAY, M.A., Lecturer in Economics

x Charles C. SMITH, **MBA**, Lecturer in ECONOMICS  
7/1/60

original investigation. Students desiring to enroll in this course should communicate with the department well in advance of the opening of the semester in which the work is to be undertaken. Such work will be under the direction of some member of the instructing staff, who will determine the credit value.

## DAIRY INDUSTRY

For courses in dairy industry, see "Food Science and Technology," page 180.

## DECORATIVE ART

For courses in decorative art, see "Home Economics" on page 201.

## DRAMATIC ART

For courses in dramatic art, see "English, Dramatic Art, Speech" on page 171.

## ECONOMICS

(Department Office, 301 Academic Office Building)

John B. Glassburner, Ph.D., *Associate Professor of Economics (Chairman of the Department)*.

§ Adam A. Pepelasis, Ph.D., *Associate Professor of Economics*.

Warren S. Gramm, Ph.D., *Assistant Professor of Economics*.

Gary W. Bickel, M.A., *Acting Instructor of Economics*.

\* *Letters and Science List*.—All undergraduate courses in economics are included in the Letters and Science List of Courses (see page 106).

*Departmental Major Advisers*.—Mr. Glassburner, Mr. Gramm.

### *The Major Program*

(A) Lower Division Courses.—Required: Economics 1A–1B and 6 additional units in social science; Mathematics 13 or a course in statistics approved by the department; and at least an average grade of C in these courses. Students planning to major in economics should complete these courses by the end of the sophomore year.

(B) Upper Division Courses.—A total of 24 units of upper division courses in economics is required including Economics 100A–100B and either 110A or 110B. It is recommended that these required courses be taken in the junior year. Except under extraordinary circumstances, no more than 9 units of economics may be taken in any one semester.

The department will certify to the completion of the major program for graduation only on the basis of at least a C average in the upper division courses taken in the department in satisfaction of major requirements. Students who do not maintain such an average may be required at any time to withdraw from the major in economics.

*Honors and Honors Program* (see page 107).—The honors program comprises at least 3 units of course 194H and an honors thesis in the same field of the study undertaken in course 194H, approved by two members of the faculty. This work normally will be completed as a fall-spring sequence during the student's senior year.

§ Absent on leave, spring semester, 1961.

## LOWER DIVISION COURSES

**1A. Principles of Economics.** (3) I and II. Mr. Glassburner

Analysis of the economy as a whole: determinants of national income; the level of employment; related topics including monetary policy, the business cycle, international trade and economic development.

**1B. Principles of Economics.** (3) I and II. Mr. Gramm

Course 1A is not a prerequisite to 1B, but it is recommended that the courses be taken in sequence.

Analysis of the allocation of resources and distribution of income through the price system; competition and monopoly; comparative economic systems.

**11A-11B. Elementary Accounting.** (3-3) Yr.

Lectures and laboratory.

Prerequisite: sophomore standing.

The basic concepts and techniques of accounting practice. 11A is prerequisite to 11B.

## UPPER DIVISION COURSES

*Upper Division Prerequisites.*—For students with a major in economics, course 1A-1B is prerequisite to all upper division work in the department. For students not majoring in economics, junior standing or consent of the instructor is prerequisite to all upper division courses in the department.

**100A-100B. Economic Theory.** (3-3) Yr. The Staff

Course 100A will be concerned with the scope and method of economic science and the theory of income and employment. Course 100B will be concerned with price and distribution theory.

**101A-101B. History of Economic Thought.** (3-3) Yr. Mr. Glassburner

Historical survey of economic doctrines; with emphasis on the classical school and its antecedents; neoclassical theory and its critics; current developments in economic thought.

**110A-110B. Economic History.** (3-3) Yr. Mr. Pepelasis, Mr. Gramm

Course 110A is not prerequisite to 110B.

Analysis of economic problems in their historical setting.

110A: Emphasis on development of economic institutions in Europe; implications for contemporary world economic relationships.

110B: Examination of the evolution of economic institutions in the United States; their significance in the contemporary world economy.

**116. Comparative Economic Systems.** (3) II. Mr. Gramm

Critical examination of major economic systems, emphasizing their economic goals and institutions; achievements and problems of capitalism; fascism; Marxian thought and socialist economics; problems of economic planning in Great Britain, U.S.S.R., China, and other industrializing societies.

**121. Industrial Organization.** (3) I. Mr. Bickel

The organization and structure of industries and their markets in the American economy, competitive behavior, price policy, and market performance in such industries; public policy in the regulation of industry.

**130. Public Finance and Taxation.** (3) I.

Examination of the growth and economic effects of public expenditures; taxation and borrowing; analysis of income, property, excise and other major taxes; fiscal policy and economic stability.

133. **Dynamic Economics and Business Fluctuations.** (3) II. Mr. Bickel  
Prerequisite: Mathematics 13 and consent of the instructor.

An analysis of the general features and chief causes of economic change, with special emphasis on the cyclical instability of economic activity. It is recommended that this course be taken in the senior year.

135. **Money and Banking.** (3) I. Mr. Bickel  
Monetary and banking institutions; monetary theory, international monetary relations, monetary policy.

150A-150B. **Labor Economics.** (3-3) Yr. Mr. Gramm  
Historical and structural analysis of the growth of trade unionism; modern collective bargaining; labor legislation; wage determination.

190A-190B. **International Economic Relations.** (3-3) Yr. Mr. Pepelasis  
Course 190A is not prerequisite to 190B.

International trade theory; international finance; United States foreign trade policies and their impact on the world economy; analysis of selected international economics problems.

194H. **Special Study for Honors Students.** (3) I and II. The Staff

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.  
The Staff (Mr. Gramm in charge)

## EDUCATION

(Department Office, 351 Academic Office Building)

\_\_\_\_\_, *Professor of Education.*

Charles M. Garverick, M.A., *Acting Instructor in Education.*



J. Richard Blanchard, M.S., *Lecturer in Education.*

Dorecy F. Davey, M.A., *Lecturer in Education, Supervisor of Student Teaching-Secondary.*

Douglas L. Minnis, M.A., *Lecturer in Education, Supervisor of Student Teaching-Elementary.*

Sumner B. Morris, Ed.D., *Lecturer in Psychology.* *Education*

Lawrence P. Newberry, M.A., *Lecturer in Education, Supervisor of Student Teaching-Secondary, Acting Administrator of Teacher Training.*

Margaret R. Sutherland, Ph.D., *Lecturer in Education, Supervisor of Teacher Training.*

*Letters and Science List.*—Education 110.

*Credentials Counselors:*

*General Secondary.*—Mr. Newberry, Miss Sutherland.

*General Elementary.*—Mr. Minnis.

### UPPER DIVISION COURSES

110. **Introduction to Educational Psychology.** (3) I and II. Miss Sutherland  
Prerequisite: Psychology 1A.

Original nature and tendencies of man; the learning process; individual differences and their measurement; the growth and development of children.

115. **Tests and Measurements.** (3) I and II. Mr. Garverick  
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.



**150. Bibliographic Methods.** (1) I. Mr. Blanchard

Prerequisite: junior standing.

Techniques of literature searching and the location of information. Use of bibliographies, abstract journals, card catalogs, reference works and other source materials. Preparation of scientific bibliographies. Designed to assist upper division and graduate students in preparation of research papers and dissertations.

**163. Introduction to Guidance and Counseling Psychology.** (3) I and II.

Prerequisite: course 110 (may be taken concurrently). Mr. Morris

Nature and scope of guidance programs in public schools; role of teacher, counselor, and administrator. Survey of basic tools and techniques. Theory and practice of counseling psychology with particular emphasis on educational and vocational adjustment.

**170. Secondary Education.** (2) I and II. Miss Sutherland

Prerequisite: course 110.

Function, scope, objectives, and curricula, including the fields of the high school and junior college in relation to individual and social needs.

**198. Directed Group Study.** (1-5) I and II. The Staff (——— in charge)

Prerequisite: consent of instructor.

**199. Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff (——— in charge)

## GRADUATE COURSE

**290. Education Seminar.** (2) I and II. \_\_\_\_\_

## PROFESSIONAL COURSES

**320A. Introduction to Teaching.** (1) I and II. Miss Sutherland

Lectures, conferences, and field work. Observations and participation in some form of public school work.

**‡320C. Supervised Teaching.** (3) I and II.

Prerequisite: course 320A. Course 320E must be taken concurrently.

Sec. 1. General Secondary. Mr. Newberry, Mr. Davey

Sec. 2. General Elementary. Mr. Minnis

Directed teaching for candidates for the general secondary and general elementary credentials.

**‡320E. Methods of Teaching.** (2) I and II.

Lectures, conferences, and laboratory.

All students enrolled in 320E must enroll in 320C concurrently.

Sec. 1. General Secondary. Mr. Newberry, Mr. Davey

Methods of teaching in secondary schools. Selection, organization, and evaluation of teaching materials.

Sec. 2. General Elementary. Mr. Minnis

Methods of teaching elementary school subjects.

**‡323. Practicum in Supervised Teaching.** (2-4) I and II.

Prerequisite: course 320C (may be taken concurrently) or experience as a teacher and consent of the instructor.

Sec. 1. General Secondary. Mr. Newberry

‡ Open only to apprentice teachers and graduate students. Courses 320C, 320E and 323 are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the semester in the public schools. Thus teaching assignments in the fall semester, 1960, will begin on or about August 31 and end January 29. For the spring semester, 1961, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

Transition period  
no budget on Engineering

X James R TAVERNETHI, MS, Lecturer  
in Agricultural  
Engineering

Sec. 2. General Elementary. Mr. Minnis

An opportunity to obtain more extended and varied experience under supervision. One hundred hours of work, including preparation and attendance at the professional methods section under course 320E, is the minimum requirement.

## ENGINEERING

(Department Office, 206 Walker Engineering Building)

Roy Bainer, M.S., *Professor of Agricultural Engineering (Chairman of the Department).*

Frederick A. Brooks, Sc.D., *Professor of Agricultural Engineering.*

S. Milton Henderson, M.S., *Professor of Agricultural Engineering.*

Clarence F. Kelly, M.S., *Professor of Agricultural Engineering.*

Robert A. Kepner, B.S., *Professor of Agricultural Engineering.*

Coby Lorenzen, Jr., M.S., *Professor of Agricultural Engineering.*

John B. Powers, Ph.D., *Professor of Agricultural Engineering.*

Norman B. Akesson, M.S., *Associate Professor of Agricultural Engineering.*

John C. Harper, D.Sc., *Associate Professor of Agricultural Engineering.*

†Samuel A. Hart, Ph.D., *Associate Professor of Agricultural Engineering.*

Lloyd H. Lamouria, M.S., *Associate Professor of Agricultural Engineering.*

Loren W. Neubauer, Ph.D., *Associate Professor of Agricultural Engineering.*

Wesley E. Yates, M.S., *Associate Professor of Agricultural Engineering.*

‡William J. Chancellor, Ph.D., *Assistant Professor of Agricultural Engineering.*

Allan A. McKillop, M.S., *Assistant Professor of Agricultural Engineering.*



Maynard A. Amerine, Ph.D., *Professor of Enology.*

Lawrence J. Andrews, Ph.D., *Professor of Chemistry.*

Robert H. Burgy, M.S., *Associate Professor of Irrigation.*

Clinton O. Chichester, Ph.D., *Associate Professor of Food Science and Technology.*

John R. Davis, Ph.D., *Lecturer in Irrigation.*

Marvin J. Dvoracek, *Lecturer in Agricultural Engineering.*

Robert B. Fridley, B.S., *Lecturer in Agricultural Engineering.*

John R. Goss, M.S., *Lecturer in Agricultural Engineering.*

James F. Guymon, Ph.D., *Professor of Enology.*

Robert M. Hagan, Ph.D., *Professor of Irrigation.*

Charles A. Hayes, Ph.D., *Professor of Mathematics.*

Frederic C. Jacob, M.S., *Lecturer in Agricultural Engineering.*

Charles R. Kaupke, B.S., *Lecturer in Agricultural Engineering.*

Arthur S. Leonard, M.S., *Lecturer in Agricultural Engineering.*

Hsin-kuan Liu, Ph.D., *Associate Professor of Irrigation.*

James N. Luthin, Ph.D., *Associate Professor of Irrigation.*

~~W. Douglas McMillan, Lecturer in Irrigation.~~

Stanton R. Morrison, *Lecturer in Engineering.*

Michael O'Brien, Ph.D., *Lecturer in Agricultural Engineering.*

Charles G. Patten, Ph.D., *Professor of Physics.*

Verne H. Scott, Ph.D., *Associate Professor of Irrigation.*

Alvin E. Stewart, *Lecturer in Irrigation.*

George F. Stewart, Ph.D., *Professor of Food Science and Technology.*

Theodor S. Strelkoff, M.S., *Acting Assistant Professor of Irrigation.*

Aloys L. Tappel, Ph.D., *Associate Professor of Food Science and Technology.*

~~Frank J. Veihmeyer, C.E., Ph.D., Professor of Irrigation, Emeritus.~~

Herbert A. Young, Ph.D., *Professor of Chemistry.*

✓ ‡ Absent on leave, fall semester, 1960-1961.

*Departmental Major Advisers.*—Mr. Davis, Mr. Harper, Mr. Henderson, Mr. Kelly, Mr. Kepner, Mr. Lorenzen.

*The Major.*—See page 88.

### AGRICULTURAL ENGINEERING

#### LOWER DIVISION COURSE

#### 12. Survey and Problems in Agricultural Engineering. (2) I.

Mr. Bainer, Mr. Kelly

The development and the application and use of farm machinery; the utilization of power on the farm; elements of hydrology in relation to agricultural engineering; the economics of farm buildings; elementary problems in the mechanics of agriculture.

#### UPPER DIVISION COURSES

Physics 2A–2B or 4A–4B are prerequisite to all upper division courses in agricultural engineering.

#### 102. Engineering Elements in Food Processing. (4) I.

Mr. Harper

Lectures and laboratory.

Prerequisite: 6 units of mathematics including differential calculus and 8 units of physics. Final semesters of mathematics and/or physics may be taken concurrently if differential calculus is complete.

The principles and application of engineering elements important in food processing. Includes electric power, fluid mechanics, heat transfer, engineering thermodynamics as related to steam generation and refrigeration, psychrometry, and work simplification.

#### 103. Agricultural Power. (3) II.

Mr. Chancellor

Lectures and laboratory.

Theory of operation, construction, and utilization of internal combustion engines; tractors; electric motors and appliances. Open to qualified lower division students by permission.

#### 104. Agricultural Machinery. (3) I.

Mr. Yates

Lectures and laboratory.

Construction, operation, requirements, and utilization of tillage, seeding, harvesting, belt-operated farm machinery and pest-control equipment; theory and testing of displacement and centrifugal pumps.

#### 105. Farm Structures. (3) I.

Mr. Kelly

Lectures and laboratory.

A course in agricultural housing, including structural materials and methods of construction; design of typical farm dwellings, storage buildings, and production structures; farmstead utilities; farmstead arrangement; plans, specifications, contracts and cost estimating.

#### 106. Heat Transfer in Agricultural Climatic Environment. (2) II.

Mr. Brooks

Atmospheric and thermal environment of life and structures near the earth's surface. Introduces agricultural climatology and treats solar and nocturnal radiations, thermal convection, diurnal heat flow, cold-air drainage, and frost protection; outdoor condensation and evaporation; dispersion of aerosols.

#### PROFESSIONAL COURSES

#### 314A. Agricultural Engineering Problems and Techniques for Teachers. (2) I.

Mr. O'Brien

Prerequisite: open only to ~~students majoring~~ in agricultural education.

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Majors

The application of engineering and mechanical principles to the construction, maintenance, and repair of ~~farm~~ structures, machinery, and utilities. *Includes demonstrations of teaching methods. Offered in even-numbered years.*

**\*314B. Agricultural Engineering Problems and Techniques for Teachers.**

(2) I.

Mr. O'Brien

Prerequisite: open only to ~~students majoring~~ in agricultural education. *Course 314A is not prerequisite to 314B.*

The application of engineering and mechanical principles to the construction, maintenance, and repair of ~~farm~~ structures, machinery, and utilities. *Includes demonstrations of teaching methods. Offered in odd-numbered years.*

**317. Problems in Teaching Farm Mechanics. (3) II.**

Mr. O'Brien

Lectures and laboratory.

Prerequisite: 8 units in agricultural engineering, including course 314A-314B; Physics 2A-2B or 4A-4B. Limited to graduate students in agricultural education.

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.

**ENGINEERING**

**LOWER DIVISION COURSES**

**1A. Plane Surveying. (3) I.**

Mr. A. Stewart

Lectures and laboratory.

Prerequisite: plane trigonometry.

Principles; field practice; calculations and mapping with special reference to irrigation, drainage, and agricultural engineering problems.

**10. Introduction to Engineering Measurements. (3) II.**

Mr. Goss

Lectures and laboratory.

Prerequisite: Mathematics 3A (may be taken concurrently).

Theory and application of engineering measurements for the evaluation of geometrical dimensions, temperature, work, fluid flow, pressure, and other physical quantities. Laboratory exercises and demonstrations, using engineering systems and including applications to surveying. Statistical representation, analysis of errors, and evaluation of data.

**25. Engineering Graphics. (4) I.**

Mr. Dvoracek

Lectures and laboratory.

Prerequisite: trigonometry; mechanical drawing; and mathematics 3A (may be taken concurrently).

The fundamental principles of orthogonal projection and their application to the solution of three-dimensional problems arising in the various branches of engineering; freehand pictorials; dimensioning; freehand and instrumental working drawings; graphic computations; plotting experimental data and determination of elementary empirical equations.

**35. Statics. (3) II.**

Mr. Fridley

Prerequisite: Physics 4A; Mathematics 14 or 4A-4B (4B may be taken concurrently).

Force systems and equilibrium conditions with emphasis on engineering problems covering structures, distributed forces, beams, cables, and friction. Includes graphical solutions and an introduction to the method of virtual work.

\* Not to be given, 1960-1961.

- 45. Properties of Materials. (3) I.** Mr. Leonard  
Lectures and laboratory.  
Prerequisite: sophomore standing in engineering.  
An introductory course on the properties of engineering materials. Applications of basic principles to the selection and use of engineering materials.

## UPPER DIVISION COURSES

- \*100A-100B. Electrical Circuits and Machinery. (4-4) Yr.** Mr. Jacob  
Lectures and laboratory.  
Prerequisite: Mathematics 14 or 4A-4B; Physics 4B.  
Voltage generation; circuit constants; electrical instruments; single-phase and polyphase circuit analysis; single phase transformers; electrical machinery (synchronous, induction, direct-current, and single phase machines) discussed primarily from the physics of performance; electronic tubes and their associated circuits; practical engineering problems; associated laboratory experiments.
- \*102. Dynamics (3) I.** Mr. Lorenzen  
Prerequisite: course 35; Mathematics 14 or 4A-4B.  
Kinematics and kinetics of a particle and of rigid bodies as applied to engineering problems. Force, energy, and momentum methods of solution. Introduction to vibrations.
- \*103. Elementary Fluid Mechanics. (3) II.** Mr. Neubauer  
Prerequisite: course 102 (may be taken concurrently).  
The principles of mechanics applied to the statics and to the flow of incompressible and compressible fluids.
- \*105A. Thermodynamics. (3) I.** Mr. Leonard  
Prerequisite: course 102 (may be taken concurrently); Chemistry 1B or 8; Physics 4C.  
Energy transformations, reversibility, availability; thermal properties of gases and vapors; theoretical cycles and practical engine forms, mechanisms and performance.
- \*105B. Thermodynamics. (3) II.** Mr. Leonard  
Prerequisite: course 105A.  
Heat transmission and equipment, fuels, combustion, and analysis of products of combustion. Heat-power engines using nozzles. Reheating and regenerative cycles and equipment. Plant performance.
- \*106A. Machine Design. (3) II.** \_\_\_\_\_  
Lectures and laboratory.  
Prerequisite: courses 25, 102, and 130.  
Application of the principles of mechanics, kinematics, physical properties of materials, and manufacturing processes to the design of machine parts.
- \*110. Theory of Machines. (3) II.** \_\_\_\_\_  
Prerequisite: course 102.  
Kinematic and dynamic analysis of machinery.
- \*111. Materials Testing Laboratory. (1) I.** \_\_\_\_\_  
Laboratory.  
Prerequisite: course 130 (may be taken concurrently).  
Principles and methods of testing engineering materials. Physical tests of concrete, steel, and wood.

\* Not to be given, 1960-1961.

- 112. Unit Operations in Agricultural Processing.** (3) II. Mr. Henderson  
Lectures and laboratory.  
Prerequisite: course 105B.  
Thermodynamic and mass transfer procedures applied to such processes as drying, dehydration, refrigeration, size reduction, separation, and materials handling.
- 114. Principles of Farm Machinery.** (3) I. Mr. Kepner  
Lectures and laboratory.  
Prerequisite: course 102.  
Functional requirements, basic principles, and performance characteristics of field machines. General design considerations, cost analysis, testing methods, and laboratory studies of specific machines.
- 115. Farm Structures Design.** (3) I. Mr. Neubauer  
Lectures and laboratory.  
Prerequisite: course 102.  
The design of farm buildings including houses, storage buildings, and production structures, with emphasis on functional requirements and characteristics of materials. Study of the principles of lighting, heating, insulating, water supply, and sanitation.
- 116. Agricultural Power.** (3) II. Mr. Lorenzen  
Lectures and laboratory.  
Prerequisite: course 105B.  
Principles of internal combustion engines and accessories for stationary and mobile power. Design criteria for agriculture.
- \*118. Structural Analysis and Design of Farm Buildings.** (3) II. Mr. Hart  
Lectures and laboratory.  
Prerequisite: course 131.  
Stress computations and design of agricultural buildings under dead, live, and wind and earthquake loads, with reference to building code conformity. Rigid-frame, pole, and stressed-skin types of construction analyzed. Requirements for timber, concrete, and steel frames are considered.
- \*120. Principles of Engineering Investment and Economy.** (3) II. Mr. Lamouria  
Prerequisite: courses 100A, 105A, and 130.  
Derivation of formulas used in the theory of investment; economy studies applied to original and alternative investments in engineering enterprise; replacement problems; relation of personnel and quality control factors to engineering economy; economy studies of governmental project.
- \*121. Soil and Foundation Engineering.** (3) II. Mr. Chancellor  
Prerequisite: courses 130, 135 (may be taken concurrently).  
Lectures, discussions, and problems on physical and mechanical properties of soils; the supporting capacity of soils; lateral earth pressures on structure; piles and pile foundations; considerations in the design of structures; cofferdams and caissons; construction problems in foundation engineering.
- \* 125. Instrumentation.** (3) I. \_\_\_\_\_  
Lectures and laboratory.  
Prerequisite: course 100A or 102.  
Description and analytical study of instruments used in engineering data observations, in research, and as basic components for controls.

\* Not to be given, 1960-1961.



**\*130. Mechanics of Materials. (3) I.** \_\_\_\_\_

Prerequisite: course 35.

Elastic and ultimate resistance of materials; stress and deformation analysis of bars, shafts, and beams; combined stresses; columns; elements of design for wood and metal members.

**\*131. Structural Analysis. (3) II.** \_\_\_\_\_

Prerequisite: course 130.

Analysis of determinate structures, including beams, frames, and roof and bridge trusses by algebraic and graphical methods. Introduction to indeterminate structural analysis.

**\*135. Reinforced Concrete Design. (3) II.** \_\_\_\_\_

Prerequisite: course 130.

The analysis and design of reinforced concrete structures.

**151. Heat Transfer. (3) I.**

Mr. McKillop

Prerequisite: courses 103, 105B.

Basic principles of heat transfer and their application to problems in agriculture. Steady state and transient problems of conduction by analytical and graphical methods. Free and forced convection. Transfer of radiant energy.

**\*154. Unit Operations in Food Processing. (3) II.**

Mr. Harper

Prerequisite: course 151. Recommended: Chemistry 110A.

Engineering design principles of unit operations of importance in food and biochemical processing. Includes flow and heat transfer with non-Newtonian fluids, evaporation, distillation, extraction, drying, adsorption and ion exchange, and process control.

**\*154L. Unit Operations Laboratory. (3) II.**

Mr. Harper

Laboratory.

Prerequisite: course 154 (should be taken concurrently).

Pilot-plant-scale laboratory studies to accompany course 154, with emphasis on analysis of the operation and preparation of engineering reports. Field trips will be scheduled.

**171. Water Supply. (3) I.**

Mr. McMillan

Prerequisite: course 103 or Irrigation 118 (may be taken concurrently).

Origin, occurrence, and utilization of surface and ground water supplies. Hydrologic analysis and methods of predicting surface and ground water yields. Irrigation and urban water requirements. Water supply systems including dams and reservoirs, wells, pumping plants, and introduction to water treatment processes.

**175. Principles of Drainage Engineering. (2) II.**

Mr. Luthin

Prerequisite: course 103 and Irrigation 100 or Soil Science 107.

Elements of seepage through porous media, theory of drainage, depth and spacing of drains, methods of drainage investigation, project planning for drainage, loads on buried pipe, design of gravel filters, strength of tile, engineering analysis of surface drainage.

**177. Irrigation Hydraulics. (3) I.**

Mr. Strelkoff

Lectures and laboratory.

\* Not to be given, 1960-1961.

Prerequisite: course 103.

Flow in pipe lines and open channels, nonuniform steady flow problems, water measurement, and principles of dimensional analysis and dynamic similitude. Laboratory experiments on pipe and open channel flow, spillways, siphons, water measuring devices, sedimentation, and models.

**185. Irrigation System Design. (2) II.**

Mr. Liu

Prerequisite: course 177.

Principles of hydraulic and structural design of diversion works, impounding structures, pipelines, flumes, canals, siphons, chutes, and energy dissipators. Engineering analysis of irrigation system design including automation considerations.

**189. Irrigation Engineering Laboratory. (2) II.**

Lectures and laboratory.

The Staff (Mr. Scott in charge)

Prerequisite: courses 177, 185 (may be taken concurrently).

Experimental analysis and design of water supply systems including related storage and conveyance structures, and of irrigation and drainage systems; measurements and instrumentation.

**190. Proseminar. (1) II.**

Mr. Bainer, Mr. O'Brien

Prerequisite: senior standing in engineering.

Professional ethics and social responsibilities of engineers; cooperative research procedures; validity of findings; written and oral presentation of short technical reports.

**198. Directed Group Studies for Advanced Undergraduates. (1-5) I and II.**

The Staff (Mr. Bainer in charge)

Prerequisite: senior standing in engineering with at least a B average.

Group study of selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects.

**199. Special Study for Advanced Undergraduates. (1-5) I and II.**

The Staff (Mr. Bainer, Mr. Hagan, Mr. Stewart in charge)

GRADUATE COURSES

**202. Engineering Analysis and Synthesis. (2) I and II.**

Prerequisite: graduate standing. The Staff (Mr. Henderson in charge)

Procedures for analyzing engineering data and synthesizing engineering systems with special reference to agricultural problems.

**203. Heat and Mass Transfer. (3) II.**

Mr. Harper

Prerequisite: course 151; Mathematics 114 or equivalent.

Development of equations describing heat, mass, and momentum transfer by convection; analogies among transport systems; applications to systems important in agricultural and food processing and in agricultural climatology.

**204. Advanced Heat Transfer. (3) II.**

Mr. McKillop

Prerequisite: course 151; Mathematics 114 or equivalent.

Analytical treatment of steady state, transient, and periodic heat conduction; transfer of radiant energy; geometrical and spectral characteristics of radiating systems.

**230. Engineering Analysis. (3) II.**

Mr. McKillop

Prerequisite: Mathematics 114 or 14B.

Methods of theoretical analysis of typical engineering problems in heat transfer, fluid mechanics, electrical network, mechanical vibrations, and elasticity.

**\*271. Advanced Hydrology. (2) I.**

Mr. Burgy

Prerequisite: course 171 and consent of instructor.

Advanced study and analysis of hydrologic processes including the theoretical considerations in investigation and analysis of water development for power, irrigation, municipal, industrial, and other uses. Hydrometeorology, including analysis of precipitation and runoff, unit graphs, and flood forecasting, routing, and control.

**272. Advanced Ground Water Problems. (2) II.**

Mr. Scott

Prerequisite: course 171 and consent of instructor.

Analyses and methods of groundwater development; fluid mechanics of porous solids; geophysical exploration and analysis; artificial recharge concepts; hydraulics of wells, including analytical treatment of transient flow problems; and problems of well design.

**275. Flow in Porous Media. (2) II.**

Mr. Luthin

Prerequisite: Mathematics 114 or equivalent and consent of instructor.

Elements of potential theory, methods of solving flow equations, numerical analysis, and solutions to specific seepage problems involving dams and other hydraulic structures.

**\*278. Advanced Fluid Mechanics. (3) I.**

Mr. Strelkoff

Prerequisite: Mathematics 220A-220B (may be taken concurrently).

Mechanics of ideal and viscous fluids; stream and potential functions, transformation relationships, conservation principles with applications to fundamental flow problems.

**287A. Advanced Engineering Dynamics. (3) II.**

Mr. Powers

Prerequisite: course 102; Mathematics 114 or equivalent.

Applications of advanced dynamics to engineering problems. Dynamics of constrained systems using generalized coordinates. Lagrange's equations with applications to engineering systems. Resistance to motion. Stability of mechanical systems. Wave propagation in elastic and plastic systems.

**290. Seminar in Engineering. (1) II.**

The Staff (Mr. Brooks in charge)

Prerequisite: graduate standing.

Discussion of current graduate research with particular attention to validity of experimental procedures, and including oral and written presentation of a term paper.

**298. Group Study. (1-5) I and II.**

The Staff (Mr. Henderson in charge)

Prerequisite: graduate standing.

Engineering topics important to agriculture such as: vibrations, indeterminate structures, mass transfer, control systems, electronics, micrometeorology, fluid mechanics of porous systems, instrumentation, food processing unit operations. The topics treated are dependent upon the availability of staff and student interest.

**299. Research in Engineering. (1-6) I and II.**

The Staff

\* Not to be given, 1960-1961.

- x Barbara R. Below, M.A., Lecturer in English 7/1/60
- x ANNE T. CASTANION, M.A. Assistant in English 11/61
- x DORIS J. HUMPHREY, B.A., Assistant in English 7/1/60
- x LOIS B. O'BRIEN, B.A., Associate in Speech 11/61

## ENGLISH, DRAMATIC ART, AND SPEECH

(Department Office, 176 Academic Office Building)

Solomon Fishman, Ph.D., *Professor of English (Chairman of the Department)*.

Linda Van Norden, Ph.D., *Professor of English*.

§Celeste T. Wright, Ph.D., *Professor of English*.

Everett Carter, Ph.D., *Associate Professor of English*.

†Thomas A. Hanzo, Ph.D., *Associate Professor of English*.

Elizabeth R. Homann, Ph.D., *Associate Professor of English*.

Gwendolyn B. Needham, Ph.D., *Associate Professor of English*.

Robert A. Wiggins, Ph.D., *Associate Professor of English*.

John T. Goldthwait, Ph.D., *Assistant Professor of Speech*.

Jay L. Halio, Ph.D., *Assistant Professor of English*.

Hilton J. Landry, Ph.D., *Assistant Professor of English*.

Ralph S. Pomeroy, Ph.D., *Assistant Professor of Speech*.

Theodore J. Shank, Ph.D., *Assistant Professor of Dramatic Art*.

Alexander Chambers, Ph.D., *Instructor in English*.

Jane L. Norton, M.A., *Acting Instructor in English*.



Clifford C. Fellage, Jr., M.A., *Associate in Dramatic Art*.

Leonard G. Homann, A.B., *Associate in Speech*.

Georg Isaak, M.A., *Lecturer in English*.

### DRAMATIC ART AND SPEECH MAJOR

*Letters and Science List of Courses*.—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Departmental Major Advisers*.—Mr. Goldthwait, Mr. Shank.

#### *The Major Program*

(A) Lower Division Courses.—Speech 1A, 2A; Dramatic Art 10A, 20 are required; Speech 1B and Dramatic Art 10B are recommended.

(B) Upper Division Courses.—Twenty-four units in dramatic art and speech, including a minimum of 6 units each selected from Groups A, B, and C:

Group A: Dramatic Art 158A, 158B, 159.

Group B: Speech 101, 102; Dramatic Art 128, 160.

Group C: Speech 117, 130, 140.

In addition, each major is expected to participate in departmental dramatic productions or forensic activities, and each senior will be required to enroll in course 195 (or 195H if an honors student).

The remainder of the 24 units may be satisfied by upper division courses in dramatic art and speech or by English courses 110, 114A, or 117J.

Dramatic Art 128 is required of teaching majors in speech arts.

The department will certify to the completion of a major program for graduation only on the basis of at least a grade C average in the upper division courses taken in the department. Students who do not maintain such an average will be required to withdraw from the major in dramatic art and speech.

*Honors and Honors Program* (see page 107).—The honors program comprises 6 units selected from Dramatic Art 194H and Speech 194H; a thesis or a comprehensive examination (see course 195H).

† Absent on leave, 1960–1961.

§ Absent on leave, spring semester, 1961.

Substantial leave in residence.  
Spring semester, 1961.

## ENGLISH MAJOR

*Letters and Science List.*—All undergraduate courses except 300 are included in the Letters and Science List of Courses (see page 106).

*Departmental Major Advisers.*—Mr. Halio, Mrs. Homann, Mr. Landry, Miss Van Norden, Mrs. Wright.

*The Major Program*

(A) Lower Division Courses.—First year, course 1A-1B required. Second year, course 45A-45B. Recommended: philosophy.

(B) Upper Division Courses.—Twenty-four units of upper division courses in literature with specific requirements; third year, course 145A-145B; fourth year, course 117J. Recommended: a course in English history.

Courses 106L and 110 and Speech 1A or 2A are required of candidates for the Certificate of Completion of the teacher-training curriculum whose teaching major is English.

The department will certify to the completion of a major program for graduation only on the basis of at least a grade C average in the upper division courses taken in the department. Students who do not maintain such an average will be required to withdraw from the major in English.

Attention is called to the requirements in foreign languages for higher degrees in English—a reading knowledge of French or German for the M.A. degree; of French, German, and Latin for the Ph.D. degree. Undergraduates contemplating advanced study in English should prepare to satisfy these requirements as they proceed to the bachelor's degree.

*Honors and Honors Program* (see page 107).—The honors program consists of course 195AH-195BH in the senior year in addition to the regular major.

## DRAMATIC ART

## LOWER DIVISION COURSES

- 10A. Fundamentals of Acting. (3) I. Mr. Shank  
Lectures and laboratory.  
Reading and analysis of contemporary plays; theory and practice of acting with emphasis on character analysis and interpretation.  
Field trips included.
- 10B. Fundamentals of Acting. (3) II. Mr. Shank  
Lectures and laboratory.  
Course 10A is not prerequisite to 10B.  
Reading and analysis of plays of different types and forms selected from various periods; theory and practice of acting with emphasis on style.  
Field trips included.
20. Introduction to Dramatic Art. (3) II. Mr. Shank  
Understanding and appreciation of the arts and literature of the theater.  
Field trips included.

## UPPER DIVISION COURSES

English 1A is prerequisite to all upper division courses.

125. Principles of Scene Design. (3) II. Mr. Fellage  
Principles of design as applied to stage settings. Study of various styles and periods of stage design. Execution of scene designs for modern and period dramas.

- \*128. Play Production. (3) I.** \_\_\_\_\_  
Lectures and laboratory.  
Principles of producing plays. Practice in directing scenes and in the designing, constructing, painting, and lighting of scenery. Required of teaching majors in speech; recommended to prospective teachers of high school English.  
Offered in alternate years.
- \*150. American Drama. (3) II.** \_\_\_\_\_  
Selected plays and the history of the theater from Colonial times to the present.  
Offered in alternate years.
- 158A. World Drama. (3) I.** Mr. Shank  
Selected plays and the history of the theater from ancient Greece to the Renaissance.  
Offered in alternate years.
- 158B. World Drama. (3) II.** Mr. Shank  
Course 158A is not prerequisite to 158B.  
Selected plays and the history of the theater from the Renaissance to the present time.  
Offered in alternate years.
- \*159. Contemporary Drama. (3) I.** \_\_\_\_\_  
Twentieth-century European, British, and American plays.  
Offered in alternate years.
- 160. Principles of Playwriting. (3) I.** Mr. Shank  
Prerequisite: consent of the instructor or at least one of the following: courses 20, 150, 158A, 158B, 159.  
Analysis of dramatic structure and the composition of original plays.  
Offered in alternate years.
- 190. Theater Laboratory. (1-3) I and II.** Mr. Shank  
Laboratory.  
Prerequisite: consent of the instructor.  
Projects in acting, production, scene design, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.
- 194H. Special Study for Honors Students. (3) I and II.** Mr. Shank  
Prerequisite: majors with honors standing.  
May be repeated once for credit.
- 195. Proseminar in Dramatic Art and Speech. (3) I and II.** The Staff  
Prerequisite: majors with senior standing.  
Extensive resurvey of the fields of dramatic art and speech, with emphasis upon individual study and research. Comprehensive examination covering the entire major field.
- 195H. Honors Proseminar in Dramatic Art and Speech. (3) I and II.** The Staff  
Prerequisite: senior majors with honors standing.  
Extensive resurvey of the fields of dramatic art and speech, with emphasis upon individual study and research. Comprehensive examination covering entire major field. Students may, with instructor's consent, substitute a thesis for a comprehensive examination.

\* Not to be given, 1960-1961.

- 199. Special Study for Advanced Undergraduates.** (1-3) I and II.  
Prerequisite: consent of the instructor. Mr. Shank  
Advanced study of dramatic literature, acting, or play production

### ENGLISH

#### LOWER DIVISION COURSES

Students must have passed Subject A before taking any course in English.

- 1A. First-Year Reading and Composition.** (3) I and II. The Staff  
Principles of effective reading and writing.
- 1B. First-Year Reading and Composition.** (3) I and II. The Staff  
Prerequisite: course 1A.  
Continuation of course 1A. For maximum benefit, the student is advised to complete both courses.
- 30. Introduction to American Literature.** (3) II. Mr. Wiggins  
Prerequisite: course 1A.  
Reading and discussion of masterpieces of American literature.
- 45A-45B. Critical Reading of Prose and Poetry.** (3-3) Yr. *Mrs. Needham*  
Prerequisite: course 1B. Mr. Landry, ~~Mr. Fishman~~  
Analysis and evaluation of works representing main types of English and American literature.
- 46A. Masterpieces of English Literature.** (3) I. Mrs. Wright  
Prerequisite: course 1A. Recommended: course 1B.  
Selected works of principal writers before the eighteenth century; lectures and discussion. Designed for majors and nonmajors.
- 46B. Masterpieces of English Literature.** (3) II. Mr. Halio  
Prerequisite: course 1A. Recommended: course 1B.  
Course 46A is not prerequisite to 46B.  
Selected works of principal writers after 1700; lectures and discussion. Designed for majors and nonmajors.

#### UPPER DIVISION COURSES

English 1A is prerequisite to all upper division courses.

- \*106G. Creative Writing.** (3) I. Mr. Wiggins  
Prerequisite: course 1B. Sophomore students may enroll in this course with the consent of the instructor.  
Offered in alternate years.
- 106L. Advanced Composition.** (3) II. Mrs. Wright  
Prerequisite: course 1B.  
Designed to develop a clear, accurate, interesting style. Required of prospective high school English teachers.
- 110. Language.** (3) I. Mrs. Homann  
Origins, materials, growth, and function of language with emphasis on English.
- 114A. The English Drama to 1642.** (3) I. Mrs. Wright  
From the miracle plays through Elizabethan drama.
- 116. The English Bible as Literature.** (3) II. Miss Van Norden

\* Not to be given, 1960-1961.



- 117J. **Shakespeare.** (3) I. Mrs. Homann  
Study of twelve to fifteen of Shakespeare's principal plays.
119. **The Age of Johnson.** (3) II. Mrs. Needham
- 125C. **The English Novel.** (3) I. Mrs. Needham  
From the beginnings to Dickens.
- 125D. **The English Novel.** (3) II. Mrs. Needham  
Course 125C is not prerequisite to 125D.  
From Dickens to Hardy.
- 125E. **The American Novel.** (3) I. Mr. Carter  
Reading and discussions of selected American novels.
- 137A. **Survey of American Literature.** (3) I. Mr. Wiggins  
From the beginning to the Civil War.
- 137B. **Survey of American Literature.** (3) II. Mr. Wiggins  
Course 137A is not prerequisite to 137B.  
From the Civil War to the present.
- 144A. **Masterpieces of World Literature: The Epic.** (3) I. Miss Van Norden  
Iliad; Odyssey; Aeneid; Beowulf; Divine Comedy; Paradise Lost.
- \*144B. **Masterpieces of World Literature: The European Novel.** (3) II. Mrs. Wright  
Course 144A is not prerequisite to 144B.  
Representative European novelists of the nineteenth and twentieth centuries.
- \*145A-145B. **History of English Literature.** (3-3) Yr. The Staff  
Prerequisite: course 45A-45B or consent of instructor.  
A study of English literature and its backgrounds.
147. **Survey of Literary Criticism.** (3) I. Mr. Wiggins  
Reading and discussion of the major texts in literary criticism, from Aristotle to the present.  
Offered in alternate years.
149. **The English Lyric.** (3) II. Mr. Landry  
Reading and discussion of representative lyric poems, English and American.
- \*151. **Study of a Major Writer.** (3) I and II. \_\_\_\_\_  
With the consent of the instructor, this course may be repeated for credit.
155. **The Age of Chaucer.** (3) II. Mrs. Homann  
Chaucer: his writings, contemporaries, and background.
- 158A. **The Age of Elizabeth.** (3) I. Mr. Halio  
Beginnings of the English Renaissance, and literature of the sixteenth century.
- 158B. **Literature of the Seventeenth Century.** (3) II. Miss Van Norden  
Course 158A is not prerequisite to 158B.
166. **The Age of Swift and Pope.** (3) I. Mrs. Needham

177. **The Romantic Period.** (3) I. Mr. Fishman  
Wordsworth, Coleridge, Byron, Shelley, Keats, and their eighteenth-century precursors.
187. **The Victorian Period.** (3) II. Mr. Fishman
191. **Literature in English from 1900.** (3) II. Mr. Halio
- 195H. **Senior Honors Tutorial.** (2) I and II. The Staff  
Prerequisite: senior honors status.  
Individual directed study leading to preparation of a long paper.
198. **Senior Preceptorial Course.** (3) I and II.  
Prerequisite: senior standing. Mr. Halio, Mr. Landry  
Reading in chosen fields, determined by the English major reading list, with critical writing.
199. **Special Study for Advanced Undergraduates.** (1-3) I and II.  
Limited to seniors who have completed at least 9 units of upper division English and who have the consent of the instructor.  
The Staff (Mr. Fishman in charge)

## GRADUATE COURSES

200. **Techniques of Literary Scholarship.** (3) I. Miss Van Norden
213. **Readings in Middle English.** (3) II. Mrs. Homann  
Prerequisite: graduate standing.  
Rapid reading of selections in Middle English from the twelfth to the fifteenth century.
- \*262. **Studies in Sixteenth Century Literature Seminar.** (3) II. The Staff  
Prerequisite: graduate standing.
- \*263. **Studies in Seventeenth-Century Literature Seminar.** (3) I. The Staff  
Prerequisite: graduate standing.
- \*264. **Studies in Eighteenth-Century Literature Seminar.** (3) I. The Staff  
Prerequisite: graduate standing.
- \*265. **Studies in Nineteenth-Century Literature Seminar.** (3) I. The Staff  
Prerequisite: graduate standing.
- \*266. **Studies in Twentieth-Century Literature Seminar.** (3) I. The Staff  
Prerequisite: graduate standing.
270. **Studies in American Literature Seminar.** (3) II. Mr. Carter  
Prerequisite: graduate standing.
299. **Special Study.** (1-3) I and II. The Staff

## PROFESSIONAL COURSE

300. **Problems in Teaching English Literature and Composition in Secondary Schools.** (2) I. Mrs. Needham  
Prerequisite: senior or graduate standing; an English teaching major or minor.  
This course, designed for seniors and graduate students undertaking an English teaching major or minor, should be completed before practice teaching. The course is accepted in partial satisfaction of the 22-unit requirement in education for the general secondary credential.

\* Not to be given, 1960-1961.

**SPEECH**

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

**LOWER DIVISION COURSES**

Students must have passed Subject A before taking courses 1A or 2A.

**1A. Elements of Speech.** (3) I and II. The Staff

The principles and practice of effective speech composition and delivery, with emphasis upon the logical organization and presentation of ideas.

**1B. Elements of Speech.** (3) I and II. The Staff

Prerequisite: course 1A.

Application of the principles of effective speech composition and delivery to group discussion and public address.

**2A. Fundamentals of Oral Interpretation of Literature.** (3) I.

Mr. Goldthwait

Introduction to the oral reading of prose and poetry; practice in speaking and reading, with training in the principles of effective delivery.

**25. Oral English for Foreign Students.** (4) I and II. Mr. Homann

For foreign students only. Pronunciation, speaking, grammar, reading, and writing of English. Required of those who do not pass the examination in English and who are not qualified to take course 26.

**26. Oral English for Foreign Students.** (4) I and II. Mr. Homann

Continuation of course 25; required of those who have taken course 25.

**UPPER DIVISION COURSES**

Prerequisite to all upper division courses are upper division standing or two of the following courses: English 1A, 1B, Speech 1A, 1B, and a course in logic.

**101. Oral Interpretation of Poetry.** (3) II. Mr. Goldthwait

Prerequisite: course 2A.

Thorough application of the principles of oral interpretation to poetic literature.

Offered in alternate years.

**\*102. Oral Interpretation of Selected Fields of Literature.** (3) II.

Prerequisite: course 2A.

Mr. Goldthwait

Application of the principles of oral interpretation to selected types, periods, or authors. An opportunity for the student to choose an area of specialization for intensive study.

Offered in alternate years.

**\*117. Theories of Rhetoric and Criticism.** (3) II. Mr. Goldthwait

A study of the underlying nature of linguistic expression and communication as given in major theories, and comparison of their criteria of effectiveness. Attention to both artistic and instrumental functions of language.

Offered in alternate years.

**130. History of Public Address.** (3) II. Mr. Pomeroy

A survey of public address in its major periods of influence in Western civilization.

Offered in alternate years.

\* Not to be given, 1960-1961.

- 140. Argumentation and Debate.** (3) I. Mr. Pomeroy  
Forms and techniques of argumentation and debate, with attention to the logical and rhetorical aspects. Materials taken largely from current events.
- 141. Debate Laboratory.** (2) I and II. Mr. Pomeroy  
Laboratory.  
Prerequisite: consent of the instructor.  
Practice in the principles of argumentation and debate. Intercollegiate and tournament debating. May be repeated for credit up to a total of 6 units.
- 194H. Special Study for Honors Students.** (3) I and II. The Staff  
Prerequisite: majors with honors standing.  
May be repeated once for credit.
- 195. Proseminar in Dramatic Art and Speech.** (3) I and II. The Staff  
Prerequisite: majors with senior standing.  
Extensive resurvey of the fields of dramatic art and speech, with emphasis upon individual study and research. Comprehensive examination covering the entire major field.
- 195H. Honors Proseminar in Dramatic Art and Speech.** (3) I and II. The Staff  
Prerequisite: senior majors with honors standing.  
Extensive resurvey of the fields of dramatic art and speech, with emphasis upon individual study and research. Comprehensive examination covering entire major field. Students may, with instructor's consent, substitute a thesis for a comprehensive examination.
- 199. Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff  
Prerequisite: consent of the instructor.  
Advanced study of one phase of speech, such as public speaking, discussion, debate, oral interpretation.

## ENOLOGY

For courses in enology see "Viticulture and Enology," page 256.

## ENTOMOLOGY AND PARASITOLOGY

(Department Office, 122 Robbins Hall)

Stanley F. Bailey, Ph.D., *Professor of Entomology.*

†Richard M. Bohart, Ph.D., *Professor of Entomology (Vice-Chairman of the Department).*

John E. Eckert, Ph.D., *Professor of Entomology.*

Harry H. Laidlaw, Jr., Ph.D., *Professor of Entomology.*

William H. Lange, Jr., Ph.D., *Professor of Entomology.*

§Leslie M. Smith, Ph.D., *Professor of Entomology.*

Eugene M. Stafford, Ph.D., *Professor of Entomology.*

Francis M. Summers, Ph.D., *Professor of Entomology.*

‡Oscar G. Bacon, Ph.D., *Associate Professor of Entomology.*

John W. MacSwain, Ph.D., *Associate Professor of Entomology (Berkeley campus).*

Ray F. Smith, Ph.D., *Associate Professor of Entomology (Chairman of the Department) (Berkeley campus).*



James R. Douglas, Ph.D., *Professor of Parasitology.*

Albert A. Grigarick, Jr., Ph.D., *Lecturer in Entomology.*

† Absent on leave, fall semester, 1960-1961.

‡ Absent on leave, spring semester, 1961.

Paul D. Hurd, Jr., Ph.D., *Lecturer in Entomology (Berkeley campus)*.  
 Dewey J. Raski, Ph.D., *Professor of Plant Nematology*.  
 Frank E. Strong, Ph.D., *Lecturer in Entomology*.  
 Gunter Zweig, Ph.D., *Lecturer in Entomology*.

**ENTOMOLOGY**

*Letters and Science List*.—Entomology 1, 106, 112, 127.  
*Departmental Major Advisers*.—Mr. Bacon, Mr. Grigarick.  
*The Major*.—See page 62–63.

**LOWER DIVISION COURSES**

1. **An Introduction to Entomology.** (4) II. Mr. Bohart, Mr. Strong  
 Lectures and laboratory.  
 A basic study of insects: their biology, anatomy, classification, and relation to human welfare.
5. **An Introduction to Apiculture.** (2) II. Mr. Eckert  
 Biology and behavior of bees and fundamentals of beekeeping.
- 5L. **Apiculture Laboratory.** (2) II. Mr. Eckert  
 Laboratory.  
 Prerequisite: course 5 (may be taken concurrently).  
 Study of structure and functions of honeybees and bee colonies; theories of colony management in apiculture.
49. **Summer Field Course.** (No credit). Mr. Bohart, Mr. Hurd, Mr. MacSwain  
 Six weeks, daily, except Sunday.  
 Prerequisite: one course in entomology or approval of instructor.  
 The study and collection of insects in their natural habitats, with special emphasis on ecology, life histories, and field recognition.

**UPPER DIVISION COURSES**

106. **Introduction to Structure and Function in Insects.** (4) I.  
 Lectures and laboratory. Mr. Laidlaw, Mr. Summers  
 Prerequisite: course 1 or equivalent.  
 General principles of insect morphology with emphasis on the functional approach. Comparative anatomy of selected insect types.
107. **Advanced Apiculture.** (4) II. Mr. Laidlaw  
 Lectures and laboratory.  
 Prerequisite: course 5 or consent of the instructor.  
 Principles of modern queen bee rearing; function of the queens; anatomy of reproductive system, formation of germ cells; genetic considerations; artificial insemination.
112. **Systematic Entomology.** (4) I. Mr. Grigarick  
 Lectures and laboratory.  
 Prerequisite: course 1 or equivalent.  
 The classification of insects, taxonomic categories and procedures; bibliographical methods; nomenclature; museum practices.
124. **Economic Entomology.** (4) I and II.  
 I. Mr. Bailey, Mr. Smith; II. Mr. Bacon, Mr. Lange.  
 Lectures and laboratory.  
 Life histories, habits, and principles underlying control of insects attacking fruit trees, field and vegetable crops.

127. **Insect Ecology.** (3) II. Mr. Bailey  
Prerequisite: upper division standing in one of the biological sciences.  
Principles of ecology with examples from the insects; insect behavior; analysis of the insect environment; population dynamics.
128. **Chemistry of Insecticides and Fungicides.** (4) II. Mr. Stafford  
Lectures and laboratory.  
Prerequisite: Chemistry 8, or consent of the instructor.  
Chemical composition and reactions of insecticides and fungicides, and their physiological effects on plant and animal tissues.
198. **Directed Group Study for Advanced Undergraduates.** (1-5) I and II.  
Prerequisite: consent of the instructor. The Staff (Mr. Bohart in charge)  
Group study of selected topics in acarology, coccidology, immature insects, and other problems for which student groups may be organized.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.  
The Staff (Mr. Bohart in charge)

## GRADUATE COURSES

250. **Principles and Methods of Entomological Research.** (3) II.  
Lectures and laboratory. Mr. Lange, Mr. Strong  
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 alternate years.
290. **Seminar in General Entomology.** (1) I and II.  
The Staff (Mr. Bacon in charge)
299. **Research in Entomology and Parasitology.** (1-6) I and II. The Staff

**FARM PRACTICE**

(Departmental Office, 2 TB 6)

Harry O. Walker, Ed.D., *Lecturer in Farm Practice (Chairman of the Department)*.

*Departmental Major Adviser.*—Mr. Walker.

## LOWER DIVISION COURSE

49. **Field Practice in Agriculture.** (No credit) I and II. Mr. Walker  
Laboratory.  
Practice in basic farm operations. Includes the operation and maintenance of farm machinery, soil tillage, irrigation, cultivation and harvesting operations. Recommended for the student whose experience in agriculture is inadequate for his occupational objectives.

**FOOD SCIENCE AND TECHNOLOGY**

(Department Office, 126 Cruess Hall)

Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*  
R. E. Feeney, Ph.D., *Professor of Food Science and Technology.*  
Eugene L. Jack, Ph.D., *Professor of Food Science and Technology.*  
George L. Marsh, M.S., *Professor of Food Science and Technology.*  
Emil M. Mrak, Ph.D., *Professor of Food Science and Technology.*  
Herman J. Phaff, Ph.D., *Professor of Food Science and Technology.*  
Clarence Sterling, Ph.D., *Professor of Food Science and Technology.*

\* JOSEPH M Smith, Sc.D; Professor  
of Food Science<sup>and</sup> Technology  
6/1/61

George F. Stewart, Ph.D., *Professor of Food Science and Technology (Chairman of the Department)*.

Nikita P. Tarassuk, Ph.D., *Professor of Food Science and Technology*.

Reese H. Vaughn, Ph.D., *Professor of Food Science and Technology*.

Chester L. Roadhouse, D.V.M., *Professor of Dairy Industry, Emeritus*.

Clinton O. Chichester, Ph.D., *Associate Professor of Food Science and Technology*.

Edwin B. Collins, Ph.D., *Associate Professor of Food Science and Technology*.

Thomas A. Nickerson, Ph.D., *Associate Professor of Food Science and Technology*.

Lloyd M. Smith, Ph.D., *Associate Professor of Food Science and Technology*.

Aloys L. Tappel, Ph.D., *Associate Professor of Food Science and Technology*.

Richard A. Bernhard, Ph.D., *Assistant Professor of Food Science and Technology*.

Walter G. Jennings, Ph.D., *Assistant Professor of Food Science and Technology*.

Martin W. Miller, Ph.D., *Assistant Professor of Food Science and Technology*.

John R. Whitaker, Ph.D., *Assistant Professor of Food Science and Technology*.

—, *Assistant Professor of Food Science and Technology*.

George K. York, II, Ph.D., *Assistant Professor of Food Science and Technology*.



Maynard A. Amerine, Ph.D., *Professor of Enology*.

A. Wade Brant, Ph.D., *Lecturer in Food Science and Technology*.

Jerry Foytik, Ph.D., *Associate Professor of Agricultural Economics*.

John C. Harper, D.Sc., *Associate Professor of Agricultural Engineering*.

Bruce E. Hubbell, Jr., B.S., *Lecturer in Food Science and Technology*.

Samuel Lepkovsky, Ph.D., *Professor of Poultry Husbandry*.

Bor S. Luh, Ph.D., *Lecturer in Food Science and Technology*.

Daniel W. Peterson, Ph.D., *Assistant Professor of Poultry Husbandry*.

~~Clement A. Phillips, M.S., *Lecturer in Food Science and Technology*~~ *retired*

Donald M. Reynolds, Ph.D., *Associate Professor of Bacteriology*.

Edward B. Roessler, Ph.D., *Professor of Mathematics*.

*Departmental Major Advisers.*—Mr. Nickerson, Mr. Marsh, Mr. Vaughn.

#### DAIRY INDUSTRY

*The Major.*—See pages 64–66.

#### LOWER DIVISION COURSES

##### 1. Principles of Dairying. (3) I.

Mr. Smith

The composition and properties of milk and their influence on the principles of dairy products processing. The importance of the milk constituents in human nutrition. Some economic aspects of the dairy industry in California.

##### 2. Laboratory in Principles of Dairying. (1) I.

Mr. Tarassuk

Laboratory.

Prerequisite: course 1 (may be taken concurrently).

A laboratory course to accompany course 1; primarily for dairy industry majors. Identification and properties of the constituents of milk, laboratory tests of milk and milk products; study of dairy processing.

##### 3. Dairy Plant Operations. (1) I.

Mr. Hubbell

Laboratory.

Prerequisite: course 1 (may be taken concurrently).

Principles of dairy processes including pasteurization, sterilization, homog-



enization, separation, clarification, freezing, condensing, drying, and crystallization, and their application in the processing of milk, ice cream, cheese, butter, condensed and dried milks, and specialty products. For students not majoring in dairy industry.

**49. Summer Practice and Observation Course. (No credit)**

The Staff (Mr. Hubbell in charge)

Daily, except Sunday, 8-5, six weeks. Required of all students whose major is dairy industry, unless proof of equivalent experience can be shown.

Prerequisite: course 1.

Practice in processing dairy products, including market milk, butter, cheese, ice cream, and concentrated milks. Applications of laboratory control and some practice in equipment maintenance.

UPPER DIVISION COURSES

**101A-101B. Principles of Dairy Processing. (3-3) Yr.**

I. Mr. Dunkley; II. Mr. Nickerson.

Prerequisite: courses 1 and 2 recommended.

The principles of dairy processes including pasteurization, sterilization, homogenization, separation, clarification, freezing, condensing, drying, and crystallization, and their application in the processing of milk, ice cream, cheese, butter, condensed and dried milks, and specialty products.

**102A-102B. Dairy Processing Laboratory. (2-2) Yr.**

Laboratory. I. Mr. Hubbell; II. Mr. Nickerson.

Prerequisite: courses 2, 101A-101B (may be taken concurrently); or consent of the instructor.

A laboratory course to accompany course 101A-101B, primarily for dairy industry majors. Laboratory- and commercial-scale studies of dairy-processing operations; problem assignments; field trips.

**106. Chemistry of Milk and Dairy Products. (4) II.**

Mr. Tarassuk

Lectures and laboratory.

Prerequisite: Chemistry 8.

The physical, and chemical properties of milk and milk products, and their relation to the manufacture and quality of dairy products.

**107. Laboratory Control for Dairy Plants. (2) I.**

Mr. Smith, Mr. Collins

Lecture and laboratory.

Prerequisite: course 1; Bacteriology 1; Chemistry 5.

Bacteriological and chemical control practices in the processing of dairy products.

**108. Food Industry Sanitation. (3) II.**

Mr. Jennings, Mr. Vaughn

Lectures and laboratory.

Prerequisite: Bacteriology 1; Chemistry 8.

Principles and practices of food industry sanitation, laws and regulations; inspection techniques; significance of microorganisms; control of animal and insect pests; detergents and chemical sanitizers; water supplies and waste disposal; plant and equipment problems; and sanitation of selected food industries.

**142. Dairy Bacteriology. (3) I.**

Mr. Collins

Lectures and laboratory.

Prerequisite: Chemistry 1A; Bacteriology 1.

The bacteria found in milk and other dairy products; their ways of entry; methods used in determining their number; effect of pasteurization and other processes on bacteria.

- 160A. Proseminar. (1) I.** Mr. Hubbell  
 Proseminar in determining the quality of dairy products and identifying defects.  
 Required of all dairy industry majors in their senior year.
- 160B. Proseminar. (1) II.** Mr. Hubbell  
 Proseminar in assigned and selected topics.  
 Required of all dairy industry majors in their senior year.

**FOOD TECHNOLOGY**

*The Major.*—See pages 64–66.

UPPER DIVISION COURSES

- 105A. Food and Industrial Microbiology Laboratory. (2) I.**  
 Laboratory. Mr. Vaughn, Mr. York  
 Prerequisite: Bacteriology 1; Chemistry 1A–1B, 8. Recommended: concurrent enrollment in Bacteriology 105A.  
 Microbiology of food fermentations (including the vinous fermentation but not brewing), food processing, food spoilage and the disposal of wastes.
- 105B. Food and Industrial Microbiology Laboratory. (2) II.**  
 Laboratory. Mr. Phaff, Mr. Reynolds  
 Prerequisite: Bacteriology 1; Chemistry 1A–1B, 8. Recommended: concurrent enrollment in Bacteriology 105B.  
 Course 105A is not prerequisite to 105B.  
 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.
- 112. Principles and Practices of Food Processing. (3) I.**  
 Prerequisite: Chemistry 1A–1B, 8; Bacteriology 1. Mr. Miller, Mr. York  
 Principles and technological processes involved in the preparation, preservation, and the examination of fruit and vegetable products.
- 113. Chemical and Biochemical Aspects of Food Processing. (3) II.**  
 Prerequisite: Chemistry 1A–1B, 8; Bacteriology 1. Mr. Tappel, Mr. Sterling  
 Relation of food processing and handling to acceptability, color changes, enzyme activity, deterioration, flavor, vitamin retention, and other factors.
- 114. Principles of Food Processing Operations. (4) I.** Mr. Marsh  
 Lectures and laboratory.  
 Prerequisite: Chemistry 5, 8; Bacteriology 1.  
 Technical principles relating to processing operations used in the commercial preservation of fruits, vegetables, and other foods; theory and practical applications, including field trips.
- 115. Food Analysis. (4) II.** Mr. Bernhard, Mr. Whitaker  
 Lectures and laboratory.  
 Prerequisite: Chemistry 5, 8.  
 Application of quantitative physical and chemical methods of analysis to examination of commercial fruit and vegetable products; laboratory control and research, methods of analysis as applied to food processing; interpretation of results in relation to manufacturing methods and commercial standards.

**118. Enzyme Technology. (3) II.**

Mr. Whitaker

Lectures and laboratory.

Prerequisite: general biochemistry (a course in general enzymology is desirable).

Special emphasis on enzymes involved in food and beverage production. The characteristics of these enzymes, methods of production, measurement of activity, control and utilization in the preparation and preservation of specific foods and food products.

**124. Analyses of Foods by Sensory Tests. (3) II.** Mr. Amerine, Mr. Roessler

Lectures and laboratory.

Prerequisite: Mathematics 13.

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.

**127. Recent Advances in Food Technology. (1) I.**

Mr. Chichester

Prerequisite: two courses in food technology or the equivalent.

Assigned topics, reports, and discussions concerning recent advances in food technology.

## RELATED COURSES

**Agricultural Business Management** (Agricultural Economics 115A-115B)

**Engineering Elements in Food Processing** (Agricultural Engineering 102)

**Food and Industrial Microbiology** (Bacteriology 105A-105B)

**Handling, Storage, and Transit of Fruits** (Pomology 112)

**Technology of Handling Poultry Products** (Poultry Husbandry 121)

**Concepts of Animal Nutrition** (Poultry Husbandry 150)

**Handling, Storage, and Transit of Vegetables** (Vegetable Crops 112)

**Enology: Wine Processing and Analyses** (Viticulture 124)

**Enology: Wine Preparation** (Viticulture 125)

## FOOD SCIENCE AND TECHNOLOGY

## UPPER DIVISION COURSES

**198. Directed Group Study. (1-5) I and II.**

Prerequisite: consent of the instructor. The Staff (Mr. Stewart in charge)

Directed group study of selected topics in food science and technology for advanced undergraduates.

**199. Special Study for Advanced Undergraduates. (1-5) I and II.**

The Staff (Mr. Stewart in charge)

## GRADUATE COURSES

**216. Yeasts and Related Organisms. (4) II.**

Mr. Phaff, Mr. Miller

(Formerly Food Technology 116.)

Prerequisite: a general course in microbiology, botany, biochemistry, and consent of instructor. Recommended: a course in cryptogamic botany.

Morphology, development, classification, and distribution of yeasts; relation to other fungi, growth requirements; physiological activities, including certain industrial aspects.

**220. The Natural Coloring Matters. (2) I.**

Mr. Chichester

(Formerly Food Technology 120.)

Lectures and laboratory.

Prerequisite: 3 units of biochemistry or plant biochemistry; 3 units of upper division organic chemistry.

Chemistry of natural pigments and related compounds; spectrophotometric

Food Science and Technology 210. Proteins-  
Their Functional Activities and Inter-  
actions. (3) II. Mr. Feeney

Prerequisite: Biochemistry 101; Chemistry  
109 or 110A-110B; or consent of instructor.

Recommended: Chemistry 112A-112B.

The relationships of structure of pro-  
teins to their biological functions. Structur-  
al proteins, complexing proteins, and  
catalytic proteins in plant and animal  
materials and products.

Donald M. Decker, Ph.D., <sup>Acting</sup> ~~Visiting~~  
instructor in Spanish  
1/61

and chromatographic techniques; special emphasis on pigments in relation to foods.

290. Seminar. (1) I and II.

Mr. Stewart

299. Research. (1-9) I and II.

The Staff (Mr. Stewart in charge)

Prerequisite: graduate standing.

## FOREIGN LANGUAGES

(Department Office, 378 Academic Office Building)

Siegfried B. Puknat, Ph.D., *Professor of German (Chairman of the Department)*.

Iver N. Nelson, Ph.D., *Professor of Spanish, Emeritus*.

Max Bach, Ph.D., *Associate Professor of French*.

Daniel S. Keller, Ph.D., *Associate Professor of Spanish*.

†Merle L. Perkins, Ph.D., *Associate Professor of French*.

Wayne S. Bowen, Ph.D., *Assistant Professor of Spanish*.

Donald G. Castanien, Ph.D., *Assistant Professor of Spanish*.

Richard E. Grimm, Ph.D., *Assistant Professor of Classics*.

Roland W. Hoermann, Ph.D., *Assistant Professor of German*.

Martin Kanes, Docteur de l'Université de Paris, Ph.D., *Assistant Professor of French*.

Marshall Lindsay, Ph.D., *Assistant Professor of French*.

James F. Hyde, Ph.D., *Instructor in German*.

Kenneth K. Shaw, M.A., *Visiting Instructor in French*.

Francisco Trinidad, M.A., *Visiting Instructor in Spanish*.

*Lectures in French*  
*Surname?*

William P. Galvin, M.A., *Associate in Foreign Languages*.

Luis G. Ireland, M.A., *Associate in Russian*.

Anthony S. Kawczynski, Mag.Phil., *Associate in Foreign Languages*.

### CLASSICS

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 106.

39A. Greek Literature in Translation. (3) I.

Mr. Grimm

Knowledge of Greek not required.

Lectures and discussions in English and reading of representative works in English translation.

39B. Latin Literature in Translation. (3) II.

Mr. Grimm

Knowledge of Latin not required. Course 39A is not prerequisite to 39B.

Lectures and discussions; reading of representative works in English translation.

### FOREIGN LANGUAGES

#### PROFESSIONAL COURSE

(Course coordinator will change from year to year.)

300. The Teaching of a Modern Foreign Language. (2) II.

Mr. Keller

Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Analysis and discussion of a variety of teaching techniques by representa-

† Absent on leave, 1960-1961.

tives of modern foreign languages and linguistics; orientation in language laboratory operation; practice in evaluating oral and written performance in language classes.

#### FRENCH

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 106.

*Departmental Major Advisers.*—Mr. Bach, Mr. Perkins.

#### *The Major Program*

(A) Lower Division Courses.—French 1, 2, 3, and 4, or their equivalents.

(B) Upper Division Courses.—Required: 24 units of upper division courses, including 101A–101B, 109A, a separate course in each of the following periods: seventeenth century, eighteenth century, nineteenth century. With the permission of the staff, three of the 24 units may be related work in other fields. Students who major in French must maintain at least an average of C in upper division French courses.

*Honors and Honors Program* (see page 107).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

#### 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 French—Beginning.** (4) I and II. The Staff  
This course corresponds to the first two years of high school French.
2. **Elementary French—Continued.** (4) I and II. The Staff  
Prerequisite: course 1 or two years of high school French.
3. **Intermediate French.** (4) I and II. The Staff  
Prerequisite: course 2 or three years of high school French.
4. **Intermediate French. Conversation and Reading.** (4) I and II.  
Prerequisite: course 3 or four years of high school French. The Staff  
Spoken French stressed through class discussion of a variety of selected readings.

#### UPPER DIVISION COURSES

Prerequisite for all courses except 122: course 4 or its equivalent.

- 101A. **Advanced Grammar, Composition, and Conversation.** (3) I. Mr. Kanes  
Offered in alternate years.
- \*101B. **Advanced Grammar, Composition, and Conversation.** (3) II. Mr. Lindsay  
Course 101A is not a prerequisite to 101B.  
Offered in alternate years.
- \*109A. **A Survey of French Literature from the Middle Ages to the End of the Seventeenth Century.** (3) I. Mr. Kanes  
Offered in alternate years.
- 109B. **A Survey of French Literature from the Beginning of the Eighteenth Century to the Present.** (3) II. Mr. Kanes  
Course 109A is not a prerequisite to 109B.  
Offered in alternate years.
117. **The Theater of the Seventeenth Century.** (3) I. Mr. Bach

\* Not to be given, 1960–1961.

- \*118A. The Age of Voltaire and Rousseau.** (3) I. Mr. Perkins  
A study of writings which helped mold the intellectual environment of the American and French Revolutions.  
Offered every third year.
- \*118B. Drama and Novel in the Eighteenth Century.** (3) II. Mr. Perkins  
Plays of Marivaux and Beaumarchais; novels of Lesage, Prevost, Diderot, Voltaire, Rousseau.  
Course 118A is not a prerequisite to 118B.  
Offered in alternate years.
- \*119A. The Nineteenth Century.** (3) I. Mr. Bach  
Romanticism in drama and poetry: Hugo, Musset, Vigny; novels of Balzac and Stendhal.  
Offered in alternate years.
- \*119B. The Nineteenth Century.** (3) II. Mr. Bach  
Realism and naturalism (Flaubert, Zola, Maupassant); criticism (Sainte-Beuve, Renan, Taine); symbolism (Baudelaire, Verlaine, Rimbaud, Mallarmé).  
Course 119A is not a prerequisite to 119B.  
Offered in alternate years.
- 122. French Literature of the Twentieth Century.** (3) II. Mr. Lindsay  
Knowledge of French not required.  
Representative readings from Proust, Gide, Valery, Sartre and others.  
Lectures in English; readings in English or French.  
Offered in alternate years.
- 194H. Special Study for Honors Students.** (3) I and II. The Staff  
Prerequisite: open only to honors students.  
Guided research leading to an honors thesis.
- 199. Special Study for Advanced Undergraduates.** (1-4) I and II. The Staff

#### GERMAN

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 106.

*Departmental Major Adviser.*—Mr. Puknat.

#### *The Major Program*

(A) Lower Division Courses.—German 1, 2, 3, 4, or their equivalents.

(B) Upper Division Courses.—Twenty-four units in upper division courses, including one full year's course in composition. Six of the 24 units may be related work in other departments. Students who fail to maintain an average of C or better in upper division courses in German will be excluded from the major.

*Honors and Honors Program* (see page 107).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

#### LOWER DIVISION COURSES

A course may not ordinarily be taken for credit if it is a prerequisite to a

\* Not to be given, 1960-1961.



course already completed. Students offering high school language preparation as a prerequisite must take a placement test.

1. **Elementary German—Beginning.** (4) I and II. The Staff  
This course corresponds to the first two years of high school German.
  2. **Elementary German—Continued.** (4) I and II. The Staff  
Prerequisite: course 1 or two years of high school German.
  3. **Intermediate German.** (4) I and II. The Staff  
Prerequisite: course 2 or three years of high school German.
  4. **Intermediate German. Conversation and Reading.** (4) II. The Staff  
Prerequisite: course 3 or four years of high school German.  
Spoken German stressed through class discussion of a variety of selected readings.
- 1G. German for Graduate Students.** (No credit) I and II. Mr. Kawczynski  
A course designed to prepare students for the graduate reading examination.

#### UPPER DIVISION COURSES

Prerequisite for all courses except 100: course 4 or its equivalent.

- 100. Introduction to Modern German Literature.** (3) I. Mr. Puknat  
Prerequisite: junior standing, or consent of the instructor. Knowledge of German not required.  
Lectures on, and readings from, the main figures of German literature in the past half century; the crisis of modern man as reflected in Rilke, Kafka, Hesse, Thomas Mann, and others. Lectures and readings in English.  
Offered in alternate years.
- \*101A. Advanced Grammar, Composition, and Conversation.** (3) I. Mr. Puknat  
(Formerly course 130A.)  
Offered in alternate years.
- 101B. Advanced Grammar, Composition, and Conversation.** (3) I. Mr. Hoermann  
(Formerly course 130B.)  
Course 101A is not a prerequisite to 101B.  
Offered in alternate years.
- \*102. German Poetry.** (3) II. Mr. Hoermann  
Literary, folk, and church forms in German lyric and narrative verse from the Middle Ages to the present.  
Offered in alternate years.
- \*103A. The Classical Period: Lessing and Schiller.** (3) II. Mr. Hyde  
The major dramas and aesthetic principles of Lessing and Schiller.  
Offered in alternate years.
- 103B. The Classical Period: Goethe.** (3) II. Mr. Puknat  
Course 103A is not a prerequisite to 103B.  
A study of *Iphigenie*; *Tasso*; and *Faust*, Parts I and II.  
Offered in alternate years.
- \*109. The "Sturm und Drang" Period and Romanticism.** (3) I. Mr. Hoermann  
The liberation of feeling in the imaginative literature of the Storm and Stress and Romantic periods.  
Offered every third year.

\* Not to be given, 1960-1961.

- \*114. **Nineteenth-Century German Prose.** (3) I. Mr. Hoermann  
Readings from representative German prose writers of the nineteenth century from the end of Romanticism to Naturalism.  
Offered every third year.
- \*116. **Nineteenth-Century German Drama.** (3) I. ———  
(Formerly course 104.)  
The development of the German drama during the nineteenth century. Readings of representative plays by Kleist, Büchner, Grillparzer, and Hebbel.  
Offered every third year.
122. **History of German Literature.** (3) II. Mr. Hyde  
(Formerly course 118B.)  
A survey of German literature from the Reformation to the end of the nineteenth century.  
Offered in alternate years.
- 194H. **Special Study for Honors Students.** (3) I and II.  
The Staff (Mr. Puknat in charge)  
Prerequisite: open only to honors students.  
Guided research leading to an honors thesis.
199. **Special Study for Advanced Undergraduates.** (1-3) I and II.  
The Staff (Mr. Puknat in charge)

**GREEK**

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 106.

## LOWER DIVISION COURSES

- \*1. **Elementary Greek—Beginning.** (4) I. Mr. Grimm
- \*2. **Elementary Greek—Continued.** (4) II. Mr. Grimm  
Prerequisite: course 1 or the equivalent.

**LATIN**

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 106.

## LOWER DIVISION COURSES

1. **Elementary Latin—Beginning.** (4) I. Mr. Grimm
2. **Elementary Latin (continuation of 1).** (4) II. Mr. Grimm  
Prerequisite: two years of high school Latin or course 1 or consent of the instructor.
3. **Latin Prose Readings.** (4) I. Mr. Grimm  
Prerequisite: course 2 or the equivalent.
4. **Readings in Latin Poetry.** (4) II. Mr. Grimm  
Prerequisite: course 3 or the equivalent.

**RUSSIAN**

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 106.

\* Not to be given, 1960-1961.

## LOWER DIVISION COURSES

1. **Elementary Russian—Beginning.** (4) I. Mr. Ireland
2. **Elementary Russian—Continued.** (4) II. Mr. Ireland  
Prerequisite: course 1.
- 1G. **Russian for Graduate Students.** (No credit) I and II. Mr. Ireland  
A course designed to prepare students for the graduate reading examination.

## SPANISH

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 106.

*Departmental Major Advisers.*—Mr. Bowen, Mr. Keller.

*The Major Program*

(A) Lower Division Courses.—Four years of high school Spanish, or courses 1, 2, and 3, and also 4 unless 3 has been passed with a grade of A or B; course 25A–25B.

(B) Upper Division Courses.—Required: 24 units of upper division courses including 106A–106B (6 units). The remaining units may be from any of the upper division courses. Students who fail to maintain an average grade of at least C in the Spanish courses taken in the upper division will be excluded from the major.

*Honors and Honors Program* (see page 107).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

## 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. Students whose native tongue is Spanish will not normally be admitted to any lower division course; prospective majors, however, are required to take Spanish 25A–25B.

1. **Elementary Spanish—Beginning.** (4) I and II. The Staff  
This course corresponds to the first two years of high school Spanish.
2. **Elementary Spanish—Continued.** (4) I and II. The Staff  
Prerequisite: course 1 or two years of high school Spanish.
3. **Intermediate Spanish.** (4) I and II. The Staff  
Prerequisite: course 2 or three years of high school Spanish, or the equivalent.
4. **Intermediate Spanish Conversation and Reading.** (4) II. The Staff  
Prerequisite: course 3 or four years of high school Spanish.  
Spoken Spanish stressed through class discussion of a variety of selected readings.
- 25A–25B. **Advanced Spanish.** (3–3) Yr. Mr. Bowen  
Required as preparation for the major.  
Prerequisite: four years of high school Spanish, or course 3 (with a grade of at least B) or course 4, or the equivalent.

## UPPER DIVISION COURSES

Prerequisite: course 4 or its equivalent.

**104A-104B. Survey of Spanish-American Literature.** (3-3) Yr. Mr. Keller  
Course 104A is not prerequisite to 104B.

Survey of major authors and important aspects of Spanish-American literary history from the Colonial Period to the present.

Offered in alternate years.

**\*105. Peninsular Drama from the Romantic Movement to the Present.**

(3) II.

Mr. Bowen

Offered every third year.

**106A. History of Spanish Literature to 1680.** (3) I.

Mr. Castanien

Offered in alternate years.

**\*106B. History of Spanish Literature from 1680 to the Present.** (3) I.

Course 106A is not prerequisite to course 106B.

Mr. Keller

Offered in alternate years.

**\*108. Modern Peninsular Prose Literature.** (3) II.

Mr. Bowen

Study of the Spanish novel and essay of the nineteenth and twentieth centuries.

Offered in alternate years.

**\*109. Spanish Drama of the Golden Age.** (3) I.

Offered in alternate years.

**\*111. Cervantes.** (3) II.

Offered in alternate years.

**115. Lyric Poetry.** (3) II.

Mr. Bowen

A survey of Spain's principal lyric poets from the Middle Ages to the present.

Offered every third year.

**194H. Special Study for Honors Students.** (3) I and II.

The Staff (Mr. Keller in charge)

Prerequisite: open only to honors students.

Guided research leading to an honors thesis.

**199. Special Study for Advanced Undergraduates.** (1-3) I and II.

The Staff (Mr. Keller in charge)

## FRENCH

For courses in French see "Foreign Languages" on page 186.

## GENETICS

(Department Office, 222 Animal Science Building)

Melvin M. Green, Ph.D., *Professor of Genetics (Acting Chairman of the Department)*.

†G. Ledyard Stebbins, Ph.D., *Professor of Genetics.*

Sidney R. Snow, Ph.D., *Assistant Professor of Genetics.*

\* Not to be given, 1960-1961.

√ † Absent on leave, 1960-1961.

*Members of the Genetics Group:*

- Ursula H. Abbott, Ph.D., *Assistant Professor of Poultry Husbandry.*  
 Hans Abplanalp, Ph.D., *Assistant Professor of Poultry Husbandry.*  
 Robert W. Allard, Ph.D., *Professor of Agronomy.*  
 Vigfus S. Asmundson, Ph.D., *Professor of Poultry Husbandry.*  
 G. Eric Bradford, Ph.D., *Assistant Professor of Animal Husbandry.*  
 Fred N. Briggs, Ph.D., *Professor of Agronomy.*  
 Royce S. Bringhurst, Ph.D., *Associate Professor of Pomology.*  
 Glen N. Davis, Ph.D., *Professor of Vegetable Crops.*  
 Paul W. Gregory, Sc.D., *Professor of Animal Husbandry.*  
 Claron O. Hesse, Ph.D., *Professor of Pomology.*  
 Paulden F. Knowles, Ph.D., *Professor of Agronomy.*  
 Robert C. Laben, Ph.D., *Associate Professor of Animal Husbandry.*  
 Harry H. Laidlaw, Jr., Ph.D., *Professor of Entomology.*  
 Lloyd A. Lider, Ph.D., *Assistant Professor of Viticulture.*  
 R. Merton Love, Ph.D., *Professor of Agronomy.*  
 Wyman E. Nyquist, Ph.D., *Assistant Professor of Agronomy.*  
 Harold P. Olmo, Ph.D., *Professor of Viticulture.*  
 Charles M. Rick, Jr., Ph.D., *Professor of Vegetable Crops.*  
 Wade C. Rollins, Ph.D., *Associate Professor of Animal Husbandry.*  
 Charles W. Schaller, Ph.D., *Associate Professor of Agronomy.*  
 Dale G. Smeltzer, Ph.D., *Assistant Professor of Agronomy.*  
 Francis L. Smith, Ph.D., *Professor of Agronomy.*  
 Ernest H. Stanford, Ph.D., *Professor of Agronomy.*  
 Clyde N. Stormont, Ph.D., *Professor of Veterinary Science.*

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Departmental Major Adviser.*—Mr. Snow.

*The Major.*—See Animal Science Curriculum, pages 59–62, and Plant Science Curriculum, pages 70–75.

## UPPER DIVISION COURSES

**100. Principles of Genetics.** (3) I and II.

I. Mr. Snow; II. Mr. Green.

Lectures and conference.

Prerequisite: general botany or general zoology.

Introduction to genetics with some consideration of its applications in agriculture and biology.

Students taking course 100C concurrently will include their conference hour within the laboratory period of that course.

**100C. Principles of Genetics Laboratory.** (1) I and II.

I. Mr. Snow; II. Mr. Green.

Laboratory.

Must be taken concurrently with course 100.

Laboratory work in elementary genetics to supplement course 100.

**101. Cytogenetics.** (3) II.

Mr. Snow

Prerequisite: course 100; general cytology (Botany 130 or its equivalent).

Genetics as related to cytological conditions.

**101L. Cytogenetics Laboratory.** (2) II.

Mr. Snow

Laboratory.

Prerequisite: course 101 (may be taken concurrently).

Laboratory study of chromosome morphology and behavior as related to problems in genetics.

- \*103. **Organic Evolution.** (3) II. Mr. Stebbins  
Prerequisite: course 100.  
The principles of evolution, with particular reference to the evolutionary processes in plants.
- \*106. **Advanced Genetics.** (3) I. Mr. Green  
Prerequisite: course 100; Botany 130; Chemistry 8.  
An introduction into the nature and properties of the gene; gene mutation, the mechanism of gene action and related topics.  
Offered in fall semester of odd-numbered years.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.  
The Staff (Mr. Green in charge)

RELATED COURSES

- Principles of Plant Breeding** (Agronomy 121)  
**The Genetics of Animal Breeding** (Animal Husbandry 107)  
**Plant Cytology** (Botany 130)  
**Chromosome Techniques** (Botany 131)  
**Applied Statistical Methods** (Mathematics 105)  
**Fruit Breeding** (Pomology 114)  
**Vegetable Breeding** (Vegetable Crops 120)

GRADUATE COURSES

297. **Graduate Seminar in Genetics.** (1-4) I and II.  
The Genetics Group (Mr. Green in charge)  
Prerequisite: graduate standing in genetics.  
Intensive study of special topics, under supervision of some member of the staff.
299. **Research.** (1-6) I and II. The Staff
- Staff Seminar in Genetics.** (No credit) I and II.  
(Formerly numbered 201.)  
Prerequisite: course 100. The Genetics Group (Mr. Green in charge)  
Weekly meetings for presentation of topics by members of the staff, visiting investigators, and graduate students.

**GEOCHEMISTRY**

For courses in geochemistry see "Geological Sciences" on page 194.

**GEOGRAPHY**

For courses in geography see "Anthropology and Geography" on page 141.

**GEOLOGICAL SCIENCES**

(Department Office, 292 Academic Office Building)

- Charles G. Higgins, Ph.D., *Associate Professor of Geology (Chairman of the Department).*  
Donald O. Emerson, Ph.D., *Assistant Professor of Geology.*  
Emile A. Pessagno, Jr., Ph.D., *Instructor in Geology.*

\* Not to be given, 1960-1961.

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Departmental Subject Advisers.*—For the B.S. degree, Mr. Emerson; for the A.B. degree, Mr. Higgins.

#### GEOLOGICAL SCIENCES MAJOR PROGRAMS

Students who are 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*

(A) Lower Division Courses.—Chemistry 1A–1B; Geology 1; Mathematics 3A–3B; Paleontology 1; Physics 4A, 4C. These courses should be completed in the freshman and sophomore years if possible.

(B) Upper Division Courses.—Geochemistry 100, 101, 103, 104; Geology 102, 107, 116, 117; Paleontology 111, 112; and a summer geology field course, approved in advance by the department, of at least four units.

##### *Bachelor of Arts Major Program*

(A) Lower Division Courses.—Chemistry 1A; Geology 1; Mathematics C and one of the following: 3A, 13, or 36; Paleontology 1; Physics 2A or 4A; Zoology 1A or Chemistry 1B.

(B) Upper Division Courses.—Geochemistry 100, 101; Geology 102, 116; and ten additional units in courses offered by the department.

#### GEOCHEMISTRY

##### UPPER DIVISION COURSES

100. **Mineralogy and Petrology.** (4) I. Mr. Emerson  
Lectures and laboratory.  
Prerequisite: Geology 1 or 2L.  
An introduction to the chemistry of the earth's crust; study of the properties, origins, and associations of important rock-forming and economic minerals and of the rocks in which they occur.  
Not open for credit to students with credit for Geology 103.
101. **Crystallography and Optical Mineralogy.** (4) II. Mr. Emerson  
Lectures and laboratory.  
Principles of structural, morphological, and optical crystallography; microscopic study of mineral fragments and thin sections.
103. **Sedimentary Petrology.** (2) I. Mr. Emerson  
Lectures and laboratory.  
Prerequisite: courses 100, 101.  
The origin, occurrence, and classification of sedimentary rocks; description and interpretation of these rocks by megascopic and microscopic means.
104. **Igneous and Metamorphic Petrology.** (3) II. Mr. Emerson  
Lectures and laboratory.  
Prerequisite: courses 100, 101.  
The origin, occurrence, and classification of igneous and metamorphic rocks; description and interpretation of these rocks by megascopic and microscopic means.

**GEOLOGY**

## LOWER DIVISION COURSE

1. **General Geology.** (3) I. Mr. Higgins  
Lectures and laboratory.  
An introduction to the earth's physical features and the changes they undergo through dynamic processes.  
Not open for credit to students with credit for course 2.

## UPPER DIVISION COURSES

102. **Field Geology.** (3) II. Mr. Higgins  
Lectures and laboratory.  
Prerequisite: course 116. Recommended: Geochemistry 100.  
Principles and methods of making topographic and geologic field observations, measurements, and maps. Several all-day periods in the field.
107. **Evolution of North America.** (2) I. Mr. Pessagno  
Prerequisite: course 116.  
Origin of continents and their tectonic elements, applied to a study of North America.
116. **Structural Geology.** (3) I. Mr. Higgins  
Lectures and laboratory.  
Prerequisite: course 1 or 2L; course 3 or Paleontology 1; trigonometry.  
Deformation of the earth, with special reference to causes, mechanics, and effects of crustal deformation; practice in laboratory methods dealing with geological problems in three dimensions.
117. **Geomorphology.** (2) II. Mr. Higgins  
Prerequisite: course 116.  
Nature, evolution, and classification of landforms.
198. **Advanced General Geology.** (2-3) I and II. The Staff  
Prerequisite: senior standing in geology or consent of the instructor.  
Directed group study in selected fields of the geological sciences.
199. **Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff

**PALEONTOLOGY**

## LOWER DIVISION COURSE

1. **General Paleontology.** (3) II. Mr. Pessagno  
Lectures and laboratory.  
Prerequisite: Geology 1 or 2L.  
An introduction to the earth's plant and animal inhabitants of the past, their evolution, relationships, and distribution in time and space.  
Not open for credit to students with credit for Geology 3.

## UPPER DIVISION COURSES

111. **Invertebrate Paleontology.** (4) I. Mr. Pessagno  
Lectures and laboratory.  
Prerequisite: course 1 or Geology 3L or Zoology 1A or 10.  
Morphology, systematics, paleoecology, and evolution of invertebrates common in the fossil record.



**112. Stratigraphy.** (3) II.

Mr. Pessagno

Lectures and laboratory.

Prerequisite: course 111, and Geochemistry 100 or Geology 103.

Principles of lithostratigraphy and biostratigraphy, with specific illustrations from the stratigraphic record.

**GERMAN**

For courses in German see "Foreign Languages" on page 187.

**GREEK**

For courses in Greek see "Foreign Languages" on page 189.

**HISTORY**

(Department Office, 163 Academic Office Building)

W. Turrentine Jackson, Ph.D., *Professor of History.*C. Bickford O'Brien, Ph.D., *Professor of History.*James H. Shideler, Ph.D., *Professor of History (Chairman of the Department).*David L. Jacobson, Ph.D., *Assistant Professor of History.*Richard N. Schwab, Ph.D., *Assistant Professor of History.*Philip J. Staudenraus, Ph.D., *Assistant Professor of History.*Craig B. Fisher, M.A., *Acting Assistant Professor of History.***HISTORY***Letters and Science List.*—All undergraduate courses in history are included in the Letters and Science List of Courses (see page 106).*Departmental Advisers.*—Mr. O'Brien, Mr. Schwab, Mr. Shideler, Mr. Staudenraus.*Graduate Adviser.*—Mr. Staudenraus.*Introductory Courses.*—Course 4A-4B and 17A-17B are open to all students.*The American History and Institutions Requirement* may be satisfied by any two of the following courses: course 17A, 17B, 170A, 170B, 171, 172A, 172B, 174A, 174B, 176A, 176B, 178A, 178B, 179, 180, 183. See also the section entitled "General Regulations" on page 41.*The Major Program*

(A) Lower Division Courses.—Required: courses 4A-4B, 17A-17B, Political Science 1A and 1B or 2, and one of the following courses: Economics 1A or Geography 1B or Philosophy 6A or 20A.

(B) Upper Division Courses.—Required: (1) Students majoring in history must complete 24 upper division units in history, including:

(a) Course 101.

(b) A minimum of 6 units each in European and United States history.

(c) Two sequence courses of two semesters each.

(2) History students must maintain at least a grade C average in the major.

*Honors and Honors Program* (see page 107).—The honors program comprises course 101, completed with a grade of B or better; course 194H, normally taken in the first senior semester; and course 195H, either a senior thesis or comprehensive examination according to the recommendation of a

x Jerome BROWN, B.A., Assistant in History, 2/1/61

x Keith L. NELSON, M. A., Assistant in History  
7/1/60

x WILLIAM T. WOLF, M. A., ASSISTANT IN History  
1/1/61

departmental honors committee. Before being admitted to the honors program, a student must complete 12 units of history, including both United States and European history (normally courses 4 and 17) with an average grade of B.

*The Master of Arts Degree in History*

The Department offers graduate study leading to the Master of Arts Degree in History to students who have completed with distinction the A.B. Degree in history, or its equivalent. Candidates for graduate study will be recommended for admission to graduate studies in history provided they meet the requirements of the Graduate Division and the Department of History.

*The Program for the Master of Arts Degree*

The Department currently offers graduate work in the fields of California History, Western United States History, and American Agricultural History.

Candidates for the M.A. degree must complete satisfactorily the following requirements:

A. *Foreign Language*.—A reading knowledge of one foreign language approved by the Department of History. The candidate should demonstrate to the Department his competence in a foreign language in advance of the semester in which his M.A. degree is to be conferred.

**B. Course Work**

1. A minimum total of twenty units of course work, of which:

a. twelve units must be in history courses.

b. at least eight units must be graduate courses, including two seminars and a minimum of two units of History 299.

2. Graduate course work must be done under at least two instructors.

The normal semester program would consist of a seminar (2 units), History 299 (2 units), and two upper division courses (6 units). Such a minimum program should enable a diligent and able student to complete his work for the M.A. degree in two semesters.

C. *Thesis*.—The thesis for the Master of Arts Degree in history shall be the result of the student's original investigations on a topic approved by his faculty graduate adviser.

LOWER DIVISION COURSES

- **4A. History of Western Civilization.** (3) I and II. The Staff  
The growth of western civilization from ancient times through the seventeenth century.
- 4B. History of Western Civilization.** (3) I and II. The Staff  
Course 4A is not prerequisite to 4B.  
The development of western civilization in the eighteenth, nineteenth, and twentieth centuries.
- 17A. History of the United States.** (3) I and II. The Staff  
American national beginnings from colonial times through 1865.
- 17B. History of the United States.** (3) I and II. The Staff  
Course 17A is not a prerequisite to 17B.  
The American nation from the Civil War to the present.

UPPER DIVISION COURSES

- 101. Introduction to Historical Method and Historiography.** (3) II. Mr. O'Brien

- 111A. Ancient History. (3) I.** Mr. Fisher  
A survey of the history of the Near East and Mediterranean area from the beginning of recorded history to the reign of Alexander the Great.
- 111B. Ancient History. (3) II.** Mr. Fisher  
Course 111A is not prerequisite to 111B.  
The history of the Near East and Mediterranean area from the reign of Alexander the Great to the time of Constantine.
- 121A. Medieval History. (3) I.** Mr. Fisher  
A survey of European history from the reign of Constantine to the tenth century, with readings from the literary sources.
- 121B. Medieval History. (3) II.** Mr. Fisher  
Course 121A is not prerequisite to 121B.  
European history from the tenth century to the Renaissance, with readings from the literary sources.
- \*131. The Renaissance and Reformation. (3) I.** Mr. O'Brien  
The economic, political, intellectual, and religious history of continental Europe from about 1300 to 1600. The conflict between old institutions and new forces, emphasizing the relationship between intellectual and social change during the transition from medieval to modern times.  
Offered in alternate years.
- 132. Europe in the Seventeenth and Eighteenth Centuries. (3) I.** Mr. O'Brien  
A survey of the period 1600-1789 with emphasis on the growth of the modern state, the new interest in science, and the growth of critical thought leading to revolutionary sentiment.  
Offered in alternate years.
- 136. The Soviet Union in World Affairs. (3) II.** Mr. O'Brien  
Primarily a history of Russia in world politics and economics since 1917. The long-range nature and problems of Russian foreign policy will be investigated.
- 137. History of Russian Civilization. (3) I.** Mr. O'Brien  
An outline of Russian social, political and economic institutions and intellectual development from earliest times to the Second World War. Emphasis will be on the period from Peter the Great through the Revolution of 1917.
- 145. Europe from 1789 to 1871. (3) I.** Mr. Schwab  
A survey of the history of Western Europe from the French Revolution to the Franco-Prussian War.
- 146. Europe Since 1870. (3) II.** Mr. Schwab  
The political, social, and economic development of Europe from the Franco-Prussian War to the present.
- 151A. History of England from 1485 to the Present. (3) I.** Mr. Schwab  
Tudor and Stuart England and the Empire, 1485-1714.
- 151B. History of England from 1485 to the Present. (3) II.** Mr. Schwab  
Course 151A is not prerequisite to 151B.  
History of Great Britain since 1714.

\* Not to be given, 1960-1961.

**\*161A. Hispanic-American History. (3) I.**

Colonial History of Latin America.

**\*161B. Hispanic-American History. (3) II.**

Course 161A is not prerequisite to 161B.

The National Period of Latin American History.

**170A. Colonial America. (3) I.**

Mr. Jacobsen

A survey of colonial society from 1607 to the American Revolution with emphasis on European expansion, political, social, and economic foundations, colonial thought and culture, and imperial rivalry.

**170B. The American Revolution. (3) II.**

Mr. Jacobsen

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.

**171. The Early National Period, 1789-1815. (3) I.**

Mr. Jacobsen

The political and social history of the American republic from the adoption of the Constitution through the War of 1812.

**172A. The Jacksonian Era. (3) I.**

Mr. Staudenraus

(Formerly course 171B.)

The political and social history of the American republic from the War of 1812 to the Compromise of 1850, with special emphasis on inter-sectional rivalry.

**172B. Civil War and Reconstruction. (3) II.**

Mr. Staudenraus

Course 172A is not prerequisite to 172B.

A survey of the major aspects of the Civil War and Reconstruction years; the problems relating to Negro freedom, constitutional readjustments, the rise of the New South, and the role of Big Business.

**174A. Recent History of the United States. (3) I.**

Mr. Shideler

A study of political, economic, and cultural aspects of American democracy in recent years. From 1896 to 1928.

Offered in alternate years.

**174B. Recent History of the United States. (3) II.**

Mr. Shideler

Course 174A is not prerequisite to 174B.

A study of political, economic, and cultural aspects of American democracy of recent years. From 1928 to the present.

Offered in alternate years.

**\*176A. Social and Cultural History of the United States. (3) I.** Mr. Shideler  
To 1865.

Offered in alternate years.

**\*176B. Social and Cultural History of the United States. (3) II.**

Course 176A is not prerequisite to 176B.

Mr. Shideler

1865 to the present.

Offered in alternate years.

**178A. Great Issues in United States History: Ideas and Interpretations.**

(3) I.

Mr. Jackson

Selected topics in the political, economic, social, and intellectual history of the United States. A study of historical thought and interpretation concerning the main currents of national development. To 1876.

\* Not to be given, 1960-1961.

**178B. Great Issues in United States History: Ideas and Interpretations.** (3) II. Mr. Jackson

Course 178A is not prerequisite to 178B.

Selected topics in the political, economic, social, and intellectual history of the United States. A study of historical thought and interpretation concerning the main currents of national development. 1876 to the present.

**179. Economic Growth of the United States.** (3) II. Mr. Staudenraus

A study of the development of capitalism and industrialism and of resultant problems in agriculture, labor, business, and government.

**180. The Westward Movement to 1850.** (3) II. Mr. Jacobsen

The political, economic, and social significance of the westward movement from colonial times to 1850.

**181. Representative Americans.** (3) I. Mr. Staudenraus

Prerequisite: course 17A-17B.

A biographical analysis of significant and representative men and women who shaped American history.

**\*183. The Trans-Mississippi Frontier.** (3) I. Mr. Jackson

The fur trade, western exploration and transportation, the mining kingdom, range cattle industry, and settlement of the West.

Offered in alternate years.

**\*188A. History of Agriculture in the United States.** (3) I. Mr. Shideler

History of agricultural development to 1900 with emphasis on social and economic institutions.

**188B. History of Agriculture in the United States.** (3) II. Mr. Shideler

Course 188A is not prerequisite to 188B.

History of agricultural changes from 1900 to the present with emphasis on the background and evolution of government policy.

**189A. History of the Pacific Coast and California.** (3) I. Mr. Jackson

History of the Pacific Coast and California to 1850.

Offered in alternate years.

**189B. History of the Pacific Coast and California.** (3) II. Mr. Jackson

Course 189A is not prerequisite to 189B.

History of California since 1850.

**194H. Special Study for Honors Students.** (3) I. The Staff

Prerequisite: 12 units of United States and European history with an average grade of B. This normally will be History 4 and 17.

Special study for honors students. Normally taken in the first senior semester.

**195H. Special Study for Honors Students.** (3) II. The Staff

Prerequisite: 12 units of United States and European history with an average grade of B. This normally will be History 4 and 17.

A senior thesis or comprehensive examination upon recommendation of a departmental Honors Committee.

**199. Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff

GRADUATE COURSES

**\*237. Seminar in Russian History.** (2) I and II. Mr. O'Brien

Prerequisite: course 137 or equivalent.

Topics relating to the political and cultural history of Russia in the seventeenth, eighteenth, and nineteenth centuries.

\* Not to be given, 1960-1961.

X CLAIRE M. EASTMAN, PH.D. Instructor

X ANITA N. LEAR, M.S., Lecturer in HOME ECONOMICS, 7/1/60  
Frank B.W. Harper, M.A., Lecturer in Home Economics 1/1/61

X JANE S. PIRKEY, B.S., Lecturer in HOME ECONOMICS, 7/1/60

- \*242. Seminar in European History. (2) I and II. Mr. Schwab  
Prerequisite: a reading knowledge of French or German.  
Intellectual and social history in the seventeenth and eighteenth centuries.  
May be repeated for credit.
271. Seminar in the History of the American West. (2) I and II. Mr. Jackson
272. Seminar in the History of the United States to 1860. (2) I and II. Mr. Staudenraus
288. Seminar in the Agricultural History of the United States. Mr. Shideler  
(2) I and II.
299. Directed Research. (2-4) I and II. The Staff

## PROFESSIONAL COURSE

- \*300. The Teaching of History in the Secondary School and the Junior College. (2) I. The Staff  
Prerequisite: upper division standing; a teaching major or minor in social studies.  
Methods for the presentation of history at the secondary and junior college level.

## HOME ECONOMICS

(Department Office, 148 Home Economics Building)

- Gladys J. Everson, Ph.D., *Professor of Home Economics.*  
Pauline C. Paul, Ph.D., *Professor of Home Economics (Chairman of the Department).*  
Richard D. Cramer, M.F.A. (Architecture), *Associate Professor of Home Economics.*  
Marilyn M. Dunsing, Ph.D., *Assistant Professor of Home Economics.*  
Elizabeth M. Elbert, Ph.D., *Assistant Professor of Home Economics.*  
Ruth J. Horsting, M.A., *Assistant Professor of Home Economics.*  
Lucille S. Hurley, Ph.D., *Assistant Professor of Home Economics.*  
Thomas M. Poffenberger, Ed.D., *Assistant Professor of Home Economics.*  
Daniel Shapiro, *Assistant Professor of Home Economics.*  
———, *Assistant Professor of Home Economics.*  
Ivane Maxfield, M.A., *Instructor in Home Economics.*  
———, *Instructor in Home Economics.*



- Ruby L. Dryden, M.A., *Lecturer in Home Economics.*  
Doris F. Heineman, B.A.E., *Lecturer in Home Economics.*  
Arline Johnson, M.S., *Lecturer in Education.*

\* Letters and Science List.—Decorative Art. All undergraduate courses; a total of not more than 8 units will be accepted for Letters and Science credit. Home Economics 112A-112B, 131, 136, 137.

*Departmental Major Advisers.*— Mr. Cramer, Miss Dunsing, Miss Everson. Mrs. Heineman, Mrs. Horsting, Mrs. Hurley, Miss Maxfield, Miss Paul, Mr. Poffenberger, Mr. Shapiro.

*The Major.*—See pages 66-68.

\* Not to be given, 1960-1961.



**DECORATIVE ART****LOWER DIVISION COURSES**

- 6A. Design and Color.** (2) I and II. The Staff  
 Laboratory.  
 Original problems exploring principles of design and color.
- 6B. Design and Color.** (2) I and II. The Staff  
 Laboratory.  
 Prerequisite: course 6A.  
 Original problems exploring principles of design and color.
- 7A-7B. Design and Color.** (2-2) Yr. Mrs. Horsting, Mr. Shapiro  
 Laboratory.  
 Prerequisite: course 6B.  
 Second-year problems emphasizing function, process, and the properties of materials.

**UPPER DIVISION COURSES**

- 130A. Interior Design.** (2) I. Mrs. Heineman  
 Prerequisite: course 6A.  
 Introduction to the principles of design. Analysis, organization, and solution of problems in interior design in reference to functional and aesthetic aspects.
- 130L. Interior Design.** (1) I. Mrs. Heineman  
 Laboratory.  
 Prerequisite: course 130A should be taken concurrently.  
 Introduction to the principles of design. Analysis, organization, and solution of problems in interior design in reference to functional and aesthetic aspects.

**HOME ECONOMICS****LOWER DIVISION COURSES**

- 1A-1B. Experimental Food Study.** (2-2) Yr. Miss Elbert  
 Prerequisite: Chemistry 8. Recommended: Bacteriology 1.  
 Composition of food, and principles involved in food preservation, meal preparation, and management.
- 1L. Experimental Food Study Laboratory.** (1-1) Yr. Miss Elbert  
 Laboratory.  
 Prerequisite: course 1A-1B (should be taken concurrently).  
 Composition of food, and principles involved in food preservation, meal preparation, and management.
- 6. Introduction to Textiles.** (2) II. Miss Dryden  
 Prerequisite: Chemistry 8.  
 Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.  
 Field trips are included.
- 6L. Introduction to Textiles Laboratory.** (1) II. Miss Dryden  
 Laboratory.  
 Prerequisite: course 6 (should be taken concurrently).  
 Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.  
 Field trips are included.

- 7. Clothing Study.** (2) I and II. Miss Dryden, Miss Maxfield  
Prerequisite: Decorative Art 6A.  
Social, psychological, and economic aspects of clothing as related to selection, design, and construction.
- 7L. Clothing Study Laboratory.** (1) I and II. Miss Dryden, Miss Maxfield  
Laboratory.  
Prerequisite: course 7 (should be taken concurrently).  
Social, psychological, and economic aspects of clothing as related to selection, design, and construction.
- 12. Euthenics.** (2) I. *and II* The Staff (Miss Paul in charge)  
A study of the function of the family and the homemaker in modern society, and of the contributions of the basic sciences and the arts to the solution of present-day social and economic problems of the individual and the family.

## UPPER DIVISION COURSES

- 104A-104B. Advanced Food Study.** (4-4) Yr. Miss Paul  
Lectures and laboratory.  
Prerequisite: course 1B or consent of the instructor.  
Application of principles of chemistry to food preparation. Development of experimental attitudes and techniques.
- 112A-112B. Nutrition and Dietetics.** (2-2) Yr. Miss Everson, Mrs. Hurley  
Prerequisite: course 1A-1B (may be taken concurrently); Chemistry 8; Physiology 1.  
An introduction to the principles of nutrition. Study of the nutrients and their chemical and physiological roles in metabolism. Nutrient requirements of man at various phases of the life cycle.
- 112AL-112BL. Nutrition and Dietetics Laboratory.** (1-1) Yr.  
Laboratory. Miss Everson, Mrs. Hurley  
Prerequisite: course 112A-112B (should be taken concurrently).  
An introduction to the principles of nutrition. Study of the nutrients and their chemical and physiological roles in metabolism. Nutrient requirements of man at various phases of the life cycle.
- 116. Nutrition and Diet Therapy.** (3) I. Miss Everson  
Prerequisite: course 112B or equivalent.  
Physiological basis for the use of special diets. Problems in the planning and computation of dietaries for normal and pathological conditions.
- 117. Problems in Human Nutrition.** (4) II. Miss Everson  
Lectures and laboratory.  
Prerequisite: biochemistry with laboratory; course 112B or equivalent.  
Fundamental concepts of human nutrition. Quantitative laboratory studies in methods of approach to nutrition problems.
- 121. Institution Food Study.** (4) I. \_\_\_\_\_  
Lectures and laboratory.  
Prerequisite: course 1A-1B.  
The principles and problems involved in the preparation and service of food in institutions.
- 122. Institution Organization and Management.** (4) II. Miss Pirkey  
Lectures and laboratory.  
Prerequisite: course 121 or permission of instructor.  
The principles and problems involved in the organization and management of institution households, such as residence halls, hospitals, and hotels.

131. **Child Development.** (3) I. Mr. Poffenberger  
Prerequisite: Psychology 1A.  
The dynamics of human development from conception to adolescence.
133. **Laboratory in Child Development.** (1) I. Mr. Poffenberger  
Lectures and laboratory.  
Course 133 must be taken concurrently with course 131.  
Laboratory conducted at the nursery school.
136. **Adolescent Development.** (3) II. Mr. Poffenberger  
Prerequisite: Psychology 1A.  
The dynamics of human development during the adolescent period.
137. **The Contemporary American Family.** (3) II. Mr. Poffenberger  
Sociological and psychological factors influencing marriage and the family in present-day society.
140. **Home Management.** (3) I. \_\_\_\_\_  
Lectures and laboratory.  
Prerequisite: Physiology 1; Psychology 1A.  
Use of time, energy, and equipment in the home from the viewpoint of the satisfaction of members of the family.  
Field trips are included.
- 140L. **Home Management House Residence.** (2) I and II. \_\_\_\_\_  
Laboratory.  
Prerequisite: course 140 (may be taken concurrently).  
Residence in the home management house providing integrated experiences in the various phases of home economics. Residence will be for five weeks. A fee is required for living costs.
141. **Consumers and the Market.** (3) I. Miss Dunsing  
Prerequisite: Economics 1A-1B; a course in statistics.  
Study of the functions and structure of the market from the standpoint of consumers; evaluation of the guides available for consumers in buying; agencies aiding and protecting consumers.
142. **Social and Economic Problems of Families.** (3) II. Miss Dunsing  
Prerequisite: Economics 1A-1B; a course in statistics.  
Present-day problems of families as they are related to economic and social conditions.
147. **Consumption and Standards of Living.** (3) I. Miss Dunsing  
Prerequisite: courses 141 and 142 or equivalent.  
The effects of family income, size, residence, and occupation on consumption; the relation of standards of living to levels of consumption. Appraisal of methodology of collecting data and analysis.
150. **The House.** (3) II. Mr. Cramer  
Prerequisite: Decorative Art 6A or consent of the instructor.  
The functional, physical, and aesthetic requirements of the individual house; historic and contemporary examples.
- 151A-151B. **Housing.** (3-3) Yr. Mr. Cramer  
Prerequisite: course 150.  
Housing problems as they have developed in Europe and in America; social, economic, technical, and aesthetic aspects; activities of private agencies and programs of government; the current scene as indicative of problems ahead.

X Donald Joseph Hebert, M.S., Visiting Associate Professor of  
Irrigation 2/1/61

X Brooke E. Sawyer, Jr., M.S., Lecturer in Irrigation. 2/1/61

175. **Clothing Design and Construction.** (3) I and II. Miss Maxfield  
Lectures and laboratory.  
Prerequisite: courses 6, 7.  
Wardrobe planning and problems in advanced clothing construction.
198. **Directed Group Study.** (1-2) II. <sup>ne Staff</sup>  
#98 " " " " " " Miss Maxfield, Mr. Shapiro
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

## RELATED COURSE

**Extension Education in Agriculture and Home Economics** (Education 187)

## GRADUATE COURSES

290. **Seminar in Home Economics.** (1) I and II. The Staff  
Prerequisite: consent of the instructor.  
Selected topics in the fields of food, nutrition, or consumer economics.
299. **Research in Home Economics.** (2-6) I and II.  
Miss Dunsing, Miss Everson, Mrs. Hurley, Miss Paul  
Research in foods, nutrition, or consumer economics.

## IRRIGATION

(Department Office, 113 Irrigation Building)

- Lloyd D. Doneen, Ph.D., *Professor of Irrigation.*  
Robert M. Hagan, Ph.D., *Professor of Irrigation (Chairman of the Department).*  
Frank Adams, M.A., L.L.D. (hon.c.), *Professor of Irrigation, Emeritus.*  
Frank J. Veihmeyer, C.E., Ph.D., *Professor of Irrigation, Emeritus.*  
†Robert H. Burgy, M.S., *Associate Professor of Irrigation.*  
Delbert W. Henderson, Ph.D., *Associate Professor of Irrigation.*  
~~Hsin-kuan Lin, Ph.D., Associate Professor of Irrigation.~~  
James N. Luthin, Ph.D., *Associate Professor of Irrigation.*  
× Verne H. Scott, Ph.D., *Associate Professor of Irrigation.*  
Donald R. Nielsen, Ph.D., *Assistant Professor of Irrigation.*  
Yoash Vaadia, Ph.D., *Assistant Professor of Irrigation.*  
Theodor S. Strelkoff, M.S., *Acting Assistant Professor of Irrigation.*
- James W. Biggar, Ph.D., *Lecturer in Irrigation.* 1/61  
John R. Davis, Ph.D., *Lecturer in Irrigation.*  
S ~~Warren A. Hall, Ph.D., Associate Professor of Engineering (Los Angeles campus).~~  
W. Douglas McMillan, M.S., *Lecturer in Irrigation.* e  
× Bert L. Smith, B.S., *Lecturer in Irrigation.*  
Alvin E. Stewart, M.S., *Lecturer in Irrigation.*

*Departmental Major Advisers.*—Mr. Henderson, Mr. Vaadia.  
*The Major.*—See pages 68-70.

## LOWER DIVISION COURSE

10. **Introduction to Irrigation.** (3) II. \_\_\_\_\_  
Prerequisite: sophomore standing or consent of the instructor.  
An introductory course in irrigation principles including soil characteristics related to irrigation; water supply, conveyance and distribution; land preparation and irrigation methods; irrigation requirements of crops; drainage of irrigated land; and problems of irrigation management.

† Absent on leave, 1960-1961.

## UPPER DIVISION COURSES

100. **Water-Soil-Plant Relationships.** (3) I. Mr. Hagan, Mr. Vaadia  
Prerequisite: Consent of the instructor.

Basic principles underlying irrigation in its soil and plant relationships. Movement of irrigation water in soil, soil-moisture availability, soil moisture measurement, relation of soil moisture to plant growth, irrigation requirements for principal crops, and scheduling irrigations for maximum efficiency.

110. **Irrigation Principles and Practices.** (4) I. Mr. Henderson  
Lectures and laboratory.  
Prerequisite: Physics 2A.

A general course for students not majoring in irrigation. Irrigation as a factor in agriculture, principles of irrigation practice, development of the farm irrigation water supply, preparation of land for irrigation, design of farm irrigation systems, and water requirements of crops.

115. **Water Quality and Salinity as Factors in Irrigation.** (3) I. Mr. Doneen  
Lectures and laboratory.

Prerequisite: Chemistry 1A-1B. Recommended: Chemistry 5; Soil Science 1.

Water quality, water analysis, salinity, soil reclamation, infiltration problems, and soil amendments.

118. **Irrigation Hydraulics.** (4) I. \_\_\_\_\_  
Lectures and laboratory.

Prerequisite: Physics 2A-2B; Mathematics 16A-16B.

Basic principles of hydraulics including flow in pipelines and open channels. Use, operation and design of water-measuring devices and water control structures used on irrigated farms.

135. **Irrigation Management and Water Conservation.** (2) II. Mr. Henderson  
Prerequisite: senior standing in irrigation science or soil science and concurrent enrollment in Soil Science 135.

Irrigation practices as affected by soil properties and topography, irrigation-tillage interrelationships, irrigation-fertility interrelationships, irrigation in relation to fertilizer applications, moisture control during germination and harvest, irrigation practices for water conservation, and influences of salinity and drainage on irrigation management.

140. **Drainage of Agricultural Lands.** (2) II. \_\_\_\_\_  
Prerequisite: course 100 and 118.

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.

150. **Water Rights and Irrigation Institutions.** (3) I. Mr. Smith

Water rights: kinds, acquirements, adjudication, administration, loss, and evaluation. Irrigation enterprises: kinds, organization, financing, public regulation, operation, and usefulness under different conditions.

160. **Farm Irrigation Systems.** (3) I. Mr. Davis  
Prerequisite: senior standing in irrigation science or engineering.

Design, construction, operation and maintenance of farm irrigation systems including appurtenant structures. Preparation of land for irrigation. Analysis of irrigation systems and water application practices.

For additional courses in irrigation, drainage, and water resources engineering, see the Engineering course section, pages 163-170.

**170. Irrigation and Drainage Laboratory. (2) II.**

Lectures and laboratory. The Staff (Mr. Davis in charge)

Prerequisite: senior standing in irrigation science or engineering.

Laboratory and field exercises on ground water, wells, and pumping plants; soil-moisture characteristics and water-soil-plant relationships; farm irrigation system design and operation; evaluation of water application methods; drainage investigation techniques; and layout of farm drainage systems. Occasional field trips may be scheduled.

**190. Irrigation Proseminar. (1) II.**

Mr. Nielsen

Prerequisite: consent of instructor.

Current problems in irrigation.

**198. Directed Group Study. (1-5) I and II.**

The Staff

Group study of selected problems in irrigation.

**199. Special Study for Advanced Undergraduates. (1-5) I and II.**

The Staff

Prerequisite: senior standing.

**GRADUATE COURSES****200. Advanced Water-Soil-Plant Relationships. (2) II.**

Mr. Vaadia

Prerequisite: consent of instructor.

Selected topics in water relations including the availability of soil moisture for plant growth; influence of water potential on plant metabolism; water uptake, movement, and distribution in plants; transpiration and water use; nutrient uptake.

**215. Advanced Topics in Water Quality. (2) II.**

Mr. Bigger

Prerequisite: consent of instructor.

chemical principles governing interactions of ionic constituents in water  
An advanced course on irrigation water quality emphasizing physio- with soils and plants. Topics include hydro-dynamic dispersion phenomena during leaching, percolating waters and ground-water quality, and irrigation disposal of waste waters.

**250. Physics of Soil Water. (2) I.**

Mr. Nielsen

Prerequisite: Mathematics 114 or 119 and consent of instructor.

An advanced course on physics of soil water with emphasis on unsaturated flow problems in soils including hydro-dynamics of viscous fluids, miscible and immiscible displacement theories, and methods for solving differential forms of flow equations.

**290. Seminar in Irrigation. (1) I and II.**

Mr. Nielsen

Required of all graduate students in irrigation science. Discussions of advanced problems in irrigation.

**298. Group Study in Irrigation. (1-6) I and II.**

The Staff

Group study on advanced topics in irrigation.

**299. Research in Irrigation. (1-6) I and II.**

The Staff

Individual research in irrigation science. May be repeated for credit.

**LANDSCAPE HORTICULTURE**

(Department Office, 106 Landscape Horticulture Building)

Richard W. Harris, Ph.D., *Associate Professor of Landscape Horticulture (Chairman of the Department).*

Robert D. Danielson, M.S., *Assistant Professor of Landscape Horticulture.*

—, *Assistant Professor of Landscape Horticulture.*



Philip A. Barker, M.S., *Lecturer in Landscape Horticulture.*

John H. Madison, Jr., Ph.D., *Lecturer in Landscape Horticulture.*

*Departmental Major Adviser.*—Mr. Danielson.

*The Major.*—See pages 71-75.

#### LOWER DIVISION COURSES

##### 1A-1B. Elementary Landscape Design and Theory. (3-3) Yr.

Lectures and laboratory.

Mr. Danielson

Prerequisite: consent of instructor. Recommended: Art 2A, 16; or Decorative Art 6A. (Not open for credit to students who have taken Landscape Architecture 1A-1B.)

The analysis and solution of typical site problems.

##### 3. Principles of Home Grounds Design. (3) II.

Mr. Danielson

Lectures and laboratory.

Principles and theories governing the design and construction of small properties, including a study of the adaptability of plant materials to landscape design.

##### 4. Home Grounds Horticulture. (3) I.

Mr. Harris

Lectures and laboratory.

Principles involved in the growth of turf, flowers, and woody ornamentals. Propagation, planting, pruning and identification of these plants for the home grounds will be emphasized.

##### 49. Orientation in Landscape Horticulture. (No credit) II.

Mr. Harris

Prerequisite: consent of the instructor.

Field trips to observe and study the opportunities for careers in the management of parks, golf courses, and public grounds; arboriculture; landscape construction and contracting; nursery production and management; commercial floriculture; and teaching, research, and extension.

To be given during the spring recess of odd-numbered years.

#### UPPER DIVISION COURSES

##### 104. Principles of Landscape Construction. (3) I.

Mr. Danielson

Lectures and laboratory.

Prerequisite: courses 1A-1B or 3; Engineering 1A (may be taken concurrently).

The analysis and solution of construction problems as they relate to design and site development. Emphasis on physical structures rather than plant materials.

Offered in alternate years.

##### 105A. Identification and Ecology of Ornamental Plants: Trees. (3) I.

Lectures and laboratory.

Mr. Barker

Prerequisite: Botany 1. (Not open for credit to students who have taken Ornamental Horticulture 131A-131B.)

Identification based on morphological comparisons, evaluation, and environmental requirements of plants used for ornamental purposes.

Field trips are included.

##### 105B. Identification and Ecology of Ornamental Plants: Shrubs, Vines, and Ground Covers. (3) II.

Mr. Barker

Lectures and laboratory.



Prerequisite: Botany 1. (Not open for credit to students who have taken Ornamental Horticulture 131A-131B.)

Course 105A is not prerequisite to 105B.

Identification based on morphological comparisons, evaluation, and environmental requirements of plants used for ornamental purposes.

Field trips are included.

**\*105C. Identification and Ecology of Ornamental Plants.** (1) II. Mr. Barker  
Prerequisite: Botany 1 and course 105A. (Not open for credit to students who have taken Ornamental Horticulture 131A-131B.)

Identification, cultural practices, and environmental requirements of desert, tropical, and subtropical ornamental plants.

Course consists of a field trip during spring recess.

Offered in spring recess of even-numbered years.

**\*108. Turf.** (2) I. Mr. Madison

Lectures and laboratory.

Prerequisite: Botany 7 or consent of instructor.

The basic practices, ecological and physiological principles involved in the selection of turf grasses, turf establishment and maintenance.

Offered in alternate years.

**109. Principles of Growing Plants in Nurseries.** (2) I. Mr. Madison

Lectures and laboratory.

Prerequisite: Pomology 9. Recommended: Botany 7.

The basic practices and physiological principles involved in the growing of woody plants in nurseries.

Offered in alternate years.

**110. Floriculture.** (2) II. Mr. Madison

Lectures and laboratory.

Prerequisite: recommended: Botany 7, Pomology 9.

The basic practices and physiological principles involved in the growing of economic flowering plants; emphasizing the modification of the environment for flower induction and growth.

Offered in alternate years.

**\*111. Arboriculture.** (2) II. Mr. Harris

Lectures and laboratory.

Prerequisite: Botany 7 or consent of instructor.

The basic practices, ecological and physiological principles involved in the selection and maintenance of perennial shrubs and trees.

Offered in alternate years.

**199. Special Study for Advanced Undergraduates.** (1-5) I and II.

Prerequisite: consent of the instructor. The Staff (Mr Harris in charge)

#### GRADUATE COURSES

**290. Seminar in Landscape Horticulture.** (1) I and II. Mr. Madison

**299. Research in Landscape Horticulture.** (1-6) I and II. Mr. Harris

## LATIN

For courses in Latin see "Foreign Languages" on page 189

\* Not to be given, 1960-1961

## MATHEMATICS

(Department Office, 227 Academic Office Building)

George A. Baker, Ph.D., *Professor of Mathematics.*

Charles A. Hayes, Jr., Ph.D., *Professor of Mathematics (Chairman of the Department).*

Edward B. Roessler, Ph.D., *Professor of Mathematics.*

Henry L. Alder, Ph.D., *Associate Professor of Mathematics.*

Hubert A. Arnold, Ph.D., *Associate Professor of Mathematics.*

Albert C. Burdette, Ph.D., *Associate Professor of Mathematics.*

Curtis M. Fulton, Ph.D., *Associate Professor of Mathematics.*

Donald A. Norton, Ph.D., *Associate Professor of Mathematics.*

David A. Pope, Ph.D., *Associate Professor of Mathematics.*

†Sherman K. Stein, Ph.D., *Associate Professor of Mathematics.*

Dallas O. Banks, Ph.D., *Assistant Professor of Mathematics.*

Donald C. Benson, Ph.D., *Assistant Professor of Mathematics.*

Fred Krakowski, Ph.D., *Assistant Professor of Mathematics.*

Kurt Kreith, Ph.D., *Assistant Professor of Mathematics.*



rances R. Jones, A.B., *Associate in Mathematics.*

Rudolph B. Merkel, M.A., *Associate in Mathematics.* 7/1/60

\*Takayuki Tamura, Ph.D., *Lecturer in Mathematics.*

*Letters and Science List.*—All undergraduate courses in mathematics are included in the Letters and Science List of Courses. (See page 106.)

*Major Subject Advisers.*—Mr. Burdette, Mr. Roessler.

### *Bachelor of Arts Major Program*

(A) Lower Division Courses.—The student is required to attain a basic knowledge of mathematics equivalent to courses 1, 7, 3A-3B, 4A-4B or 14. In order to anticipate as much of this work as possible, it is desirable that he complete in high school plane and solid geometry, trigonometry, and two years of algebra.

(B) Upper Division Courses.—In the 24 units of upper division work required for the major in mathematics, the student is to acquire competence in algebra, analysis, and geometry. For this purpose he must elect, subject to the approval of the adviser, at least 3 units of upper division work in each of these fields.

Subject to the above requirement of competence, and with the approval of the adviser, the student is at liberty to take a maximum of 6 units of theoretical courses in physical sciences as a part of his major in mathematics.

### *Bachelor of Science Major Program*

The major program consists of 60 units of numbered mathematics and/or natural sciences courses including:

(A) Lower Division Courses.—The student is required to attain a basic knowledge of mathematics equivalent to courses 1, 7, 3A-3B, and 14 or 4A-4B, totaling respectively 17 or 18 units.

(B) Upper Division Courses.—The student must pass successfully courses 108, 111, 114, 127, 113 or 116, 119 or 185, and at least 6 additional units in upper division mathematics courses which may, if desired, be chosen from the alternate courses just listed. Total, 26 units.

*Honors and Honors Program* (see page 107).—The honors program com-

† Absent on leave, 1960-1961

x Shirley A. GOLDMAN, M. S., ASSOCIATE IN MATHEMATICS,  
11/61

x ~~Nancy S. GLANDER, A. B., ASSOCIATE IN MATHEMATICS~~

~~7/1/60~~

may 12/60  
Ded

prises courses 111H, 127H, and either course 113H or 116H; a comprehensive examination in fields of the parent courses 111, 113, 116, 127.

*A numbered course in mathematics is not acceptable as a prerequisite for another course in mathematics unless a grade of C or higher has been attained in the prerequisite course.*

#### LOWER DIVISION COURSES

#### C. Trigonometry. (3) I and II.

The Staff

Prerequisite: plane geometry; one and one-half years of high school algebra or course D. Only 2 units credit will be allowed if the student has taken trigonometry in high school. Not open for credit to students who have received credit in course 3B.

The course includes plane trigonometry and spherical right triangles.

#### D. Intermediate Algebra. (3) I and II.

The Staff

Prerequisite: one year of high school algebra. One and one-half years of high school algebra is advised. Not open for credit to students who have received credit for two years of high school algebra, or course 16A, or any course for which course D is a prerequisite.

#### 1. College Algebra. (3) I.

Mr. Burdette

Prerequisite: two years of high school algebra, or course D; trigonometry (may be taken concurrently).

Selected topics from college algebra including complex numbers, theory of equations, inequalities, determinants, mathematical induction.

#### 3A. Analytic Geometry and Calculus, First Course. (3) I and II.

The Staff

Prerequisite: two years of high school algebra or course D; plane geometry; plane trigonometry. Only 2 units credit will be allowed if the student has received credit in course 16A.

Introduction to analytic geometry and calculus. The sequence of courses 3A-3B, 4A-4B, or 3A-3B, 14 includes plane and solid analytic geometry, formal differentiation and integration of elementary functions, infinite series, functions of several variables, partial differentiation, multiple integration with applications.

#### 3B. Analytic Geometry and Calculus, Second Course. (3) I and II.

The Staff

Prerequisite: course 3A or course 16B. Only 2 units credit will be allowed if the student has received credit in course 16B.

Continuation of course 3A.

#### 4A. Analytic Geometry and Calculus, Third Course. (3) I and II.

The Staff

Prerequisite: course 3B. Not open to students who have completed course 14 with a grade of C or better.

Continuation of course 3B.

#### 4B. Analytic Geometry and Calculus, Fourth Course. (3) I and II.

The Staff

Prerequisite: course 4A.

Continuation of course 4A.

#### 7. Introduction to Mathematical Structures. (3) II.

Mr. Hayes

Prerequisite: course 1 or consent of the instructor.

Topics selected from the theory of sets, functions, axiomatic systems.

#### 13. Elementary Statistics. (3) I and II.

The Staff

Prerequisite: two years of high school algebra or course D.

Arrays of experimental measurements, measures of central tendency, variation and correlation, significance of measures; elementary reliability and validity of tests.

**14. Analytic Geometry and Calculus.** (5) I and II. Mr. Merkel  
Prerequisite: course 3B. Not open to students who have completed course 4A with a grade of C or better.  
Continuation of course 3B.

**16A. Analytic Geometry and Calculus.** (3) I and II. The Staff  
Prerequisite: one and one-half years of high school algebra or course D, plane geometry, and plane trigonometry. Only 2 units credit will be allowed if the student has received credit in course 3A. Not open for credit to students who have received credit in course 3B.

A short course in analytic geometry and differential and integral calculus. Primarily for students in the College of Agriculture.

**16B. Analytic Geometry and Calculus.** (3) I and II. Mr. Roessler  
Prerequisite: course 16A. Not open for credit to students who have received credit in course 3B.

A short course in analytic geometry and differential and integral calculus. Primarily for students in the College of Agriculture.

**36. Fundamentals of Mathematics.** (3) I. Mr. Alder  
Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics.

#### UPPER DIVISION COURSES

Students who major in mathematics must maintain at least a grade C average in upper division courses in mathematics.

~~**105. Applied Statistical Methods.** (3) II. Mr. Alder  
Prerequisite: course 15.  
Recent developments in statistical analysis, methods of sampling, design of experiments, and interpretation of results; illustrative examples, primarily from biology.~~

**\*108. Linear Algebra.** (3) I. Mr. Banks  
Prerequisite: courses 3B, 7.  
Vector spaces, linear transformation and matrices, characteristic values, quadratic forms.

**\*109. Introduction to Mathematical Logic.** (3) II. \_\_\_\_\_  
Prerequisite: one of the following: courses 108 or 123 or consent of the instructor.  
The propositional and functional calculi. Examples for formalized mathematical theories. Introduction to metalogical problems.  
Offered in alternate years.

**111. Introduction to Higher Algebra.** (3) II. Mr. Norton  
Prerequisite: course 108.  
Introduction to formal systems of modern algebra including rings and fields.

**111H. Higher Algebra.** (1) II. Mr. Norton  
Prerequisite: honors standing and course 111 (concurrent registration recommended).  
Supplementary material to course 111 for honors candidates.

**112. Higher Geometry.** (3) I. Mr. Fulton  
Prerequisite: course 1, or consent of the instructor.  
Homogeneous point and line coordinates, cross ratio, one- and two-dimensional projective geometry, point and line conics.  
Offered in alternate years.

\* Not to be given, 1960-1961.

→Cancelled - Spring 1961.

Mathematics 105A. Applied Statistical Methods:  
Analysis of Variance and Related Topics.

(3) I and II. Mr. Alder, Mr. Roessler  
Prerequisite: course 13.

Applications of Student's  $t$ -distribution;  
chisquare distribution;  $F$ -distribution; the  
sign test. Analysis of variance. Duncan's  
multiple range test. Design of experiments  
including randomized complete-block designs,  
Latin squares, split-plot designs, factorial  
designs, and incomplete-block designs.

- \*113. Synthetic Projective Geometry.** (3) II. Mr. Fulton  
Prerequisite: course 1, or consent of the instructor.  
Duality, perspectivity, harmonic sets, projectivity, definition of conics, theorems on conics, pole and polar.  
Offered in alternate years.
- \*113H. Synthetic Projective Geometry.** (1) II. Mr. Fulton  
Prerequisite: honors standing and course 113 (concurrent registration recommended).  
Supplementary material to course 113 for honors candidates.
- †114. **Advanced Calculus.** (5) I and II. The Staff  
Prerequisite: course 4B or 14.  
Line and surface integrals, Fourier series, complex variables, ordinary differential equations.
- \*115A-115B. The Theory of Numbers.** (3-3) Yr. Mr. Alder  
Prerequisite: course 1.  
Divisibility, congruences, diophantine equations; selected topics from the theory of prime numbers; partitions; continued fractions.  
Offered in alternate years.
- 116. Metric Differential Geometry.** (3) II. Mr. Fulton  
Prerequisite: course 4B or 14.  
Vector analysis, study of curves and surfaces in three dimensions.  
Offered in alternate years.
- 116H. Metric Differential Geometry.** (1) II. Mr. Fulton  
Prerequisite: honors standing and course 116 (concurrent registration recommended).  
Supplementary material to course 116 for honors candidates.
- 119. Differential Equations.** (3) II. Mr. Burdette  
Prerequisite: course 4B or 14.  
Solution of ordinary differential equations with special attention to linear equations, Bessel's functions, Laplace transforms, introduction to partial differential equations.
- 123. Introduction to the Theory of Finite Groups.** (3) I. Mr. Norton  
Prerequisite: course 7 and senior standing or consent of the instructor.  
Topics from the theory of groups including Abelian groups, subgroups, normality, structure of groups, Galois theory.
- 127. Foundations of Analysis.** (3) II. Mr. Hayes  
Prerequisite: course 4B or 14, and course 7 or consent of instructor.  
Set theory, development of properties of the real number system from basic axioms, theory of limits of sequences and real functions, properties of continuous functions.
- 127H. Foundations of Analysis.** (1) II. Mr. Hayes  
Prerequisite: honors standing and course 127 (concurrent registration recommended).  
Supplementary material to course 127 for honors candidates.
- \*128A-128B. Numerical Analysis.** (3-3) Yr. Mr. Arnold  
Prerequisite: course 4B or 14.  
Finite differences, interpolation, polynomial approximations, non-linear equations, integration of differential equations, partial differential and

\* Not to be given, 1960-1961.

† Not to be given, fall semester, 1960.

difference equations, large systems of linear equations, linear programming, programming for analog and digital calculators, large-scale methods.

Offered in alternate years.

131A-131B. **Statistics.** (3-3) Yr.

Mr. Baker

Prerequisite: course 4A or 14, or 16B.

A basic introductory course in the theory and applications of statistical methods.

\*147A-147B. **Introduction to Topology.** (3-3) Yr.

Mr. Stein

Prerequisite: course 127.

An introduction to topology based on a study of spaces of low dimension. Topics will be selected from linear graphs, complexes, Euclidean plane, fixed points, homology, homotopy, and applications.

Offered in alternate years.

185. **Introduction to Functions of a Complex Variable.** (3) I. Mr. Burdette

Prerequisite: course 4B or 14.

Differentiability of complex functions, Cauchy's integral, power series, Laurent series, residue theorem, conformal mapping.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff (Mr. Hayes in charge)

#### GRADUATE COURSES

200A-200B. **Classical Analysis.** (3-3) Yr.

Mr. Hayes

Prerequisite: course 127. Seniors with facility for mathematics may well take this course.

Elements of metric topology, theory of differentiation and integration of functions of one or more real variables, line integration, the role of uniformity in classical analysis, calculus of functions of a complex variable.

201A-201B. **Functions of a Real Variable.** (3-3) Yr.

Mr. Benson

Prerequisite: course 127.

Real number system, theory of point sets in Euclidean spaces, content, measure, Riemann-Stieltjes and Lebesgue integration.

Offered in alternate years.

\*205A-205B. **Functions of a Complex Variable.** (3-3) Yr.

Prerequisite: course 127.

Mr. Benson

Theory of analytic functions, Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions.

Offered in alternate years.

\*215A-215B. **Topology.** (3-3) Yr.

Mr. Krakowski

Prerequisite: course 127.

Topics selected from general topology (compactness, connectedness, metrization, Euclidean space); algebraic topology (complexes, homology, duality); and applications to analysis, geometry, and algebra.

Offered in alternate years.

\*220A-220B. **Mathematics for Students in the Physical Sciences.** (3-3) Yr.

Mr. Banks

Prerequisite: courses 114, 185 (185 may be taken concurrently with 220A).

Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices, calculus of variations.

\* Not to be given, 1960-1961.



Mathematics 129. Theory of Automatic  
Digital Computers. (3) II. -----

Lectures and laboratory.

Prerequisite: course 4B or 14.

Organization of a digital computer;  
instruction code for the University computer;  
elementary machine language coding; sub-  
routines and assembly programs; code checking.  
Laboratory work on the University computer.

Mathematics 208. Linear Algebra. (3) II.

Mr. Krakowski, Mr. Norton.

Vector spaces, linear transformations,  
Euclidean spaces.

Offered in alternate years.

Mathematics 216. Integral Equations. (3) II.

Mr. Kreith

Prerequisite: courses 108, 200B.

Volterra equations, Fredholm equations,  
symmetric kernels.

Offered in alternate years.

Mathematics 223A-223B. Theory of Groups.

(3-3) Yr. -----

Elements of group theory, structure and construction of composite groups, Sylow theory of groups, solvable groups, group extension.

Offered in alternate years.

Mathematics 229. Approximation Theory and Applications to Computation.

(2) II. -----

Prerequisite: course 128A-128B. Recommended: course 185.

Orthogonal functions and least squares; Chebyshev approximations; rational approximations; approximations in several variables; approximation of analytic functions of a complex variable; approximation by continued fractions; use of approximations in computation.

\* DONN W. YODER L/K

X EARL W. HALE, - , Assistant in Military Science,  
9/15/60.

**231. Multivariate Analysis. (3) I.**

Mr. Baker

Prerequisite: course 131A-131B and course 114 or consent of the instructor. Multivariate normal distribution, analysis of variance, correlation and regression, chi-square.

Offered in alternate years.

**232. Theory of Estimation and Testing Hypotheses. (3) II.**

Mr. Baker

Prerequisite: course 131A-131B and course 114 or consent of the instructor. Estimates, asymptotic efficiency and normality, theory of statistical tests.

Offered in alternate years.

**\*240A-240B. Differential Geometry. (3-3) Yr.**

Mr. Fulton

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 alternate years.

**250A-250B. Algebra. (3-3) Yr.**

Mr. Norton

Prerequisite: courses 111, 123 (123 may be taken concurrently with 250A).

The basic tools of commutative algebra: theory of fields; algebraic and transcendental extensions; Galois theory; valuations; ideal theory.

**290. Seminars. (1-6) I and II.**

The Staff (Mr. Hayes in charge)

Advanced study in various fields of mathematics as follows: (a) algebra; (b) analysis; (c) geometry; (d) mathematical logic; (e) number theory; (f) topology; (g) theoretical statistics; (h) applied statistics; (i) applied mathematics.

**295. Research in Mathematics. (2-6) I and II.**

The Staff (Mr. Hayes in charge)

## MICROBIOLOGY

For courses in microbiology see "Bacteriology" on page 146.

## MILITARY SCIENCE

(Department Office, 125 Gymnasium)

*Transferred*  
*3/24/61*  
**Louis B. Beebeck**, Lieutenant Colonel, Infantry; *Professor of Military Science (Chairman of the Department).*

**Kermit J. Wilson**, Lieutenant Colonel, Chemical Corps; *Associate Professor of Military Science.*

**Harold V. Kays**, Major, Infantry; *Associate Professor of Military Science.*

**Douglas G. Marshall**, ~~Captain~~, *Major* Infantry; ~~Assistant Professor of Military Science.~~ *Associate*

\* In addition to courses offered in the Department of Military Science, upper division military science requires the completion of six units outside the department which may fulfill dual requirements for the baccalaureate degree in the Colleges as well as for the commission as a Second Lieutenant of the United States Army Reserve. The six dual-credit units may

be completed in any of the general areas of natural science, general psychology, effective communication, or political science. Elective subjects selected must be taken while in the enrolled advanced course.

In the event that a subject was required in the student's normal academic curriculum during his freshman and sophomore years, electives must be selected either from another general area or from advanced subjects in the same area. Conversely, for subjects not required in the student's academic curriculum during his freshman and sophomore years, complete freedom of selection from the four academic areas is permissible.

The chairman of the department will evaluate and approve the elective subjects selected. Consideration will be given to the value of the subjects in furthering the professional qualifications of the student as a prospective commissioned officer in the United States Army.

**College of Letters and Science.**—The Bachelor of Arts degree requires the completion of 120 units. Twenty of the 21 units of lower and upper division military science courses combined may be accredited toward this requirement. One hundred eight of the 120 units must be in courses chosen from the Letters and Science List of Courses. The 8 units of lower division military science courses are included in the list. Upper division military science courses total 13 units (including three units for summer camp) of which 12 units may be accredited to the remaining 12 of the total 120 units required. The 6 dual-credit units in general areas may be selected from the List of Courses.

**College of Agriculture.**—The Bachelor of Science degree in agriculture requires the completion of 124 units. All 21 units of lower and upper division military science courses combined may be accredited toward this requirement. The six dual-credit units in general areas may be selected from upper division courses required by the College of Agriculture.

**College of Engineering.**—The Bachelor of Science degree in engineering requires the completion of 134 units. Eight units of military science may be accredited toward this requirement. The six dual-credit units in general areas may be selected from upper division courses required by the College of Engineering.

**School of Veterinary Medicine.**—The Bachelor of Science degree in veterinary medicine requires the completion of 124 units. Eight units of military science may be accredited toward this requirement. No upper division military science course units may be accredited toward the degree of Doctor of Veterinary Medicine. Students in upper division military science may select the six dual-credit units in general areas from upper division courses required by the School of Veterinary Medicine. Graduates with the D.V.M. degree may be offered direct first lieutenant commissions in the United States Army Veterinary Corps.

#### GENERAL MILITARY SCIENCE

For the general regulations concerning enrollment and the program in Military Science, see page 33.

#### LOWER DIVISION COURSES

**1A. Basic General Military Science (First Year). (2) I.** The Staff Lectures and drill.

Required of all physically fit male students unless specific exemption is granted.

Military organization; individual weapons and marksmanship; American military history; leadership laboratory.

- 1B. Basic General Military Science (First Year).** (2) II. The Staff  
Lectures and drill.  
Required of all physically fit male students unless specific exemption is granted.  
American military history; school of the soldier; leadership laboratory.
- 20A. Basic General Military Science (Second Year).** (2) I. The Staff  
Lectures and drill.  
Prerequisite: course 1A-1B, or equivalent.  
Required of all physically fit male students unless specific exemption is granted.  
Map and aerial photograph reading; role of the U. S. Army and national security; school of the soldier; and leadership laboratory.
- 20B. Basic General Military Science (Second Year).** (2) II. The Staff  
Lectures and drill.  
Prerequisite: course 20A or equivalent.  
Required of all physically fit male students unless specific exemption is granted.  
Military tactics; school of the soldier; and leadership laboratory.

## UPPER DIVISION COURSES

- 130A. Advanced General Military Science (First Year)** (2) I. The Staff  
Lectures and drill. Field trips to be arranged.  
Prerequisite: completion of the lower division courses or the equivalent.  
Military teaching methods; leadership.
- 130B. Advanced General Military Science (First Year).** (3) II. The Staff  
Lectures and drill. Field trips to be arranged.  
Prerequisite: course 130A.  
Organization, missions, and functions of the branches of the U. S. Army; small-unit tactics; communications; leadership; pre-camp orientation.
- 140A. Advanced General Military Science (Second Year).** (2) I. The Staff  
Lectures and drill. Field trips to be arranged.  
Prerequisite: course 130B.  
Command and staff; military intelligence; training management; logistics; leadership laboratory.
- 140B. Advanced General Military Science (Second Year).** (3) II. The Staff  
Lectures and drill. Field trips to be arranged.  
Prerequisite: course 140A.  
Supply and evacuation; troop movement; military administration; military justice; service orientation; school of the soldier and exercise of command and leadership.
- ROTC Summer Training for Advanced Military Students.** (3).  
Summer training is of six weeks' duration from approximately June 20 to August 1.  
Prerequisite: course 130A-130B.  
Practical training in atomic, chemical, biological, and radiological warfare; tactical, technical, and administrative duties in the field; firing individual and crew-served weapons; bivouac; individual and small-unit tactics; and development of military leadership.  
Successful completion is a requisite for the commission.

## MUSIC

(Department Office, 1 Music Building)

‡George Perle, Ph.D., *Associate Professor of Music.*

Jerome W. Rosen, M.A., *Associate Professor of Music (Chairman of the Department).*

Larry D. Austin, M.M., *Assistant Professor of Music.*

Richard G. Swift, M.A., *Assistant Professor of Music.*

Robert C. Below, M.M., *Acting Instructor in Music.*

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

A student may not receive more than 16 units of credit in performance courses.

*Major Subject Advisers.*—Mr. Rosen, Mr. Swift.

### *The Major Program*

(A) Lower Division Courses.—Required: Music 2A–2B, 2C–2D, 4A–4B, 5A–5B and at least two semesters' participation in a lower division performance course (41, 43, 44, or 46A–46B). Students intending to major in music must acquire some ability in piano playing. Those who are deficient in this respect will be advised concerning further study after an advisory examination to be given during the first semester. Sufficient pianistic ability to perform a four-part chorale and a composition comparable in difficulty to *The Little Preludes* by Bach is prerequisite to admission to upper division courses in the major. Undergraduate students transferring from other colleges should consult with the departmental major adviser before enrolling in any music course.

(B) Upper Division Courses.—Required: Music 104A–104B, 121A–121B and two semesters of 141, 143, or 144. In addition, eight units must be selected from the following courses: 105A–105B, 108, 112A, 112B, 122, 199.

*Individual Group Major.*—Individual group majors may be established by combining the work offered in this field with courses in allied fields. The major subject adviser should be consulted for details.

### GROUP I

Courses open to all students in the University.

#### LOWER DIVISION COURSES

10. **Basic Musicianship.** (2) I and II. Mr. Below, Mr. Perle  
Fundamentals of music, with singing, ear-training, harmonization of melodies, and conducting.

27A. **Introduction to Musical Literature.** (3) I and II.  
Two lectures and one section meeting per week. Mr. Austin, Mr. Below  
Lectures, guided listening, and readings designed to furnish the student with an understanding of basic musical concepts.  
Intended primarily for students whose major is not music.

27B. **Introduction to Musical Literature.** (3) II. Mr. Austin  
Prerequisite: course 27A or consent of the instructor.  
Two lectures and one section meeting per week.  
Lectures, guided listening, and readings designed to acquaint the student

‡ Absent on leave, fall semester, 1960–1961.

with stylistic elements characterizing music of the eighteenth, nineteenth and twentieth centuries.

Intended primarily for students whose major is not music.

#### Performance Courses

**41. University Symphony Orchestra.** (2) I and II. Mr. Swift  
Two hour-and-a-half rehearsals and one section hour per week.

Open to any student in the University whose technical proficiency meets the requirements of concert performance.

Rehearsal and performance of symphonic music. May be repeated once for credit.

**43. University Concert Band.** (2) II. Mr. Austin  
Two hour-and-a-half rehearsals and one section hour per week.

Open to any student in the University whose technical proficiency meets the requirements of concert performance.

Rehearsal and performance of band music. May be repeated once for credit.

In the fall semester, band practice and performance will be offered as an activity, rather than a course, with one two-hour rehearsal per week.

**44. University Chorus.** (2) I and II. Mr. Rosen  
Two hour-and-a-half rehearsals and one section hour per week.

Rehearsal and performance of choral music. May be repeated once for credit.

**46A-46B. Chamber Music Ensemble.** (1-1) Yr. Mr. Below  
Course 46A is not prerequisite to 46B.

Two one-hour rehearsals per week.

Open to any student in the University of sufficient technical ability to take part in ensemble combinations for strings, wind instruments, and piano.

May be repeated once for credit.

#### UPPER DIVISION COURSES

**127A. Musical Literature: The Opera.** (3) I. Mr. Rosen  
Prerequisite: course 27A-27B or consent of the instructor.

Two lectures and one section meeting per week.

A study of selected operas such as *Dido and Aeneas*, *The Marriage of Figaro*, *The Barber of Seville*, *Tristan and Isolde*, *Aida*, *Pelleas and Melisande*, and *Wozzeck*, emphasizing the contribution of music to the total dramatic effect.

Intended primarily for students whose major is not music.

**127B. Musical Literature: The Symphony.** (3) II. Mr. Perle  
Prerequisite: course 27A-27B or consent of the instructor.

A study of selected symphonies by composers such as Haydn, Mozart, Beethoven, Schubert, Brahms, and Stravinsky, emphasizing form and style.

Intended primarily for students whose major is not music.

Offered in alternate years.

**128. Musical Literature: Music in the United States.** (3) II. Mr. Swift  
Prerequisite: course 27A-27B or consent of the instructor. Intended primarily for students whose major is not music.

A study of the musical scene in America from colonial times to the present. Lectures, reading assignments, and guided listening to representative works of significant composers.

Offered in alternate years.

## Performance Courses

141. **Advanced University Symphony Orchestra.** (2) I and II. Mr. Swift  
Prerequisite: 2 semesters in course 41.  
May be repeated once for credit.
143. **Advanced University Concert Band.** (2) II. Mr. Austin  
Prerequisite: 2 semesters in course 43.  
May be repeated once for credit.
144. **Advanced University Chorus.** (2) I and II. Mr. Rosen  
Prerequisite: 2 semesters in course 44.  
May be repeated once for credit.

## GROUP II

Courses primarily for students whose major is music.

LOWER DIVISION COURSES *Mr. Perle*

- 2A-2B. **Masterworks of Music.** (1-1½) Yr. Mr. Below  
Prerequisite: the ability to read music or consent of the instructor.  
Course 2A is prerequisite to 2B.  
Guided listening and discussion.
- 2C-2D. **Masterworks of Music.** (2-2) Yr. Mr. Austin  
Prerequisite: courses 2A-2B and 4A-4B, or consent of the instructor. A  
continuation of course 2A-2B.
- 4A-4B. **Elementary Theory.** (5-5) Yr. Mr. Swift  
Exercises in notation, rhythm, ear-training, beginning counterpoint and  
harmony.
- 5A-5B. **Intermediate Theory.** (4-4) Yr. Mr. Rosen  
Prerequisite: course 4A-4B.  
Course 5A is prerequisite to 5B.  
A continuation of course 4A-4B.

## UPPER DIVISION COURSES

- 104A-104B. **Advanced Theory.** (3-3) Yr. \_\_\_\_\_  
Prerequisite: course 5A-5B.  
Course 104A is prerequisite to 104B.  
104A: Two and three part tonal counterpoint leading to the writing of  
canons, inventions, and chorale preludes.  
104B: Homophonic forms, beginning with phrase and period structure.
- 105A-105B. **Principles of Composition.** (3-3) Yr. Mr. Swift  
Prerequisite: course 104A-104B.  
Course 105A is prerequisite to 105B.  
Elementary assignments in free composition.
108. **Instrumentation.** (3) I. Mr. Austin  
Prerequisite: course 5A-5B.  
A study of the instruments of the orchestra, leading to practice in scoring  
for instrumental combinations.
- \*112A. **Choral Conducting.** (2) I. \_\_\_\_\_  
Prerequisite: course 5A-5B.  
A study of the principles and techniques of conducting choral ensembles.  
Offered in alternate years.

\* Not to be given, 1960-1961.



- 112B. Instrumental Conducting.** (2) II. Mr. Austin  
Prerequisite: course 108.  
A study of the principles and techniques of conducting instrumental ensembles.  
Offered in alternate years.
- \*121A-121B. History and Literature of Music.** (3-3) Yr. Mr. Perle  
Prerequisite: courses 2A-2B, 4A-4B or consent of instructor.  
Course 121A is prerequisite to 121B.  
A study of the development of music from antiquity to the present; lectures, listening, technical analysis, and written reports.
- \*122. Music of the Twentieth Century.** (3) I. Mr. Rosen  
Prerequisite: course 121A-121B.  
Critical and analytical study of works by such composers as Schoenberg, Stravinsky, Milhaud, Bartok, Hindemith, and Sessions; lectures, listening, technical analysis and written reports.  
Offered in alternate years.
- 199. Special Study for Advanced Undergraduates.** (1-4) I and II.  
The Staff (Mr. Rosen in charge)

## PALEONTOLOGY

For courses in paleontology see "Geological Sciences," page 195.

## PARASITOLOGY

For courses in parasitology see "Entomology and Parasitology," page 178.

## PHILOSOPHY

(Department Office, 311 Academic Office Building)

Arthur Child, Ph.D., *Professor of Philosophy (Chairman of the Department)*.  
William H. Bossart, Ph.D., *Assistant Professor of Philosophy*.

Philosophy examines the principles that the other intellectual disciplines must take for granted in order to pursue their own work, as well as the characteristics of all the major types of human activity. By examining these principles and characteristics critically, it tries to ascertain their meaning; by examining them constructively, it tries to see their possible relations to each other. Philosophy therefore answers to man's perennial aspiration toward understanding. Moreover, the many attempts to accomplish the aims of philosophy have reacted on the disciplines and activities themselves throughout their long history. Some grasp of philosophy, past and present, is therefore indispensable to a comprehension of the other matters involved in thinking, doing, and making.

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Departmental Major Adviser.*—Mr. Bossart.

*The Major Program*

(A) Lower Division Courses.—Twelve units of lower division work in philosophy, including courses 20A-20B. For 3 of the remaining 6 units,

\* Not to be given, 1960-1961

English 45A or Mathematics 36 may be substituted. These courses are also recommended as additional to the preparation for the major.

(B) Upper Division Courses.—Twenty-four units in upper division courses in philosophy, selected with the approval of the departmental major adviser. Three of these units, however, may be taken in another department, if the adviser considers that the course contributes directly to the student's major program. Among courses that could be so considered are: Economics 101, English 147, Mathematics 109, Political Science 113 and 118. These courses are also recommended as additional to the major in accordance with the direction of the student's interests and talents. Students who do not maintain a grade C average in the upper division courses of the major program will be required to withdraw from the major in philosophy.

#### LOWER DIVISION COURSES

**6A-6B. Introduction to Philosophy.** (3-3) Yr. Mr. Bossart, Mr. Child  
Course 6A is prerequisite to 6B.

**\*12A. Introduction to Modern Logic.** (3) II.

The concept of a deductive theory. The sentential calculus; use of variables and quantifiers. Construction of an elementary mathematical theory.

**20A-20B. History of Philosophy.** (3-3) Yr.

I. Mr. Child; II. Mr. Bossart.

Prerequisite: sophomore standing. Course 20A is not prerequisite to 20B.

I. From the Pre-Socratics to the Scholastics.

II. From Descartes to Kant.

#### UPPER DIVISION COURSES

**\*103. Philosophy of the Nineteenth Century.** (3) I. Mr. Bossart

The idealism of Hegel, his contemporaries, and his successors; Marxism; the positivism of Comte and Mill; the irrationalism of Kierkegaard and Nietzsche.

Offered in alternate years.

**\*104. Ethics.** (3) II. Mr. Child

The principles of intelligent conduct: their status and nature; how they are discovered, known, and proved; and their relationships to the principles of art, science, and logic.

Offered in alternate years.

**105. Kant.** (3) I. Mr. Bossart

The *Critique of Pure Reason* and selections from other works.

Offered in alternate years.

**111. Metaphysics.** (3) II. Mr. Bossart

The search for being; the meaning of being and the relation of being to ontology. The theory of knowledge. Possible types of world order.

Offered in alternate years.

**\*112. Philosophy of Religion.** (3) I. Mr. Child

The nature of religion; its relations to morality and institutions; sources, status, and kinds of religious knowledge; the existence and nature of God; man's relations to the divine; the significance of death; concepts of survival; relations of church and state.

Offered in alternate years.

\* Not to be given, 1960-1961.

- x William L. LAKIE, ED.D., ASSISTANT  
Professor of Physical Education
- x BARBARA J. HELLER, ED.D., ASSISTANT  
Professor of Physical Education
- x Barbara F. Santoni, —, Associate  
in Physical  
Education

116. **Plato.** (3) II. Mr. Child  
 Several dialogues, exemplifying various aspects of Plato's thought, from among such works as the *Gorgias*, *Phaedrus*, *Statesman*, *Theaetetus*, *Timaeus*, *Parmenides*, *Philebus*, and *Sophist*.  
 Offered in alternate years.
- \*117. **Aristotle.** (3) II. Mr. Child  
 The *Metaphysics* and related portions of other treatises.  
 Offered in alternate years.
- \*124. **Philosophy of Science.** (3) I. \_\_\_\_\_  
 Basic concepts and methods of the mathematical, physical, and biological sciences; philosophical reflections on science.  
 Offered in alternate years.
- \*135A. **Contemporary Tendencies: British-American.** (3) II. Mr. Child  
 Idealism, realism, pragmatism, logical empiricism, linguistic analysis.  
 Offered in alternate years.
- \*135B. **Contemporary Tendencies: European.** (3) II. Mr. Bossart  
 Existentialism, phenomenology, and their immediate antecedents.  
 Offered in alternate years.
137. **Aesthetics.** (3) I. Mr. Bossart  
 (Formerly course 136C.)  
 The nature of art, of artistic creation, of the work of art, and of aesthetic experience; the nature and validity of criticism; and the relations of art to its environment.  
 Offered in alternate years.
147. **Theory of History.** (3) I. Mr. Child  
 The nature of historical thinking and of the historical process, and the relations between them.  
 Offered in alternate years.

## PHYSICAL EDUCATION

(Department Office, 204 Gymnasium)

- Charles R. Kovacic, Ed.D., *Professor of Physical Education (Chairman of the Department)*.  
 Marya Welch, Ed.D., *Associate Professor of Physical Education*.  
 Willard S. Lotter, Ed.D., *Associate Professor of Physical Education*.  
 ✓ Everett D. Ryan, Ed.D., *Assistant Professor of Physical Education*.  
 James L. Sells, Ed.D., *Assistant Professor of Physical Education*.  
 \_\_\_\_\_, *Assistant Professor of Physical Education*.  
 Vernard B. Hickey, A.B., *Lecturer and Supervisor of Physical Education*.  
 George A. Stromgren, M.S., *Lecturer and Supervisor of Physical Education*.  
 Irving F. Toomey, B.S., *Supervisor of Physical Education*.  
 Herbert A. Schmalenberger, M.A., *Associate Supervisor of Physical Education*.  
 Ruth J. Rose, M.A., *Lecturer and Assistant Supervisor of Physical Education*.  
 \_\_\_\_\_, *Assistant Supervisor of Physical Education*.  
 Myron R. Schall, A.B., *Assistant Supervisor of Physical Education*.

The incidental fee payable by all students at the time of registration, entitles students to the use of the gymnasium, swimming pool, shower, towels, lockers, tennis courts, and the athletic fields. Equipment for games and sports

\* Not to be given, 1960-1961.

is available for exercise and recreation, either with or without instruction. Courses may be elected with or without academic credit.

Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

*Major Advisers.*—Mr. Kovacic, Mr. Lotter, Mr. Sells, Miss Welch.

*The Major Program*

(A) Lower Division Courses.—Physical Education 10 for men; Physical Education 22 and 35 for women; Physical Education 20 and 24; Physiology 1-1L; Psychology 1A; Zoology 10 and Zoology 25.

(B) Upper Division Courses.—Twenty-four units of upper division courses in physical education and allied subjects, including courses 103A-103B, 130, 131, 180A-180B; one of the following: 135, 140, 145, 171; Home Economics 131 or 136.

It is also recommended that students elect a 3-unit upper division course in the area of sociology, and a 3-unit upper division course in the area of psychology to be chosen with the approval of the adviser.

LOWER DIVISION COURSES FOR MEN

**1. Physical Education for Men.** ( $\frac{1}{2}$ ) I and II. The Staff  
Sections meet twice weekly at hours to be arranged.

Sections are organized in baseball, basketball, boxing, football, golf, soccer, tennis, touch football, track, wrestling, swimming, lifesaving, and water sports. Men qualified for athletics may enroll in any sport pursued at Davis, such as football and basketball, and receive credit for this elective.

This course may be repeated for credit not to exceed a total of 4 units.

**10. Professional Physical Education Activities (Men).** (1) I and II. The Staff

Fundamental knowledges and skills in swimming, basketball, football, track, baseball, tennis, golf, combative sports, developmental activities, court sports, tumbling.

LOWER DIVISION COURSES FOR WOMEN

**22. Professional Physical Education Activities (Women).** (1) I and II. The Staff

Fundamental knowledge and skill in aquatics (swimming—beginning, intermediate, advanced, synchronized; diving; lifesaving; water safety); archery; badminton; basketball; dance (folk and square, modern, social); tennis; tumbling; gymnastics; volleyball.

**26. Physical Education for Women.** ( $\frac{1}{2}$ ) I and II. The Staff  
Sections meet twice weekly at hours to be arranged.

Sections are organized in archery, badminton, volleyball, riding, swimming, lifesaving, and swimming formations.

This course may be repeated for credit not to exceed a total of 4 units.

**35. Rhythmic Form and Analysis.** (1) II. Miss Rose

The fundamentals of rhythmic form; the use of rhythm as the basic element in activity and its application to physical education. A workshop class in the function of rhythm, form, and analysis.

LOWER DIVISION COURSES FOR MEN AND WOMEN

**A. First Aid.** (1) I and II. Mr. Stromgren  
Standard course. Upon successful completion of the course, the Red Cross certificate is awarded.

- 20. Introduction to Physical Education.** (1) I. Mr. Schmalenberger  
An orientation and interpretation of the field of physical education for the prospective major. Open only to students specializing in physical education and candidates for the teaching credential.
- 24. The Theory of Swimming and Diving.** (1) I and II. Mr. Hickey  
Lectures and laboratory.  
Prerequisite: course 1 or 26 in swimming or equivalent.  
Advanced swimming and diving, including water safety. Red Cross Senior Lifesaving Certificate awarded those who qualify. Fundamental skills and teaching techniques.
- 25. The Theory of Lifesaving and Water Safety.** (1) I and II. Mr. Hickey  
Lectures and laboratory.  
Prerequisite: course 24 or equivalent and Red Cross Lifesaving Certificate.  
Organization of waterfront activities in schools, colleges, camps, and recreation centers. Skill and techniques of teaching swimming and lifesaving. An Instructor's Red Cross Certificate awarded upon completion of the course.
- 36A-36B. Dance History and Practice.** (2-2) Yr. Miss Rose  
Lectures and laboratory.  
Prerequisite: body mechanics section of course 22 or 26 (may be taken concurrently).  
Survey of the dance from its origins in prehistoric and antique ceremonial to 1900. A study of the materials, growth, and function of dance in society. Practice primarily in dance forms which developed out of Renaissance foundations.
- \*37A-37B. Contemporary Dance Theory and Practice.** (2-2) Yr. Miss Rose  
Lectures and laboratory.  
Prerequisite: course 36A-36B.  
A study of the perspectives and practices of contemporary American art dance: traditional forms and twentieth-century innovation. A comparative study of selected theories and practices in America, Europe, and the Orient.
- 44. Principles of Healthful Living.** (1) II. Mr. Stromgren  
Use of scientific information, proper attitudes, knowledge and health practices in daily living.

## UPPER DIVISION COURSE FOR MEN

- 171. Conditioning of Athletes and Care of Injuries.** (2) I. Mr. Stromgren  
Prerequisite: course 5A, physiology or anatomy.  
Modern principles and practices in conditioning and care of athletes. Prevention, care of athletic injuries and therapeutic exercises applied to athletic injuries; training-room equipment, protective devices and supplies.

## UPPER DIVISION COURSES FOR MEN AND WOMEN

- 103A-103B. Analysis of Human Movement.** (4-4) Yr. Mr. Kovacic  
Lectures and laboratory.  
Prerequisite: Physiology 1-1L.  
Analysis of human movement based upon the integration of kinesiology, physiology of activity and adapted physical education.
- 130. Principles and Theory and Physical Education.** (3) I. Miss Welch  
Prerequisite: course 20.  
A critical analysis of the assumptions underlying the physical education program.

\* Not to be given, 1960-1961.

**131. Organization and Administration of Physical Education. (3) II.**

Prerequisite: course 130.

Mr. Sells

Principles and policies pertaining to departmental organization and administration, personnel, academic programming, facilities, equipment and supplies, intramural and interscholastic relationships, public relations and legal practices.

**135. Measurement and Evaluation in Physical Education. (3) II. Mr. Ryan**

Historical background and review of measurement and evaluation in physical education; statistical procedures essential in measurement; basic principles of constructing and selecting tests; interpretation of results; analysis of selected research studies.

**140. Recreation in the Community. (2) II.**

Miss Welch

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.

**145. School Health Education. (2) II.**

Mr. Stromgren

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.

**180A-180B. Physical Education in the Secondary School. (2-2) Yr.**Prerequisite: course 130 and individual proficiency in activities. ~~Mr. Ryan~~

An analysis and study of the principles and methods basic to the physical education program in the secondary school; the role of the teacher in the program and the competencies necessary to carry out the functions of the physical education teacher.

**199. Special Study for Advanced Undergraduates. (1-5) I and II.**

Prerequisite: consent of department. The Staff (Mr. Kovacic in charge)

## PROFESSIONAL COURSE

**380A-380B. Methods of Physical Education in the Secondary School.**

(2-2) Yr.

~~Mr. Ryan~~

Prerequisite: course 130 and individual proficiency in activities. Course 180A-180B must be taken concurrently.

The methods of teaching group and individual activities in the secondary school; program planning; class management; organization of the intramural and extramural programs. Laboratory experience in teaching methods.

**PHYSICS**

(Department Office, 2 Physics Building)

Milton E. Gardner, Ph.D., *Professor of Physics.*John A. Jungerman, Ph.D., *Professor of Physics.*Charles G. Patten, Ph.D., *Professor of Physics (Chairman of the Department).*\_\_\_\_\_, *Professor of Physics.*David B. Beard, Ph.D., *Associate Professor of Physics.*

Miss Helter, Mr. Lakie

Miss Helter, Mr. Lakie



William J. Knox, Ph.D., *Associate Professor of Physics.*

William W. True, Ph.D., *Assistant Professor of Physics.*



Shuki Hayashi, Ph.D., *Visiting Assistant Professor of Physics.*

*Letters and Science List.*—All undergraduate courses in physics are included in the Letters and Science List of Courses (see page 106).

*Major Subject Adviser.*—Mr. Gardner.

*The Major Program*

(A) Lower Division Courses.—Required: Physics 4A, 4B, 4C, or the equivalent: Chemistry 1A–1B, Mathematics 3A–3B, 4A–4B, or Mathematics 3A–3B, 14 or their equivalent. Recommended: Mathematics 7 and a reading knowledge of French and German.

(B) Upper Division Courses.—The major must include Physics 105A–105B, 108B, 110A–110B, 115, 121, and Mathematics 114. Recommended: Mathematics 185. The department will certify to the completion of the major program for graduation only on the basis of at least a C average in the upper division courses taken in the department. Students who cannot maintain such an average may be required at any time to withdraw from the major in physics.

LOWER DIVISION COURSES

Physics 4A, 4B, 4C are fundamental and are designed to meet the needs of students whose major is physics and of students preparing for applications of physics in the colleges of Engineering and Chemistry. After completing 4A, the order of taking 4B and 4C is immaterial.

Prerequisite for all lower division courses: (1) either high school physics or chemistry; (2) trigonometry (may be taken concurrently).

**2A. General Physics Lecture.** (3) I and II. Mr. Hayashi, Mr. True

Prerequisite: (1) either high school physics or chemistry; (2) trigonometry (may be taken concurrently).

Elective in the College of Letters and Science. Required for premedical students.

Mechanics, properties of matter, heat, and sound.

**2B. General Physics Lecture.** (3) I and II. Mr. True, Mr. Hayashi

Prerequisite: course 2A.

Elective in the College of Letters and Science. Required for premedical students.

Properties of light, electricity, magnetism, and atomic and nuclear physics.

**3A. General Physics Laboratory.** (1) I and II. Mr. Hayashi, Mr. True

Required for premedical students. Recommended for all students who elect course 2A.

Mechanics, properties of matter, heat, and sound. Experimental work planned to accompany the lectures in course 2A.

**3B. General Physics Laboratory.** (1) I and II. Mr. True, Mr. Hayashi

Required for premedical students. Recommended for all students who elect course 2B.

Properties of light, electricity, magnetism, and atomic and nuclear physics. Experimental work planned to accompany the lectures in course 2B.

**4A. General Physics. (4) II.**

Mr. Gardner

Lectures and laboratory.

Prerequisite: (1) high school physics or chemistry; (2) Mathematics 3A-3B or its equivalent (3B may be taken concurrently).

Open to students in all colleges. Together with courses 4B and 4C, required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.

Mechanics, properties of matter.

**4B. General Physics. (4) I.**

Mr. Gardner

Lectures and laboratory.

Prerequisite: course 4A.

Open to students in all colleges. Required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.

Electricity and magnetism.

**4C. General Physics. (4) II.**

Mr. Hayashi

Lectures and laboratory.

Prerequisite: course 4A.

Open to students in all colleges. Required for students in the College of Letters and Science whose major subject is physics, and for students in engineering and chemistry.

Heat, wave motion, sound, and light.

**\*38A-38B. Supplementary Lecture Course in General Physics. (2-2) Yr.**

Mr. Jungerman

Prerequisite: course 2A-2B; Mathematics 3A-3B, 4A (may be taken concurrently).

Equivalent to parts of the lecture material in courses 4A, 4B, and 4C. Together with the laboratory courses 3A-3B, this course will supply the student with the necessary basic training required for the upper division program in physics.

Offered in alternate years.

## UPPER DIVISION COURSES

Courses 4A, 4B, 4C or their equivalent and differential and integral calculus are prerequisite to all upper division courses, except course 107.

**104. Vector Analysis. (3) I.**

Mr. Jungerman

Elements of vector and tensor analysis with applications to physics.

Offered in alternate years.

**105A-105B. Analytic Mechanics. (3-3) Yr.**

Mr. Knox

Fundamental principles of Newtonian mechanics.

**107. Introduction to Electronics. (3) I.**

Mr. Gardner

Prerequisite: course 2B, or equivalent.

Elementary principles of single-phase alternating-current circuits, characteristics of thermionic tubes and a study of simple electronic circuits.

Offered in alternate years.

**108B. Physical Optics. (3) I.**

Mr. Beard

Lectures and laboratory.

The phenomena of diffraction, interference, and polarization of light, and their applications.

Offered in alternate years.

\* Not to be given, 1960-1961.

**110A-110B. Electricity and Magnetism.** (3-3) Yr. Mr. Knox  
Prerequisite: Mathematics 114.

Elementary and mathematical theory of electrostatics, magnetostatics, magnetism, steady and varying currents, electron theory, and electromagnetic waves.

Offered in alternate years.

**\*112. Heat.** (3) I. Mr. Patten

The thermal properties of matter, with an introduction to the mathematical theory of heat conduction, the kinetic theory of matter, and thermodynamics.

Offered in alternate years.

**115. Introduction to Quantum Mechanics.** (3) II. Mr. True

Prerequisite: courses 105A, 121.

The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

**121. Introduction to Atomic Structure.** (3) II. Mr. Gardner

An introduction to atomic physics treating cathode and positive rays, the electron, thermionic emission, the photoelectric effect, the structure of the atom, and the interpretation of spectra and X rays.

**129A-129B. Nuclear Physics.** (3-3) Yr. Mr. Jungerman

Prerequisite: course 121.

Natural and artificial radioactivity, nuclear radiations and their interaction with matter, general properties of nuclei and the theory of nuclear structure, high energy physics, mesons.

Offered in alternate years.

**199. Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff (Mr. Patten in charge)

All special work of upper division grade not included in courses announced above.

#### GRADUATE COURSES

**205. Theoretical Mechanics.** (3) I. Mr. Patten

Prerequisite: course 105A-105B or the equivalent.

The generalized methods of Lagrange, Hamilton, and Jacobi. Advanced theories leading to the formulation of quantum mechanics.

Offered in alternate years.

**210. Theory of Electricity and Magnetism.** (3) II. Mr. Jungerman

Prerequisite: course 110A-110B or the equivalent, and a working knowledge of differential equations.

Classical description of the electromagnetic field including special relativity and electron theory.

Offered in alternate years.

**215A-215B. Quantum Mechanics.** (3-3) Yr. Mr. Beard

Prerequisite: courses 115, 205.

Development and interpretation of the Schrödinger wave equation and Heisenberg matrix mechanics. Approximation methods. Applications to atomic, molecular, and solid state problems. Radiation theory. Scattering theory. Dirac wave equations leading to elementary field theory.

Offered in alternate years.

\* Not to be given, 1960-1961.

219. **Statistical Mechanics and Kinetic Theory.** (3) II. Mr. Beard  
Prerequisite: courses 115, 205.

Foundations of statistical mechanics. Classical and quantum statistics, with applications to properties of matter; kinetic theory; gases at very low pressure; Boltzmann transport equation; irreversible processes.

Offered in alternate years.

229. **Nuclear Theory.** (3) I. Mr. True  
Prerequisite: courses 115, 129A, or their equivalent.

Nuclear structure with emphasis on recent theoretical models of nuclear forces and potentials and the physical properties and behavior of nuclei at low excitation energy. Theoretical problems of experimental interest, such as the penetration of electrons through matter.

Offered in alternate years.

290. **Seminar.** (1-3) I and II.  
I. Mr. Jungerman; II. Mr. Beard.

Advanced study in various fields of modern physics. Topics will vary from year to year.

299. **Research.** (1-6) I and II. The Staff (Mr. Patten in charge)

## PHYSIOLOGY

For courses in physiology see "Animal Physiology," page 138, and "Zoology," page 259.

## PLANT NEMATOTOLOGY

(Department Office, 231 Soils and Plant Nutrition Building)

Merlin W. Allen, Ph.D., *Professor of Plant Nematology.*

Dewey J. Raski, Ph.D., *Professor of Plant Nematology (Chairman of the Department).*



Bert Lear, Ph.D., *Lecturer in Nematology.*

Armand R. Maggenti, Ph.D., *Lecturer in Nematology.*

### UPPER DIVISION COURSE

100. **General Plant Nematology.** (4) I. Mr. Raski  
Lectures and laboratory.  
Prerequisite: Zoology 1A or 10.

An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

### GRADUATE COURSES

- \*290. **Seminar in Plant Nematology.** (1) I and II.  
Prerequisite: graduate standing. The Staff (Mr. Raski in charge)
299. **Research in Plant Nematology.** (1-6) I and II.  
Prerequisite: graduate standing. The Staff (Mr. Raski in charge)

## PLANT NUTRITION

For courses in plant nutrition see "Soils and Plant Nutrition," page 245.

Plant Nematology 220. Principles and Techniques of Nematode Taxonomy and Morphology.

(3) I. Mr. Allen, Mr. Maggenti  
Lectures and laboratory.

Prerequisite: course 100 (may be taken concurrently).

Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material.

Plant Nematology 221. Nematode Pathogenicity and Control. (3) II. Mr. Lownsbery, Mr. Lear  
Lectures and laboratory.

Prerequisite: course 100.

Advanced studies of the relation of nematodes to plants and control of plant parasitic nematodes.

\* DAVID R. VIGLIERCHIO, Ph. D. , Lecturer in Nematology  
9/12/60

Plant Nematology 225. Nematode Taxonomy and Comparative Morphology. (4) II.

Mr. Allen, Mr. Maggenti

Lectures and laboratory.

Prerequisite: course 220.

The taxonomy, morphology, and comparative anatomy of soil and freshwater nematodes.

**PLANT PATHOLOGY**

(Department Office, 258 Hunt Hall)

- W. Harley English, Ph.D., *Professor of Plant Pathology.*  
 Raymond G. Grogan, Ph.D., *Professor of Plant Pathology.*  
 William B. Hewitt, Ph.D., *Professor of Plant Pathology.*  
 Byron R. Houston, Ph.D., *Professor of Plant Pathology.*  
 James B. Kendrick, Sr., Ph.D., *Professor of Plant Pathology, Emeritus*  
 Lysle D. Leach, Ph.D., *Professor of Plant Pathology (Chairman of the Department).*  
 Edward E. Wilson, Ph.D., *Professor of Plant Pathology.*  
 James E. DeVay, Ph.D., *Associate Professor of Plant Pathology.*  
 George Nyland, Ph.D., *Associate Professor of Plant Pathology.*  
 Robert N. Campbell, Ph.D., *Assistant Professor of Plant Pathology.*  
 Philip M. Halisky, Ph.D., *Assistant Professor of Plant Pathology.*  
 Thomas A. Shalla, Ph.D., *Assistant Professor of Plant Pathology.*



- Edward E. Butler, Ph.D., *Lecturer in Plant Pathology.*  
 Joseph M. Ogawa, Ph.D., *Lecturer in Plant Pathology.*  
 ———, *Lecturer in Plant Pathology.*

*Letters and Science List.*—Plant Pathology 124.  
*Departmental Major Advisers.*—Mr. English, Mr. Houston.  
*The Major.*—See pages 70–75.

## UPPER DIVISION COURSES

**120. Plant Diseases. (4) I and II.**

Lectures and laboratory. I. Mr. English, Mr. Campbell; II. Mr. Houston, Mr. Halisky.

Prerequisite: Botany 1. Recommended: Bacteriology 1.  
 A general course on the nature, cause, and control of plant diseases.

**122. Plant Pathology Methods. (3) I.**

Mr. Nyland

Lectures and laboratory.

Prerequisite: course 120.

The laboratory methods and techniques used in the study of plant diseases.

**124. Pathogenic Fungi. (3) II.**

Mr. Butler

Lectures and laboratory.

Prerequisite: Botany 119.

The Morphology and taxonomy of the fungi, with special emphasis on plant pathogens.

**125A. Diseases of Crop Plants. (3) I.**

Mr. Grogan

Lectures and laboratory.

Prerequisite: course 120.

The pathology of important field and vegetable crop plants. Diagnosis, host reaction, factors influencing inception and severity of the disease, dissemination and control.

Frequent field trips are required.

**125B. Diseases of Crop Plants. (3) II.**

Mr. Wilson, Mr. Ogawa

Lectures and laboratory.

Prerequisite: course 120.

The pathology of important fruit, nut, and vine crop plants. Diagnosis, host reaction, factors influencing inception and severity of the disease, dissemination and control.

Frequent field trips are required.

\* **198. Principles and Techniques of Plant Virology. (3) II.**

Lectures and laboratory.

Mr. Shalla, Mr. Hewitt

Prerequisite: course 120.

Viruses as causal agents of plant diseases; the nature, ~~of plant viruses,~~ ~~their~~ morphology, chemical, physical and serological properties, ~~methods~~ of transmission including insect vector relationships; ~~the application of techniques and equipment used in research with plant viruses.~~

**199. Special Study for Advanced Undergraduates. (1-5) I and II.**

The Staff (Mr. Grogan in charge)

GRADUATE COURSES

\* **191. Seminar in Plant Pathology. (1) I and II.**

The Staff (Mr. Grogan in charge)

**210. Physiology of Plant Pathogens. (3) I.**

Mr. DeVay

Lectures and laboratory.

Prerequisite: course 122; Chemistry 5 and 8 or equivalent. Recommended: Botany 120A-120B; Chemistry 101.

A study of the fundamental concepts and current information on the physiology and biochemistry of plant pathogens and to relate this knowledge to host-parasite relationships.

**215. Advanced Plant Pathology. (3) II.**

Mr. Leach

Prerequisite: courses 122, 124.

A study of the factors influencing pathogenicity and of the reaction of host plants to disease.

**299. Research in Plant Pathology. (1-6) I and II.**

The Staff (Mr. Leach in charge)

**POLITICAL SCIENCE**

(Department Office, 257 AOB)

Vernon J. Puryear, Ph.D., *Professor of Political Science.*

Clyde E. Jacobs, Ph.D., *Associate Professor of Political Science (Chairman of the Department).*

Ernest G. Miller, Ph.D., *Assistant Professor of Political Science.*

John R. Owens, Ph.D., *Assistant Professor of Political Science.*

Charles E. Young, Ph.D., *Assistant Professor of Political Science.*

\* *Letters and Science List.*—All undergraduate courses in Political Science are included in the Letters and Science List of Courses. (See page 106.)

*Departmental Major Advisers.*—Mr. Jacobs, Mr. Miller, Mr. Puryear.

*The American History and Institutions Requirement* may be satisfied by any two of the following courses: 1A, 1B, 102, 105, 113, 128A, 157A, 157B, 162, 163, 166. See also the section entitled "General Regulations" on page 41.

*The Major Program*

(A) Lower Division Courses.—Required: courses 1A, 1B, 2, 3, and either History 4A-4B or History 17A-17B, and a minimum average grade of C in these courses. Economics 1A and Philosophy 6A or 20A are recommended as preparation for the major.

(B) Upper Division Courses.—Required: (1) 24 units as follows:

(1) 18 units in Political Science. This must include at least one course from each of four of the six groups offered: American Government, Political Theory, International Relations, Comparative Government, Public Law and Political Parties.

\* 226

\* 291

x 224 { see 124  
x 226 { 126

x John L. Eberhardt, M.A., Assistant in  
Political Science 7/1/60.  
1/1/61.

James E. Sandmire, M.A., Assistant in Political Science  
1/1/61.



- (2) 6 additional units in political science or related subjects chosen in consultation with the adviser.

Political Science students must maintain at least a grade C average in the major.

*Honors and Honors Program* (see page 107).—The honors program comprises course 194H, which will include either a thesis or a comprehensive examination, according to the recommendation of a special honors committee in political science. Before being admitted to the honors program, a student must complete 9 units of political science (normally courses 1A, 1B, and 2), with an average grade of B.

#### LOWER DIVISION COURSES

**1A-1B. American Government.** (3-3) I and II. The Staff  
Course 1A is not prerequisite to 1B.  
National, state, and local government in the United States.

**2. Introduction to Government (Comparative Government).** (3) I. Mr. Puryear  
A study of constitutional principles, governmental institutions, and political problems of selected European governments.

**3. International Relations.** (3) II. Mr. Puryear  
Rise and development of the Western State systems; problems of nationalism and imperialism, particularly in connection with the peace settlement following World War II.

#### UPPER DIVISION COURSES

**102. State Government and American Federalism.** (3) II. Mr. Miller  
State constitutions, institutions, political patterns, and public programs, emphasizing the impact of inherited political values and the challenge of contemporary problems. State-national conflict and cooperation, and the role of the states in the American federal system.

**103. Local Government.** (3) I. Mr. Miller  
Patterns, programs, problems, and legal powers of government in counties, municipalities, and special districts; professional management and non-partisan politics; community power structures; local autonomy and central financing; the governmental challenge of metropolitan areas.

**\*105. The Legislative Process.** (3) II. Mr. Young  
An analysis of the legislative process in the United States with emphasis on Congressional and state legislative functions, organization, and practices.

**113. American Political Theory.** (3) II. Mr. Young  
Underlying theories and principles of United States government and politics.

**\*118. Political Thought from Plato to Dante.** (3) I. Mr. Jacobs  
Critical analysis of the works of major political theorists of ancient and medieval times.

**\*124. International Organization.** (3) II. Mr. Puryear  
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.  
Offered in alternate years.

\* Not to be given, 1960-1961.

- 128A. Recent American Foreign Policy.** (3) I. Mr. Puryear  
Abandonment of isolation and assumption of leadership during the First World War. Return to isolationist policies in the twenties. The neutrality acts of the thirties. The Second World War and reversal of the policy of isolation.
- 128B. The Conduct of American Foreign Relations.** (3) II. Mr. Puryear  
Diplomacy and the conduct and control of foreign relations. The Department of State and the Foreign Service. Case studies in recent diplomacy to illustrate policy formation and execution. Some comparative materials will be introduced but emphasis will be placed upon the United States.
- 144. Government in Great Britain and the British Empire.** (3) II. Mr. Puryear  
The democratic process in Britain; party politics; the cabinet system; the colonies; the evolution of the British Commonwealth of Nations.  
Offered in alternate years.
- 157A-157B. American Constitutional Law.** (3-3) Yr. Mr. Jacobs  
Prerequisite: course 1A or History 17A-17B. Course 157A is prerequisite to 157B.  
Analysis of judicial cases and related materials illustrating the historical and current interpretations of the Constitution.
- 161. Political Behavior.** (3) II. Mr. Owens  
Prerequisite: course 1A.  
The individual and group determinants of political belief and action. Political institutions considered in relation to individual values and behavior.
- 162. Problems of American Government.** (3) II. Mr. Owens  
An analysis of selected governmental topics of contemporary importance. Problems and issues selected from such areas as executive-legislative relations, federal-state-local relations, the regulatory process, and agricultural, labor, and business policy.
- 163. Political Parties.** (3) I. Mr. Owens  
Nature and function of political parties; their origin, development, structure, economic and social composition, internal management and control; relation of parties and pressure groups to legislation and administration; analysis of pressure politics as distinguished from party politics.
- 166. Public Policy and the Governmental Process.** (3) I. Mr. Owens  
(Formerly course 160B.)  
An examination of the processes of formulating public policy. Methods of policy making by executive, legislative, judicial, and party agencies illustrated with case studies from agriculture, labor, civil rights, and other areas.
- 181. Elements of Public Administration.** (3) I. Mr. Miller  
The role of public administration in modern government; the nature of administrative agencies; human behavior in the administrative process; executive leadership and decision making; bureaucracy and bureaucratic accountability in a democratic society.
- 182. Problems of Public Administration.** (3) II. Mr. Miller  
Common problems of administrative organization, direction, operation, and control in the public service; management tools and techniques. Analysis by the individual student of a particular administrative organization, program, or problem.

- 194H. **Special Study for Honors Students.** (3) I and II. The Staff  
Prerequisite: open to majors with honors standing. May be taken once during the junior year and repeated once during the senior year.  
A survey of a defined field of political science. Students will prepare a thesis or pass a comprehensive examination covering their work in the major.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

## GRADUATE COURSES

230. **Seminar in American Foreign Policy.** (2) I and II. Mr. Puryear
290. **Seminar in American Public Law.** (2) II. Mr. Jacobs  
Prerequisite: consent of instructor.  
Selected current topics.
295. **Seminar in Political Parties.** (2) I. Mr. Owens  
Intensive study of selected topics.
296. **Seminar in State and Local Government.** (2) II. Mr. Miller  
An examination of selected institutions, processes, and problems.
299. **Research in Political Science.** (2-4) I and II. The Staff

## POMOLOGY

(Department Office, 1043 Horticulture Science Building)

- Reid M. Brooks, Ph.D., *Professor of Pomology.*  
Dillon S. Brown, Ph.D., *Professor of Pomology.*  
Lawrence L. Claypool, Ph.D., *Professor of Pomology.*  
Julian C. Crane, Ph.D., *Professor of Pomology.*  
Luther D. Davis, Ph.D., *Professor of Pomology.*  
William H. Griggs, Ph.D., *Professor of Pomology.*  
Carl J. Hansen, M.S., *Professor of Pomology.*  
†Hudson T. Hartmann, Ph.D., *Professor of Pomology.*  
Claron O. Hesse, Ph.D., *Professor of Pomology (Chairman of the Department).*  
E. Louis Proebsting, Ph.D., *Professor of Pomology.*  
Frank W. Allen, M.S., *Professor of Pomology, Emeritus.*  
Warren P. Tufts, Ph.D., *Professor of Pomology, Emeritus.*  
Royce S. Bringhurst, Ph.D., *Associate Professor of Pomology.*  
Dale E. Kester, Ph.D., *Associate Professor of Pomology.*  
———, *Assistant Professor of Pomology.*



- Muriel V. Bradlev, Ph.D., *Lecturer in Pomology.*  
Peter B. Catlin, Ph.D., *Lecturer in Pomology.*  
Omund Lilleland, Ph.D., *Lecturer in Pomology.*  
Edward C. Maxie, Ph.D., *Lecturer in Pomology.*  
Harold P. Olmo, Ph.D., *Professor of Viticulture.*  
Roger J. Romani, *Lecturer in Pomology.*  
Eugene F. Serr, Jr., B.S., *Lecturer in Pomology.*

*Letters and Science List.*—Pomology 110.

*The Major.*—See pages 70-75.

*Departmental Major Advisers.*—Mr. Brown, Mr. Crane.

† Absent on leave, 1960-1961.

## LOWER DIVISION COURSES

- 1. Introduction to Pomology. (3) I.** Mr. Hansen  
Lectures and laboratory.  
Not open to students who have completed course 2.  
A survey of the fruit industry, including climatic influences, effect of root-stocks, selection of varieties, pollination requirements, and effect of the essential elements on growth.
- 2. Principles of Fruit Growing. (3) I.** Mr. Davis  
Prerequisite: Botany 1.  
An introduction to the principles underlying the behavior of fruit trees, their response to environment and cultural operations.
- 3. Citrus and Other Subtropical Fruits. (2) II.** Mr. Serr  
The production of the evergreen 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.
- 9. Principles of Plant Propagation. (2) II.** Mr. Kester  
Lectures and laboratory.  
Prerequisite: Botany 1.  
Principles of propagating horticultural plants with special emphasis on anatomical and physiological relationships.

## UPPER DIVISION COURSES

- 105. The Deciduous Fruit Industries of California. (5)** Mr. Kester  
Lectures and laboratory.  
Prerequisite: course 2 or consent of the instructor.  
A study of the important fruit industries of California as influenced by culture, climate and variety; includes surveys of fruit-growing areas.  
A five-weeks extra-session offered in odd-numbered years. Preregistration with the instructor before June 1 required.
- 106A-106B. Fruit Plants. (2-2) Yr.** I. Mr. Crane; II. Mr. Brown  
Lectures and laboratory.  
Prerequisite: course 2.  
Course 106A is not prerequisite to 106B.  
The principles underlying the growth and development of fruit plants related to species and environment as determinants in fruit-growing practices such as pruning, pollination, and thinning.
- 107. Small-Fruit Plants. (2) I.** Mr. Bringhurst  
Prerequisite: course 2.  
Fundamental principles concerned with growth, reproduction and adaptation of strawberries, blackberries, raspberries, blueberries, currants and gooseberries with emphasis on their botanical origin, physiological and morphological nature and the relationship of these factors to environment.
- 110. Fruit Morphology. (3) I.** Mr. Brooks  
Lectures and laboratory.  
Prerequisite: Botany 1.  
The morphological development of the flower, fruit, and seed of more than thirty typical horticultural species.

112. **Handling, Storage, and Transit of Fruits.** (3) I. Mr. Claypool  
Lectures and laboratory.  
Prerequisite: course 2; Botany 7.  
Fundamentals of certain fruit-handling operations; fruit maturity; pre-cooling; fruit storage and transportation. Particular emphasis is given to the physiological principles underlying these postharvest practices.
114. **Fruit Breeding.** (3) II. Mr. Olmo  
Lectures and laboratory.  
Prerequisite: course 2; Genetics 100.  
The genetics and cytology of fruit species in relation to varietal improvement, including a study of sterility, incompatibility, interspecific hybridization, and clonal selection in fruit varieties.
121. **Advanced Pomology.** (3) II. Mr. Proebsting  
Prerequisite: course 2; Botany 7; consent of the instructor.  
The physiology of fruit trees, their response to environment and to cultural operations.
198. **Directed Group Study in Experimental Pomology.** (2) I. Mr. Hesse  
Prerequisite: 3 units upper division work in pomology completed; consent of the instructor.  
A critical review and discussion of horticultural research in selected fields. Emphasis is placed on criticism of methods and their application, validity of conclusions, and relation to the development of the field of study.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

## GRADUATE COURSES

290. **Seminar.** (1) I and II. Mr. Davis  
(Formerly course 205.)
291. **Seminar in Postharvest Physiology.** (1) I and II. Mr. Maxie  
(Formerly course 202.)  
Prerequisite: consent of the instructor.  
An intensive study of selected topics in the field of postharvest physiology of fruits and vegetables. This seminar will be conducted jointly with Vegetable Crops 291.
299. **Research in Pomology.** (1-6) I and II. The Staff

**POULTRY HUSBANDRY**

(Department Office, 109 Poultry Building)

Vigfus S. Asmundson, Ph.D., *Professor of Poultry Husbandry.*†Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*Fredric W. Hill, Ph.D., *Professor of Poultry Husbandry (Chairman of the Department).*Frank H. Kratzer, Ph.D., *Professor of Poultry Husbandry.*Samuel Lepkovsky, Ph.D., *Professor of Poultry Husbandry (Berkeley campus).*Frederick W. Lorenz, Ph.D., *Professor of Poultry Husbandry.*Lewis W. Taylor, Ph.D., *Professor of Poultry Husbandry (Berkeley campus).*

✓† Absent on leave, 1960-1961.

- Wilbor O. Wilson, Ph.D., *Professor of Poultry Husbandry.*  
 Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*  
 Arthur H. Smith, Ph.D., *Associate Professor of Poultry Husbandry.*  
 †Ursula K. Abbott, Ph.D., *Assistant Professor of Poultry Husbandry.*  
 Hans Abplanalp, Ph.D., *Assistant Professor of Poultry Husbandry.*  
 Frank X. Ogasawara, Ph.D., *Assistant Professor of Poultry Husbandry.*



- A. Wade Brant, Ph.D., *Lecturer in Food Science and Technology.*  
 X George F. Stewart, Ph.D., *Professor of Food Science and Technology.*

*Letters and Science List.*—Poultry Husbandry 107, 108.

*Departmental Major Adviser.*—Mr. Ogasawara.

*The Major.*—See pages 60–62.

#### LOWER DIVISION COURSES

1. **Poultry Production.** (3) I. Mr. Ogasawara  
 Lectures and laboratory.  
 An introductory study of the relation of the several sciences underlying poultry production to flock management.
48. **Poultry Industries.** (2) II.  
 Laboratory. The Staff (Mr. Peterson and Mrs. Abbott in charge)  
 Prerequisite: course 1.  
 The hatchery industry; poultry meat and egg technology; and cost analyses of various kinds of poultry enterprises.
49. **Poultry Management.** (2) I. The Staff (Mr. Smith in charge)  
 Laboratory.  
 Prerequisite: course 1.  
 Sanitation; brooding and rearing practices; management of laying stock; raising meat birds, and artificial insemination.

#### UPPER DIVISION COURSES

- \*102. **Experimental Incubation.** (3) I. Mrs. Abbott, Mr. Taylor  
 Lectures and laboratory.  
 Prerequisite: Zoology 100 and 100L; Chemistry 8.  
 Problems of embryonic development, causes of embryonic mortality in poultry, and principles of artificial incubation.
103. **Poultry Breeding.** (3) I. Mr. Asmundson  
 Prerequisite: Genetics 100.  
 Inheritance in poultry and study of the application of genetic principles to problems in poultry breeding (chickens and turkeys).
- 103L. **Laboratory in Poultry Breeding.** (1) I. Mr. Abplanalp  
 Prerequisite: Genetics 100; course 103 (may be taken concurrently).  
 Problems in quantitative genetics with applications to practical poultry breeding procedures. Exercises in the analysis, interpretation, and use of breeding records.
105. **Avian Nutrition.** (3) II. Mr. Hill, Mr. Kratzer  
 Lectures and laboratory.  
 Prerequisite: Animal Husbandry 101 or equivalent.  
 A study of the fundamentals of nutrition specifically related to avian organisms. Introduction to methods used in nutritional evaluations.

\* Not to be given, 1960–1961.

† Absent on leave, fall semester, 1960–1961.

+ absent on leave, Spring Semester 1961

x LEO C. NORRIS, Ph. D., Lecturer in Poultry  
Husbandry . 7/1/60

106. **Poultry Feeds and Feeding.** (2) II. Mr. Hill, Mr. Kratzer  
Lectures and laboratory.  
Prerequisite: course 105 (may be taken concurrently).  
A study of the manufacture, composition, and use of poultry feedstuffs.
107. **Avian Physiology.** (2) II. Mr. Lorenz  
Prerequisite: Physiology 1 and 1L or Animal Husbandry 110 or equivalent; Zoology 1B.  
Physiology of the various systems of birds with emphasis on reproduction, digestion, metabolism, and endocrinology.
108. **Avian Physiology Laboratory.** (1) II. Mr. Lorenz  
Laboratory.  
Prerequisite: course 1, 107 (may be taken concurrently); consent of the instructor.  
Selected problems in the physiology of birds.
112. **Poultry Meat Production.** (3) II. Mr. Asmundson  
Prerequisite: course 1; senior standing in animal science or consent of the instructor.  
The relation of heredity, nutrition, physiology and environment to the breeding, feeding and management of poultry for meat production with particular reference to turkeys and chickens.
121. **Technology of Handling Poultry Products.** (2) I. Mr. Peterson, Mr. Brant, Mr. Stewart  
Prerequisite: consent of the instructor.  
Lectures and demonstrations regarding the physical, chemical, and nutritional composition of poultry products; quality criteria and standards; physical, chemical, and microbiological factors influencing keeping quality.
- \*149. **Environmental Physiology of Domestic Animals.** (2) I. Mr. Wilson  
Prerequisite: Zoology 1A-1B.  
The relation of environmental factors on physiological processes related to animal production.  
Offered in odd-numbered years.
150. **Concepts of Animal Nutrition.** (2) II. Mr. Lepkovsky  
Prerequisite: Animal Husbandry 101; Chemistry 8; Physiology 1; Zoology 1B or their equivalents.  
Dynamic interrelationship between food, animal and environment. Covers: (1) transfer of nutrients from environment to gastrointestinal tract; (2) processing in gastrointestinal tract; (3) transfer from gastrointestinal tract to cell; (4) utilization by cell.
198. **Directed Group Study.** (1-2) II. Mr. Abplanalp  
Prerequisite: senior standing and consent of the instructor.  
Group study of methods employed in poultry production and management.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff (Mr. Hill in charge)  
Prerequisite: course 1; courses basic to problem elected; consent of the instructor.  
Problems may be elected relating to the nutrition, breeding, incubation, physiology, and egg quality of chickens or turkeys.



## RELATED COURSES

**Fundamentals of Farm Management** (Agricultural Economics 140)

**Principles of Pathology and Control of Diseases of Domestic Animals** (Veterinary Science 111)

**Poultry Pathology Laboratory** (Veterinary Science 112)

## GRADUATE COURSES

290. **Seminar in Poultry Husbandry.** (1) I and II.

The Staff (Mr. Hill in charge)

Reports and discussion of recent advances and selected topics of current interest in avian genetics, physiology, and nutrition, and poultry-products technology.

299. **Research in Poultry Husbandry.** (1-6) I and II.

The Staff

## PSYCHOLOGY

(Department Office, 356 Academic Office Building)

William F. Dukes, Ph.D., *Associate Professor of Psychology.*

Paul Dempsey, Ph.D., *Assistant Professor of Psychology (Chairman of the Department).*

Andrew K. Solarz, Ph.D., *Assistant Professor of Psychology.*



~~Sumner B. Morris, Ed.D., *Lecturer in Psychology.*~~

*Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Departmental Major Advisers.*—Mr. Dempsey, Mr. Solarz.

*The Major Program*

(A) Lower Division Courses.—Required: (1) course 1A-1B; (2) 3 units of statistics; (3) 6 units of biological science, composed of one of these three combinations; Zoology 1A-1B, Zoology 1A and Physiology 1, or Zoology 10 and Physiology 1; (4) 6 units of sociology and/or cultural anthropology. Requirements should be completed before the beginning of the junior year and must be completed before the beginning of the senior year.

(B) Upper Division Courses.—Twenty-four units of advanced work in psychology (courses numbered above 99) with the following specific requirements: (1) course 196 (to be taken during the senior year); (2) one course from each of the following: (a) 108, 150; (b) 130, 131; (c) 145, 168; (d) 147, 165. With the approval of the adviser, 6 units of the 24, exclusive of the specific requirements, may be satisfied by advanced work in closely allied departments.

Before graduation the student must complete 6 units of philosophy. 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 107).—The honors program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

ELIZABETH A. Waterman, B.A.,  
ASSISTANT in Psychology

Psychology 3. Quantitative Description of  
Behavior. (3) II. Mr. Dempsey

Prerequisite: Mathematics D or equivalent;  
Mathematics 13; course 1A (may be taken con-  
currently).

Principles and problems of measurement in  
psychology; methods of ordering and comparing  
measurements; inference and prediction from  
psychological data.

## LOWER DIVISION COURSES

**1A. General Psychology.** (3) I and II.

I. Mr. Dukes; II. Mr. Solarz.

Not open to entering freshmen.

An introduction to the facts and principles of psychology.

**1B. General Psychology.** (3) II.

Mr. Dukes

Prerequisite: course 1A.

A continuation of course 1A with a detailed treatment of the application of the scientific method in the study of behavior. Basic assumptions, limitations, and advantages of the method of experiment. Intended primarily for prospective major students.

**X 33. Personal and Social Adjustment.** (3) II.

Mr. Dempsey

Prerequisite: course 1A.

A continuation of course 1A, intended primarily for students who will not major in psychology. The dynamics of normal personality development. Family relationships, social adjustment, and self-evaluation are emphasized.

## UPPER DIVISION COURSES

**\*108. Physiological Psychology.** (3) I.

Mr. Solarz

Prerequisite: course 1A; Zoology 1B or Physiology I.

A study of the relationships between behavioral adjustments and receptor-, connector-, effector-systems.

Offered in alternate years.

**130. Learning.** (3) I.

Mr. Solarz

Lectures and laboratory.

Prerequisite: course 1A.

Consideration of major theories of learning and memory with critical examination of relevant experimental, clinical and social data.

**131. Perception.** (3) II.

Mr. Dukes

Lectures and laboratory.

Prerequisite: course 1A.

The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

Offered in alternate years.

**145. Social Psychology.** (3) II.

Mr. Dempsey

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.

**\*147. Personality Theory and Assessment.** (3) I.

Mr. Dempsey

Lectures and laboratory.

Prerequisite: 6 units of advanced work in psychology (courses numbered above 99).

A systematic consideration of contemporary theories in the field of personality, together with an exploration and evaluation of some of the principal methods of collecting relevant empirical evidence.

Offered in alternate years.

\* Not to be given, 1960-1961.

**150. Comparative Psychology.** (3) I. Mr. Solarz  
Prerequisite: course 1A.

A phylogenetic account of behavior with emphasis on the similarities and differences in response patternings evident at various levels. The relative influence of internal and external factors on these patternings and their modifiability.

Offered in alternate years.

**165. Clinical Psychology: Techniques and Problems in Diagnosis.** (3) I. Mr. Dempsey  
Lectures and laboratory.

Prerequisite: courses 1B, 145 or 168; 3 units of statistics.

The interview and psychological test as diagnostic instruments. An examination of underlying theory and methods of construction and standardization; an evaluation of empirical results. Laboratory work in interviewing and testing.

Offered in alternate years.

**168. Abnormal Psychology.** (3) I. Mr. Dempsey  
Prerequisite: course 1A.

A descriptive and functional account of behavior disorders with primary consideration given to neurotic and psychotic behavior. Methods and theories of psychotherapy.

**194H. Special Study for Honors Students.** (3) I and II. The Staff  
Prerequisite: 15 units in psychology and honors status.

Independent investigation of an empirical problem. A written report in thesis form required. May be repeated once for credit.

**196. Advanced General Psychology.** (3) II. Mr. Solarz  
Prerequisite: 12 units of advanced work in psychology (courses numbered above 99).

Exploration of the present status of systematic psychology. An integrative treatment of the major areas, problems, and methodologies. Required of all majors in their senior year.

**199. Special Study for Advanced Undergraduates.** (1-3) I and II. The Staff (Mr. Dempsey in charge)  
Investigation of special problems.

## **RANGE MANAGEMENT**

(Committee Office, 131 Hunt Hall)

### *Committee in Charge:*

Harold H. Biswell, Ph.D., *Professor of Forestry (Berkeley campus).*

Harold F. Heady, Ph.D., *Associate Professor of Forestry (Berkeley campus).*

R. Merton Love, Ph.D., *Professor of Agronomy.*

Henry J. Vaux, Ph.D., *Professor of Forestry (Chairman of the Committee) (Berkeley campus).*

William C. Weir, Ph.D., *Professor of Animal Husbandry.*

Instruction in Range Management is not organized as a single administrative unit in the University, but the relevant courses are offered by a number of departments, and are coordinated by the committee in charge.

*Group Major Adviser.*—Mr. Love.

*The Major.*—See pages 78-80.

x WINSLOW ROUSE, M.S.W., Lecturer in Sociology  
1/1/61

LOWER DIVISION COURSE

49. **Range Management Field Practice Course.** (No credit) Mr. Love  
Approximately four weeks devoted to field studies of range conditions and methods of utilization in various parts of the state. Required of all students with a major in range management.

UPPER DIVISION COURSE

198. **Directed Group Study.** (1-5) I and II. The Staff (Mr. Love in charge)  
Prerequisite: consent of instructor.  
Directed group study of selected topics in range management for advanced undergraduates.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.  
The Staff (Mr. Love in charge)  
Prerequisite: senior standing and consent of the instructor.

REQUIRED COURSES IN THE MAJOR

- Forage Crops (Agronomy 112)  
Range Improvement (Agronomy 115)  
Introduction to Animal Husbandry (Animal Husbandry 7)  
Type Evaluation in Livestock Selection (Animal Husbandry 8)  
Feeds and Feeding (Animal Husbandry 103)  
Meat Production (Animal Husbandry 118)  
Plant Ecology (Botany 110)

GRADUATE COURSES

290. **Seminar in Range Management.** (2) I and II.  
The Staff (Mr. Love in charge)  
Prerequisite: course 133 (given at Berkeley).
299. **Research in Range Management.** (1-6) I and II.  
The Staff (Mr. Love in charge)

## RUSSIAN

For courses in Russian see "Foreign Languages" on page 189.

## SOCIOLOGY

(Department Office, 314 Academic Office Building)

- Edwin M. Lemert, Ph.D., *Professor of Sociology (Chairman of the Department)*.  
Charles D. Bolton, Ph.D., *Assistant Professor of Sociology*.  
Kenneth Kammeyer, Ph.D., *Instructor in Sociology*.

× *Letters and Science List.*—All undergraduate courses are included in the Letters and Science List of Courses (see page 106).

*Major Advisers.*—Mr. Lemert, Mr. Bolton.

*The Major Program*

(A) Lower Division Courses.—Sociology 1, 2; Anthropology 1 or 2; Psychology 1A and a course in statistics approved by the department.

(B) Upper Division Courses.—Required: 24 upper division units in sociology, to include Sociology 105 and 165.

#### LOWER DIVISION COURSES

- 1. Introduction to Sociology. (3) I.** The Staff  
Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality.
- 2. Introduction to Sociology: Social Organization. (3) II.** The Staff  
A study of social organization and institutions, with attention to the application of concepts and related research findings.
- 3. Social Problems. (3) II.** The Staff  
A general sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

#### UPPER DIVISION COURSES

- 105. Introduction to Methods of Sociological Study. (3) I.** Mr. Kammeyer  
Prerequisite: 6 units of sociology; a course in statistics approved by the department (may be taken concurrently).  
Examination of methodological problems and technical procedures: selection and definition of problems of investigation; selection, description, classification, and analysis of data.
- 120. Social Disorganization and Sociopathic Behavior. (3) I.** Mr. Lemert  
Prerequisite: courses 1 and 2 and upper division standing.  
A survey of the incidence and forms of social disorganization. An analysis of selected deviant and sociopathic behaviors.
- 123. American Society. (3) I.** Mr. Kammeyer  
Prerequisite: 6 units in the social sciences or consent of the instructor.  
The institutional structure and social organization of the United States.
- 126. Society, Culture, and Personality. (3) I.** Mr. Bolton  
Prerequisite: courses 1 and 2.  
The interrelationships of society, culture and personality in primitive and modern settings with special attention to social roles. Emphasis upon comparative materials.
- 144. Rural Society. (3) II.** Mr. Kammeyer  
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.
- 150. Criminology. (3) II.** Mr. Lemert  
Prerequisite: courses 1 and 2 and upper division standing.  
The sociological analysis of criminal behavior in relation to social structure and the criminalization process.
- 165. Sociological Theory. (3) II.** Mr. Bolton  
Prerequisite: six units of sociology or consent of the instructor.  
Analysis of major theoretical and conceptual systems in sociology.
- 185. The Field of Social Welfare. (3) II.** \_\_\_\_\_  
Prerequisite: courses 1 and 2; upper division standing or consent of the instructor.



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up

Constant C Delwiche, Ph.D.

Professor of  
Soil Science

A sociological analysis of social work as an institution. Attention given to agency organization and functions.

**199. Special Study for Advanced Undergraduates.** (1-3) I and II.

Open to seniors only.

The Staff (Mr. Lemert in charge)

PROFESSIONAL COURSE

**401. Institutional Field Work.** (1-3) I and II.

Study of formal and informal organization of institutions. Administrative and therapeutic procedures considered. Students will gain experience in different departments of correctional institutions and submit an analysis of a phase of institutional operation based upon a program of related reading.

**SOILS AND PLANT NUTRITION**

(Department Office, 125 Dennis Robert Hoagland Hall)

Daniel G. Aldrich, Ph.D., *Professor of Soils (Berkeley campus).*

Lannes E. Davis, Ph.D., *Professor of Soils.*

Frank F. Harradine, Ph.D., *Professor of Soil Technology.* Morphology

Perry R. Stout, Ph.D., *Professor of Soil Science (Chairman of the Department).*

Francis E. Broadbent, Ph.D., *Associate Professor of Soil Microbiology.*

Victor V. Rendig, Ph.D., *Associate Professor of Soils and Plant Nutrition.*

James A. Vomocil, Ph.D., *Assistant Professor of Soil Physics.*

Lynn D. Whittig, Ph.D., *Assistant Professor of Soil Science.*

John L. McMurdie, Ph.D., *Instructor in Soil Physics.*



Arthur L. Brown, Ph.D., *Lecturer in Soils and Plant Nutrition.*

~~John P. Conrad, Ph.D., *Professor of Agronomy, Emeritus.*~~

Lloyd D. Doneen, Ph.D., *Professor of Irrigation.*

Emanuel Epstein, Ph.D., *Lecturer in Plant Nutrition.*

Robert M. Hagan, Ph.D., *Professor of Irrigation.*

Delbert W. Henderson, Ph.D., *Associate Professor of Irrigation.*

Jerome J. Jurinak, Ph.D., *Lecturer in Soils.*

James N. Luthin, Ph.D., *Associate Professor of Irrigation.*

William E. Martin, Ph.D., *Lecturer in Soils and Plant Nutrition.* JAN. 1, '61.

Duane S. Mikkelsen, Ph.D., *Associate Professor of Agronomy.*

~~Frank J. Veihmeyer, C.E., Ph.D., *Professor of Irrigation, Emeritus.*~~

*Departmental Major Adviser.*—Mr. Davis.

*The Major.*—See pages 80-84.

**PLANT NUTRITION**

UPPER DIVISION COURSE

**116. Principles of Plant Nutrition.** (3) II.

Mr. Epstein

Lectures and laboratory.

Prerequisite: Botany 7; Chemistry 5.

Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; functions of inorganic nutrients; deficiencies and toxicities; relation to animal nutrition; experimental techniques, including solution culture and use of radioisotopes.

## SOIL SCIENCE

No student will be accepted as a major student in soil science who has not attained at least an average of grade C in each of the fields of required courses in chemistry, physics, botany, bacteriology, and the geological sciences.

## LOWER DIVISION COURSE

- 1. Introduction to Soil Science. (3) I.** Mr. Whittig  
Lectures and laboratory.  
Prerequisite: Chemistry 1A.  
Elementary principles of soil-plant interrelations; development of soil as a natural body; physical, chemical, and biological properties of soils; soil moisture; effect of management practices on soil properties; composition and use of fertilizers.

## UPPER DIVISION COURSES

- 104. Soil Chemistry. (3) I.** Mr. Davis  
Lectures and laboratory.  
Prerequisite: course 1; Chemistry 5, 8.  
Mineral and organic constituents of soils and their chemical reactions; the interactions of the liquid and solid phases including ion exchange and other colloidal phenomena; the chemical reactions involved in aggregation and structure formation; chemical factors of soil formation.
- 105. Summer Field Course. (5)** Mr. Harradine  
Lectures and laboratory.  
Prerequisite: course 118.  
Field study of soil characteristics, development, and morphology of soils. Field work in soil surveying including mapping and classifying soils; and the preparation of soil reports. Field practice in identifying and judging the probable value of the dominant soils of the state for agricultural, grazing, and forest use.
- 107. Principles of Soil Physics. (3) I and II.** Mr. Vomocil  
Lectures and laboratory.  
Prerequisite: course 1; Physics 2A-2B.  
An introduction to the physical properties and behavior of mineral and organic soil particles and structural units; the effect of environmental factors and cultural treatments on structure; soil-water relations; laboratory methods of evaluating the effect of various treatments on soil aggregation, permeability and degree of compaction.
- 108. Soil and Plant Relations. (2) II.** Mr. Rendig  
Prerequisite: course 1; Chemistry 8.  
Physicochemical properties of soils in relation to plant growth, occurrence and availability of plant nutrients, mechanisms of nutrient uptake.
- 109. Soil Fertility. (2) I.** Mr. Aldrich  
Prerequisite: course 1; Chemistry 1A-1B.  
The nature of fertilizers and soil amendments, their properties, methods of application, and reaction upon soils and plants.
- 111. Soil Microbiology and Soil Biochemistry. (3) I.** Mr. Broadbent  
Lectures and laboratory.  
Prerequisite: course 1; Bacteriology 1; Chemistry 8.  
Microorganisms occurring in soils, biochemical activities of the soil population, and the formation and properties of soil organic matter.

- 118. Soil Morphology and Survey.** (3) II. Mr. Harradine  
Lectures and laboratory.  
Prerequisite: course 1; Geology 2.  
Soil-forming factors and processes; study of the soil profile; soil survey practices; relationship between soil groups and agricultural use.  
Field trips required.
- 123. Soil Analysis.** (3) II. Mr. Brown  
Lectures and laboratory.  
Prerequisite: course 1; Chemistry 5.  
Methods of chemical analysis of soils, fertilizers, and plant material, including those useful in evaluating fertility and alkali problems.
- 124. Recent Advances in Soil Science.** (1) II. Mr. Jurinak  
Prerequisite: senior standing.
- 135. Soil Management and Conservation.** (2) II. Mr. Aldrich  
Prerequisite: senior standing in soil science or irrigation science and concurrent enrollment in Irrigation 135.  
Effect of various soil management and conservation practices including irrigation, reclamation, fertilization, tillage, and cropping on the physical, chemical and microbiological properties of soils and their relationship to crop production.
- 198. Directed Group Study.** (1-5) I and II. The Staff  
Directed group study in soil science for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

## RELATED COURSE

**Water-Soil-Plant Relationships (Irrigation 100)**

## GRADUATE COURSES

- 207. Advanced Soil Physics.** (3) II. Mr. McMurdie  
Prerequisite: course 107; Chemistry 109; Mathematics 16A-16B.  
An advanced course emphasizing soil moisture statics and the strength properties of soils. Includes discussions of the application of thermodynamics to the soil-water system, double layer theory, and the basic concepts of soil strength.
- 214. Soil Mineralogy.** (3) II. Mr. Whittig  
Lectures and laboratory.  
Prerequisite: graduate standing in soil science or consent of instructor.  
Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of methods of mineral analysis in study of formation and properties of soils. X-ray, thermal, surface area, petrographic, and elemental analyses of mineral fractions.
- 215. Physical Chemistry of Soils.** (2) I. The Staff  
Prerequisite: course 104; Chemistry 109; and consent of instructor. Open to qualified seniors.  
Physicochemical, colloidal, and surface aspects of the soil system.  
Offered in alternate years.
- \*216. Advanced Soil Biology.** (2) I. The Staff  
Prerequisite: course 108, 111; Plant Nutrition 116.  
Chemistry of plant residues and their decomposition by soil microorganisms; soil organic matter and its properties. Influence of soil conditions on plant growth and composition. The ionic environment of cells and tissues; permeability of cell membranes; ion absorption and transport.

\* Not to be given, 1960-1961.

**290. Seminar in Soil Science. (1) I.**

Mr. Jurinak

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.

**299. Research in Soil Science. (1-6) I and II.**

The Staff

**SPANISH**

For courses in Spanish see "Foreign Languages" on page 190.

**SPEECH**

For courses in speech see "English, Dramatic Art, and Speech" on page 177.

**SUBJECT A**

(Department Office, 176 Academic Office Building)

Richard A. Champlin, A.B., *Associate in Subject A*

Leonard G. Homann, A.B., *Supervisor of Instruction in Subject A.*

Joseph S. Schwartz, A.B., *Associate in Subject A.*

**Subject A. English Composition. (No credit) I and II.**

The Staff

Required of all students who do not pass the examination in Subject A. Fee, \$35. To those students who maintain an average grade of A during the first seven weeks of the semester half of the fee will be refunded; they may discontinue attending the course.

**VEGETABLE CROPS**

(Department Office, 152 Hunt Hall)

Glen N. Davis, Ph.D., *Professor of Vegetable Crops.*

James F. Harrington, Ph.D., *Professor of Vegetable Crops.*

James E. Knott, Ph.D., Sc.D., (hon.c.), *Professor of Vegetable Crops (Chairman of the Department).*

John H. MacGillivray, Ph.D., *Professor of Vegetable Crops.*

Louis K. Mann, Ph.D., *Professor of Vegetable Crops.*

Leonard L. Morris, Ph.D., *Professor of Vegetable Crops.*

Charles M. Rick, Jr., Ph.D., *Professor of Vegetable Crops.*

Paul G. Smith, Ph.D., *Professor of Vegetable Crops.*

Harlan K. Pratt, Ph.D., *Associate Professor of Vegetable Crops.*

Arthur R. Spurr, Ph.D., *Associate Professor of Vegetable Crops.*

John C. Lingle, Ph.D., *Assistant Professor of Vegetable Crops.*



William J. Flocker, Ph.D., *Lecturer in Vegetable Crops.*

Lawrence Rappaport, Ph.D., *Lecturer in Vegetable Crops.*

Masatoshi Yamaguchi, Ph.D., *Lecturer in Vegetable Crops.*

*Departmental Major Adviser.*—Mr. Davis.

*The Major.*—See pages 70-76.

**LOWER DIVISION COURSES****1. Vegetable Production. (2) II.**

Mr. MacGillivray

Principles involved in vegetable production; survey of the vegetable industry.

- 11. Laboratory in Principles of Vegetable-Crops Production** (1) II.  
 (Formerly course 2.)  
 Laboratory.  
 Prerequisite: course 1 (may be taken concurrently).  
 Application of the principles underlying vegetable-production techniques of seeding, propagation, and culture of vegetables.

Mr. MacGillivray

## UPPER DIVISION COURSES

- 101. Major California Vegetable Crops.** (3) I. Mr. Lingle  
 Prerequisite: course 1, or consent of the instructor.  
 Adaptation, distribution, growth habits, and methods of production and handling of the principal California vegetable crops. The application of pertinent experimental evidence to production problems is stressed.
- 105. Systematic Olericulture.** (3) I. Mr. Smith  
 Lectures and laboratory.  
 Prerequisite: course 1; Botany 1.  
 Origin, history, types, classification, nomenclature, adaptation, and judging of the more important American vegetable varieties. One or more field trips will be made.
- 112. Handling, Storage, and Transit of Vegetables.** (3) I. Mr. Morris  
 Lectures and laboratory.  
 Prerequisite: course 1; Botany 7; or consent of the instructor.  
 Physiological processes contributing to the postharvest deterioration of vegetables and their relation to practices involved in harvesting, packing, transit, storage, and marketing. One or more field trips will be made.
- 118. Vegetable-Seed Production.** (2) II. Mr. Harrington  
 Prerequisite: course 1; Botany 7. Recommended: course 105.  
 Principles of vegetable-seed production; physiological factors affecting induction of seeding, seed development, viability and longevity of seed. One or more field trips.
- 120. Vegetable Breeding.** (3) I. Mr. Rick  
 Lectures and laboratory.  
 Prerequisite: course 1; Genetics 100. Recommended: course 105.  
 Genetics, cytology, reproductive mechanisms, floral morphology, and field-plot techniques as related to the improvement of the vegetable crop species. One or more field trips will be made.
- 121. Vegetable Physiology.** (3) II. Mr. Mann, Mr. Pratt  
 Lectures and laboratory.  
 Prerequisite: course 1; Botany 7.  
 Physiological principles involved in the production of vegetables.
- 190. Proseminar.** (1) II. Mr. Knott  
 Prerequisite: consent of instructor.  
 Current problems and research in vegetable production.
- 198. Directed Group Study.** (1-5) I and II. The Staff (Mr. Davis in charge)  
 Prerequisite: consent of instructor.  
 Directed group study of selected topics in vegetable crops for advanced undergraduates.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

## GRADUATE COURSES

290. Seminar in Vegetable Crops. (1) I and II.  
The Staff (Mr. Rappaport in charge)
291. Seminar in Postharvest Physiology. (1) I and II.  
Prerequisite: consent of instructor. The Staff (Mr. Pratt in charge)  
An intensive study of selected topics in the field of postharvest physiology of fruits and vegetables. This seminar will be conducted jointly with Pathology 291.
299. Research in Vegetable Crops. (1-6) I and II. The Staff

## VETERINARY MEDICINE

(Department Office, 1018 Haring Hall)

- Raymond A. Bankowski, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
- Hugh S. Cameron, D.V.M., Ph.D., *Professor of Veterinary Science.*
- John F. Christensen, D.V.M., Ph.D., *Professor of Veterinary Science. Med/K 11/60*
- Donald R. Cordy, D.V.M., Ph.D., *Professor of Veterinary Science. Pathology 12/60*
- James R. Douglas, Ph.D., *Professor of Parasitology.*
- Louis W. Holm, Ph.D., *Professor of Physiology.*
- Donald E. Jasper, D.V.M., Ph.D., *Professor of Veterinary Medicine (Chairman of the Department).*
- †Delbert G. McKercher, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
- Stuart A. Peoples, M.D., *Professor of Comparative Pharmacology.*
- Oscar W. Schalm, D.V.M., Ph.D., *Professor of Veterinary Science. Clinical Pathology 12/60*
- Clyde N. Stormont, Ph.D., *Professor of Veterinary Science.*
- John D. Wheat, D.V.M., *Professor of Veterinary Medicine.*
- Jacob Traum, D.V.M., M.S., *Professor of Veterinary Medicine, Emeritus.*
- Henry E. Adler, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*
- Norman F. Baker, D.V.M., Ph.D., *Associate Professor of Parasitology.*
- Ernst L. Biberstein, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*
- Arthur L. Black, Ph.D., *Associate Professor of Biochemistry.*
- †Robert M. Cello, D.V.M., *Associate Professor of Veterinary Medicine.*
- John B. Enright, Ph.D., *Associate Professor of Veterinary Science.*
- Theodore J. Hage, D.V.M., M.S., *Associate Professor of Veterinary Medicine.*
- Jack A. Howarth, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*
- Logan M. Julian, D.V.M., Ph.D., *Associate Professor of Veterinary Science.*
- John W. Kendrick, D.V.M., M.S., *Associate Professor of Veterinary Medicine.*
- †Peter C. Kennedy, D.V.M., Ph.D., *Associate Professor of Veterinary Pathology.*
- Blaine McGowan, Jr., D.V.M., *Associate Professor of Veterinary Medicine.*
- Jack E. Moulton, D.V.M., Ph.D., *Associate Professor of Veterinary Pathology.*
- John W. Osebold, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*
- Edward A. Rhode, Jr., D.V.M., *Associate Professor of Veterinary Science. Medicine*
- Walter W. Sadler, D.V.M., M.P.H., *Associate Professor of Veterinary Public Health.*
- Peter P. T. Sah, Ph.D., *Associate Professor of Comparative Pharmacology.*
- Moses T. Clegg, Ph.D., *Assistant Professor of Veterinary Medicine.*
- Charles E. Cornelius, D.V.M., Ph.D., *Assistant Professor of Veterinary Medicine. Clinical Pathology 12/60*
- Murray E. Fowler, D.V.M., *Assistant Professor of Veterinary Medicine.*
- John P. Hughes, D.V.M., *Assistant Professor of Veterinary Science.*
- Jiro J. Kaneko, D.V.M., Ph.D., *Assistant Professor of Clinical Pathology.*

- Ghery D. Pettit, D.V.M., Assistant Professor of Veterinary Science. *Medicine*  
 Livio G. Raggi, D.V.M., Ph.D., Assistant Professor of Veterinary Medicine.  
 Gordon H. Theilen, D.V.M., Assistant Professor of Veterinary Medicine.  
 Walter S. Tyler, D.V.M., Ph.D., Assistant Professor of Veterinary Medicine.  
 Alida P. Wind, M.V.D., Assistant Professor of Veterinary Medicine.  
 Larry Z. McFarland, D.V.M., Acting Assistant Professor in Veterinary Medicine *of Anatomy 3/1/61*

- Allen C. Andersen, Ph.D., Lecturer in Radiopathology.  
 Frederick N. Cooper, B.S., Lecturer in Public Health.  
 Donald L. Dungworth, B.V.Sc., Lecturer in Veterinary Medicine.  
 Richard A. Freedland, Ph.D., Lecturer in Veterinary Medicine. *Biochemistry 12/1/60*  
 Charles E. Grayson, M.D., Lecturer in Radiology.  
 Leslie A. Page, Ph.D., Lecturer in Veterinary Medicine. *Avian Medicine 3/1/61*  
 Allan C. Pier, D.V.M., Lecturer in Veterinary Medicine.  
 Johannes Storz, D.V.M., Lecturer in Veterinary Medicine.

Letters and Science List.—Veterinary Science List.—Veterinary Science 124, 140, 140L.

Departmental Major Advisers.—Mr. Biberstein, Mr. Black, Mr. Cameron, Mr. Christensen, Mr. Cordy, Mr. Cornelius, Mr. Douglas, Mr. Hage, Mr. Holm, Mr. Julian, Mr. Kaneko, Mr. Kendrick, Mr. McGowan, Mr. Moulton, Mr. Osbold, Mr. Peoples, Mr. Raggi, Mr. Sadler, Mr. Tyler.

The Major.—See page 112.

### VETERINARY SCIENCE

#### UPPER DIVISION COURSES

100. Veterinary Medical Orientation. (No credit) I. Mr. Christensen  
 Prerequisite: first-year standing in the School of Veterinary Medicine.  
 An introduction to the literature and history, fields of specialization, and professional obligations of veterinary medicine.

101. Physiological Chemistry. (5) II. Mr. Black, Mr. Freedland  
 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.

101L. Physiological Chemistry Laboratory. (2) II.  
 Laboratory. Mr. Black, Mr. Freedland  
 Prerequisite: course 101 (should be taken concurrently).

Laboratory practice to illustrate the chemical and physical properties of important constituents of animal cells including enzymes; blood and urine analysis; animal experiments on intermediary metabolism using isotopes.

\*105. Intermediary Metabolism of Animals. (3) II. Mr. Black  
 Prerequisite: biochemistry and physiology or consent of the instructor.  
 A survey of chemical pathways of metabolism with emphasis on studies in intact animals. Biosynthesis of major tissue constituents such as carbohydrates, amino acids and proteins, lipids, nucleic acids, and porphyrins. Hormonal control of metabolic reactions.

Offered in alternate years.

\* Not to be given, 1960–1961.



**110. Medical Terminology. (1) I.**

Mr. Christensen

Prerequisite: first-year standing in the School of Veterinary Medicine.  
An introduction to medical terminology, with special reference to the meaning of roots, prefixes, and suffixes used in the formation of medical terms.

**111. Principles of Pathology and Control of Diseases of Domestic Animals.**

(3) II.

Mr. Cameron

Prerequisite: Bacteriology 1 or 2.

The causes, pathology, prevention, and control of animal diseases in relation to economic production and public health.

This course meets the requirement of 3 units of parasitology in the animal science curriculum.

**112. Poultry Pathology Laboratory. (1) II.**

Mr. Adler

Laboratory.

Prerequisite: Zoology 1A; Bacteriology 1 or 2; course 111 (may be taken concurrently); junior standing in poultry husbandry; or consent of the instructor.

Designed to acquaint students majoring in poultry husbandry with the procedures required for identification, prevention, and control of the more prevalent parasites and diseases of poultry in California.



**Veterinary Science 120, 121, 122A-122B, 123A-123B, and 124** are designed for students who have been accepted by the School of Veterinary Medicine; they are open to other students only with the consent of the instructor.

**120. Anatomy of Domestic Animals. (10) I.**

Lectures and laboratory.

Mr. Julian, Mr. Tyler, Mr. McFarland

Prerequisite: first-year standing in the School of Veterinary Medicine or consent of the instructor.

Lectures, demonstrations and student dissection of domestic animals.

**121. Microbiology. (10) I.**

Mr. Biberstein, Mr. Osebold

Lectures and laboratory.

Prerequisite: second-year standing in the School of Veterinary Medicine or permission of instructor.

The principles of immunity, and a study of the bacterial, mycotic, and viral disease-producing agents of importance in veterinary medicine.

**122A-122B. Veterinary Pathology. (5-5) Yr.**

Lectures and laboratory.

Mr. Cordy, Mr. Moulton, Mr. Dungworth

Prerequisite: second-year standing in the School of Veterinary Medicine. Qualified graduate students admitted with consent of instructor.

**123A-123B. Comparative Pharmacology. (4-4) Yr.**

Mr. Peoples, Mr. Sah

Lectures and laboratory.

Prerequisite: second-year standing in School of Veterinary Medicine or permission of instructor.

The action of drugs on the physiological mechanism of domestic animals. Laboratory exercises and demonstrations to illustrate the principles of pharmacology, chemotherapy, and toxicology.

**124. Veterinary Parasitology. (6) II.**

Mr. Douglas, Mr. Baker

Lectures and laboratory.

Prerequisite: second-year standing in the School of Veterinary Medicine or permission of instructor.

The protozoan, helminth, and arthropod parasites of domesticated animals with emphasis on biology, life history, identification and control.

125. **Veterinary Genetics.** (2) II. Mr. Stormont  
 Lectures and laboratory.  
 Prerequisite: Genetics 100. Recommended: general bacteriology course.  
 Special veterinary aspects of genetics to supplement general genetics.
126. **Immunology.** (3) II. Mr. Osebold  
 Lectures and laboratory.  
 Prerequisite: course 121 or Bacteriology 100 with consent of the instructor. Also one of the following courses: Zoology 107, Animal Husbandry 110, Physiology 1 and 1L, Veterinary Science 140.  
 Dynamics of infection and resistance: host responses to invasion of foreign substances, factors in microbial invasiveness and virulence, antibody production and manifestations of antigen-antibody reactions, immunochemistry. Immunological considerations of the groups of disease agents.  
 Offered in spring semester of even-numbered years.
127. **Medical Microbiology.** (5) II. Mr. Biberstein, Mr. Page  
 Lectures and laboratory.  
 Prerequisite: Bacteriology 1; Zoology 1A (1B recommended); Chemistry 8.  
 The pathogenic microorganisms (exclusive of protozoa) affecting man; immunological phenomena especially as related to human disease.  
 Offered in spring semester of odd-numbered years.
140. **Mammalian Physiology.** (6) II. Mr. Holm, Mr. Kronfeld, Mr. Peoples  
 Prerequisite: Physiology 1 and 1L or Zoology 1A-1B; Physics 2A-2B; Chemistry 1A-1B, 8.  
 A comprehensive survey of mammalian physiology.
- 140L. **Laboratory in Mammalian Physiology.** (3) II.  
 Laboratory. Mr. Holm, Mr. Kronfeld, Mr. Peoples  
 Prerequisite: course 140 or equivalent (may be taken concurrently).
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.  
The Staff (Mr. Jasper in charge)

GRADUATE COURSES

265. **Experimental Physiology.** (3) I. Mr. Holm  
 Lectures and laboratory.  
 Prerequisite: course 140-140L or Animal Husbandry 110; Animal Husbandry 101; Animal Husbandry 102; and consent of instructor.  
 Selected lectures and experiments on the physiology of the nervous system, neutrality regulation, cardiac function and rumen function. Preparation and study of certain endocrine deficiencies and excesses.
275. **Biochemistry of Metabolic Disease.** (3) I. Mr. Cornelius, Mr. Kaneko  
 Prerequisite: course 101 or Biochemistry 101 or Animal Husbandry 101; course 140 or Animal Husbandry 110 or Physiology 1 and 1L; or consent of the instructor.  
 The biochemistry of inborn and acquired errors of metabolism in animals and man.  
 Offered in even-numbered years.
- \*282. **Tumors of Domestic Animals.** (2) I. Mr. Moulton  
 Lectures and laboratory.  
 Prerequisite: course 122A.  
 The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals.  
 Offered in odd-numbered years.

\* Not to be given, 1960-1961.

290. **Seminar in Comparative Pathology.** (1) I and II. Mr. Cornelius

299. **Research in Comparative Pathology.** (1-6) I and II. The Staff

### VETERINARY MEDICINE

#### GRADUATE COURSES

201. **Clinical Pathology.** (3) I. Mr. Schalm, Mr. Kaneko, Mr. Pier Laboratory.

Prerequisite: third-year standing in the School of Veterinary Medicine. Other qualified students admitted with consent of the instructor.

Bacteriologic and hematologic techniques in the diagnosis of diseases. Special emphasis on mastitis.

202. **Clinical Pathology.** (3) II. Mr. Cornelius, Mr. Kaneko Lectures and laboratory.

Prerequisite: third-year standing in the School of Veterinary Medicine. Other qualified students admitted with consent of the 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.

203. **Introductory Medicine.** (4) I. Mr. Rhode, Mr. Hughes Lectures and laboratory.

Prerequisite: Veterinary Science 122A-122B, 123A-123B, 140-140L.

Lectures on the principles of clinical diagnosis of animal diseases, with special emphasis on history taking and identification and interpretation of symptoms. The laboratory will provide practice in physical examination of normal and abnormal animals.

204. **Infectious Diseases.** (5) II. Mr. Howarth

Prerequisite: course 203.

Epidemiology, pathology, and control methods on diseases of livestock, including those diseases important in public health in which domestic livestock are the reservoirs of infection.

205. **Small-Animal Medicine.** (5) II. Mr. Pettit

Prerequisite: course 203.

Diagnosis, treatment, and prevention of infectious and noninfectious diseases of the dog, cat, and other small animals.

206. **Large-Animal Medicine.** (3) II. Mr. Hughes

Prerequisite: courses 203, 210.

The diagnosis and control of internal parasitism, diseases of the respiratory, cardiovascular, and urinary systems, and diseases of the blood-forming organs of horses, cattle, swine, sheep, and goats.

207. **Large-Animal Medicine.** (4) I. Mr. Theilen

Prerequisite: course 203, 206.

The diagnosis and control of diseases of the skin, internal parasitism, mastitis, diseases of the nervous and locomotor systems, diseases of the eye, metabolic and nutritional diseases, and poisonings of horses, cattle, swine, sheep, and goats.

208. **Poultry Diseases.** (3) I. Mr. Raggi, Mr. Bankowski, Mr. Adler.

The etiology, diagnosis, and control of the diseases of poultry.

210. **Large-Animal Medicine.** (2) I. Mr. McGowan  
 Prerequisite: course 203.  
 The diagnosis and control of diseases of the gastrointestinal system, liver and peritoneum, and diseases of the newborn of horses, cattle, swine, sheep, and goats.
220. **Introductory Surgery.** (4) II. Miss Wind  
 Lectures and laboratory.  
 Prerequisite: Veterinary Science 122A-122B, 123A-123B.  
 Principles and methods of surgical technique.
221. **Surgical Anatomy.** (4) II. Mr. McFarland, Mr. Julian  
 Lectures and laboratory.  
 Prerequisite: Veterinary Science 120.  
 Regional anatomy with reference to its application in surgery.
223. **Large-Animal Surgery.** (4) I. Mr. Wheat  
 Prerequisite: courses 220, 221.  
 Diseases of domestic animals that require surgical treatment.
224. **Small-Animal Surgery.** (2) I. Mr. Pettit  
 Prerequisite: course 220.  
 Surgical diseases of small animals.
225. **Operative Surgery.** (1) I. Mr. Pettit, Mr. Fowler  
 Laboratory.  
 Prerequisite: courses 223 and 224 (may be taken concurrently).  
 A laboratory course in specific surgical procedures in large and small animals.
230. **Diseases of the Genital Organs, and Obstetrics.** (4) I. Mr. Kendrick  
 Lectures and laboratory.  
 Prerequisite: Veterinary Science 122A-122B, 123A-123B.  
 A course in the diagnosis, treatment, and control of diseases affecting the reproductive organs; the normal and disturbed physiology of reproduction; and obstetrics.
235. **Therapeutics.** (2) II. Mr. Christensen  
 Prerequisite: Veterinary Science 123A-123B, 140, 140L; course 203.  
 Lectures and discussions of newer developments in the therapy of animal diseases.
240. **Veterinary Public Health.** (5) II. Mr. Sadler, Mr. Enright, Mr. Cooper  
 Lectures and laboratory.  
 Prerequisite: course 206, or permission of the instructor.  
 Meat, milk, and food hygiene. Epidemiologic and public health aspects of diseases of animals transmissible to man.
245. **Ecological Factors of Animal Disease.** (2) I. Mr. McGowan  
 Prerequisite: senior standing in the School of Veterinary Medicine or permission of the instructor.  
 Relationship of animal environment to control and prevention of disease. Application of nutrition, genetics, husbandry, and management to disease control.
249. **Extra-Session Clinic.** (2-4) The Staff (Mr. Christensen in charge)  
 Laboratory.  
 Prerequisite: completion of the first three years of the professional course in veterinary medicine.

Diagnosis and treatment of diseases and disorders of domestic animals. Work will be done in the clinic during the summer for any continuous period of six weeks.

May be repeated for credit.

**250. Clinic Orientation.** (1) II.

Mr. Theilen, Mr. Fowler

Laboratory.

Prerequisite: course 203.

Laboratory exercises in the practice of clinical procedures and methods of restraint used in the handling and treatment of horses, cattle, swine, sheep, dogs, cats, and other species.

**251A-251B. Clinics.** (5-5) Yr.

The Staff (Mr. Christensen in charge)

Laboratory.

Prerequisite: courses 203, 220. Course 251A is prerequisite to 251B.

Interdepartmental course, offering training in ambulatory clinic, autopsy, clinical pathology, large-animal clinic, pharmacy, poultry pathology, radiology, and small-animal clinic. The student must make a passing grade in all sections to pass the course.

**254. Clinic Conference.** (No credit) II. The Staff (Mr. Kendrick in charge)

Prerequisite: course 203.

Discussion of selected cases from the clinic.

**256A-256B. Clinic Conference.** (1-1) Yr.

Prerequisite: fourth-year standing. The Staff (Mr. Kendrick in charge)

Discussion of selected cases from the clinic.

**260. Radiology.** (2) I.

Mr. Hage, Mr. Grayson

Lectures and laboratory.

Prerequisite: Veterinary Science 120.

Production of X rays, roentgenographic technique, roentgenographic interpretation, biological effect of, protection from, and the therapeutic use of ionizing irradiation as applied to veterinary medicine.

**270A-270B. Jurisprudence.** (No credit) Yr.

Mr. Jasper

Professional ethics and business law.

**280. Advanced Special Pathology.** (3) II.

Mr. Cordy, Mr. Moulton

Lectures and laboratory.

Prerequisite: Veterinary Science 122A-122B; course 251A-251B.

Selected topics in the pathology of communicable, systemic, neoplastic, nutritional and metabolic diseases and the toxicoses.

Offered in the spring semester of even numbered years.

**281. Necropsy and Surgical Pathology.** (1-4) I and II.

Laboratory.

Mr. Cordy, Mr. Moulton

Prerequisite: Veterinary Science 122A-122B; courses 204, 207.

Responsible pathologic diagnosis of necropsy, performance of necropsies, slide reading, and case reporting. Attendance at histopathology slide conferences required. May be repeated for credit.

## VITICULTURE AND ENOLOGY

(Department Office, 1027 Horticultural Sciences Building)

Maynard A. Amerine, Ph.D., *Professor of Enology (Chairman of the Department)*.

Harold W. Berg, M.S., *Professor of Enology*.

James F. Guymon, Ph.D., *Professor of Enology*.

Harold P. Olmo, Ph.D., *Professor of Viticulture.*  
 A. Dinsmoor Webb, Ph.D., *Professor of Enology.*  
 Albert J. Winkler, Ph.D., *Professor of Viticulture.*  
 James A. Cook, Ph.D., *Associate Professor of Viticulture.*  
 Klayton E. Nelson, Ph.D., *Associate Professor of Viticulture.*  
 John L. Ingraham, Ph.D., *Assistant Professor of Enology.*  
 Lloyd A. Lider, Ph.D., *Assistant Professor of Viticulture.*

*Enzyme Chemistry*



Julian C. Crane, Ph.D., *Professor of Pomology.*  
 George L. Marsh, M.S., *Professor of Food Science and Technology.*  
 Vernon L. Singleton, Ph.D., *Lecturer in Enology.*  
 Robert J. Weaver, Ph.D., *Lecturer in Viticulture.*

*Departmental Major Advisers.*—Viticulture, Mr. Olmo; Enology, Mr. Ingraham.

*The Majors.*—See pages 70–76 for Viticulture and pages 64–66 for Enology.

## VITICULTURE

### LOWER DIVISION COURSES

1. **Introduction to Grape Growing.** (2) I. Mr. Olmo  
 An elementary survey of the grape industry. Botany and distribution of the vine, climatic requirements, cultural practices, utilization of crop, and the principal diseases and insects.
2. **Grape Production.** (2) I. Mr. Lider  
 Lectures and laboratory.  
 Prerequisite: course 1 (may be taken concurrently).  
 A course covering the principal varieties and the principles and practices involved in the production of table, raisin, and wine grapes. Not open for credit to students in the major.
3. **Introduction to Wine Making.** (2) II. Mr. Singleton  
Mr. Amerine  
 An introduction to the wine industry, including fermentation, wine types, handling and diseases, and economic problems of the industry.

### UPPER DIVISION COURSES

105. **Systematic Viticulture and Principles of Fruit Handling.** (3) I.  
 Lectures and laboratory. Mr. Nelson, Mr. Lider  
 Prerequisite: course 1 or Pomology 2.  
 Botanical classification of the grape—the principal varieties, rootstocks, and species; production factors affecting maturity and quality of the fruit for raisins, wine and table grapes; harvesting, handling, and marketing of table grapes; raisin making; costs and returns.
108. **Plant Regulators in Horticulture.** (2) I. Mr. Crane, Mr. Weaver  
 Prerequisite: course 1 or Pomology 2; Botany 7; or consent of instructor.  
 History, occurrence, extraction, and measurement, chemical nature, developmental and physiological effects, role, and theories of action of plant growth regulators; methods of application and factors altering effectiveness; horticultural applications in the control of plant and fruit responses.

- 116. General Viticulture.** (4) II. Mr. Cook, Mr. Winkler  
Lectures and laboratory.  
Prerequisite: course 1 or Pomology 2.  
Plant structure and physiology; principles underlying propagation, pruning, grafting and cultivation; and factors influencing fruit development and quality.
- 124. Enology: Wine Processing and Analyses.** (3) II. Mr. Berg, Mr. Amerine  
Lectures and laboratory.  
Prerequisite: Bacteriology 1; Chemistry 5. Recommended: courses 1 and 3 and Food Technology 124.  
Introduction to enology: wine types and analyses, nonbacterial disorders and their control, fining, filtration, and the preparation of vermouths and sparkling wines.
- 125. Enology: Wine Preparation.** (3) I. Mr. Webb  
Lectures and laboratory.  
Prerequisite: course 105; Bacteriology 1; Chemistry 5, 8.  
The principles and practices of making the various standard types of wine, with special reference to the varieties used, and the method of vinification required for each.
- 140. Principles of Distillation and Brandy Technology.** (3) II. Mr. Guymon  
Lectures and laboratory.  
Prerequisite: Chemistry 5, 8.  
The distillation process, theory, calculations and technological aspects, mass and energy transfer relationships, with emphasis upon the alcohol-water system and the distillation of wines; brandy types, analysis, production factors and legal aspects.
- 160. Proseminar.** (1) I. Mr. Olmo  
Reports and discussions concerning recent advances in viticulture.
- 199. Special Study for Advanced Undergraduates in Viticulture.** (1-5) I and II. The Staff

## RELATED COURSES

Yeasts and Related Organisms (Food Technology 116)

Analyses of Food by Sensory Tests (Food Technology 124)

Fruit Breeding (Pomology 114)

## GRADUATE COURSES

- ~~200.~~ **Seminar.** (1) II. Mr. Webb
- 217. Microbiology of Wine Production.** (2) II. Mr. Ingraham  
(Formerly course 117.)  
Lectures and laboratory.  
Prerequisite: Bacteriology 1, 105A or 105B; Chemistry 5, 8. Open to properly qualified undergraduates with the permission of the instructor.  
Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging, and spoilage of wine.
- 299. Research in Viticulture and Enology.** (1-6) I and II. The Staff

\* 290. Seminar (I) II.

Mr. Webb

Prerequisite: consent of instructor.



**ZOOLOGY**

(Department Office, 249 Animal Science Building)

Milton A. Miller, Ph.D., *Professor of Zoology (Chairman of the Department)*.Lauren E. Rosenberg, Ph.D., *Professor of Zoology*.Tracy I. Storer, Ph.D., LL.D., *Professor of Zoology, Emeritus*.Milton Hildebrand, Ph.D., *Associate Professor of Zoology*.Everett W. Jameson, Jr., Ph.D., *Associate Professor of Zoology*.George W. Salt, Ph.D., *Associate Professor of Zoology*.Charles R. Goldman, Ph.D., *Assistant Professor of Zoology*.Robert L. Rudd, Ph.D., *Assistant Professor of Zoology*.\_\_\_\_\_, *Assistant Professor of Zoology*.Norman F. Baker, D.V.M., Ph.D., *Assistant Professor of Parasitology*.Robert H. Catlett, M.A., *Associate in Zoology*.James R. Douglas, Ph.D., *Professor of Parasitology*.Howard Shellhamer, *Associate in Zoology*.**PHYSIOLOGY***Letters and Science List*.—Physiology I, 1L

## LOWER DIVISION COURSES

**1. Introductory Physiology Lecture. (3) I.** \_\_\_\_\_

Prerequisite: high school chemistry.

The physiology of muscle, nerve, central nervous system, sensation, circulation, respiration, excretion, and digestion.

**1L. Introductory Physiology Laboratory. (2) I.** \_\_\_\_\_

Laboratory.

Prerequisite: course 1 completed or in progress.

**ZOOLOGY***Letters and Science List*.—All undergraduate courses in zoology except course 104 are included in the Letters and Science List of Courses (see page 106).*Departmental Major Advisers*.—Mr. Goldman, Mr. Hildebrand, Mr. Jameson.*The Major Program*

(A) Lower Division Courses.—Zoology 1A and 1B; Chemistry 1A and 1B or 8.

(B) Upper Division Courses.—24 units of upper division courses in zoology (not more than 4 units of zoology courses in the 190 series may be counted in this requirement). With the approval of the major adviser, 6 units of the 24 may be satisfied by upper division courses in other sciences related to the student's program.

*Honors and Honors Program* (see page 107).—The honors program comprises courses 194H and 195H. These two courses will be accepted as part of the 24-unit requirement in upper division courses.

## LOWER DIVISION COURSES

**1A. General Zoology. (4) I.**

Mr. Miller

Lectures and laboratory.

Introduction to the structure, physiology, classification, and interrelations of animals, and the principles of evolution and heredity.

x Spec Leave of Absence 1960-61

- 1B. General Zoology.** (4) II. Mr. Salt  
Lectures and laboratory.  
Prerequisite: course 1A.  
Structure of the vertebrate body with special reference to the mammal and bird; gross and microscopic anatomy of organs and organ systems.
- 10. General Biology.** (3) II. Mr. Rudd  
Not open for credit to students who have had course 1A, but students who have taken course 10 may elect course 1A for credit. Open without prerequisite to all students, but designed for those not specializing in animal biology.  
Consideration of the main facts and principles of animal biology, with emphasis on animal biology and special reference to evolution, heredity, and the bearing of biology upon human life.
- 25. General Human Anatomy.** (3) II. Mr. Goldman  
Lectures and laboratory.  
Prerequisite: course 1A or 10 or Physiology 1; and sophomore standing.  
A basic study of human anatomy with demonstration and laboratory study of prepared human dissections, models, and microscopic materials.  
Not open to premedical students.

## UPPER DIVISION COURSES

- 100. Vertebrate Embryology.** (2) I. Mr. Hildebrand  
Prerequisite: course 1B.  
Embryologic development of the vertebrates, including amphibian, chick, and mammal.
- 100L. Vertebrate Embryology Laboratory.** (2) I. Mr. Hildebrand  
Laboratory.  
Prerequisite: course 100, which should be taken concurrently.
- 104. Materials and Methods of Animal Micrology.** (3) I. Mr. Rosenberg  
Lectures and laboratory.  
Prerequisite: course 1B. (Limited enrollment.)  
History, theory, and application of methods for microscopic work in the animal sciences.
- 106. Comparative Anatomy of the Vertebrates.** (4) II. Mr. Hildebrand  
Lectures and laboratory.  
Prerequisite: course 1B. Recommended: courses 100, 100L.  
Evolution and adaptations of organ systems and phylogeny of the major vertebrate groups.
- 107. Microanatomy.** (4) I. Mr. Rosenberg  
Lectures and laboratory.  
Prerequisite: course 1B.  
The finer structure and activities of organs, tissues, and cells of vertebrates, with emphasis on those of mammals.
- 110. Protozoology.** (4) II. Mr. Rosenberg  
Lectures and laboratory.  
Prerequisite: course 1A and junior standing.  
Structure, life history, and ecology of the groups of protozoa with emphasis on relationships to biological problems.  
Minimum enrollment of 5 students.

\* HAROLD R. PARKER, Ph.D, ASSISTANT  
~~Acting~~ Professor of Physiology

- x John C. Bartley, DVM, Lecturer in Biochemistry 3/1/61. ~~9/4/60~~ 1/61
- x Joseph D. Bergevin, DVM, lecturer in Veterinary Medicine 3/1/61.
- x David E. Brown, - , lecturer in Surgery 2/1/61.
- x Herman Bonasch, DVM, lecturer in Veterinary Medicine 3/1/61.
- x John H. REED, D.V.M., Lecturer in Veterinary Medicine,  
10/10/60

- 112. Invertebrate Zoology.** (4) II. Mr. Miller  
Lectures and laboratory.  
Prerequisite: course 1A and junior standing.  
Anatomy, classification and natural history of representative invertebrate animals, excluding protozoans and insects.
- 116. Economic Vertebrate Zoology.** (3) I. Mr. Rudd  
Lectures and laboratory.  
Prerequisite: course 1A and junior standing.  
Relation of vertebrate animals to human affairs; effect of settlement, forestry, agriculture, and hunting on wild populations; attention to rodents, deer, carnivorous mammals and birds, fur production, game birds, food and game fisheries; principles and agencies of management and conservation.  
Minimum enrollment of 5 students.
- 125. Animal Ecology.** (3) II. Mr. Salt  
Prerequisite: junior standing in one of the biological sciences.  
Study of animal communities; with emphasis on vertebrates and their environment.
- 133. Biology of the Cold-Blooded Vertebrates.** (4) I. Mr. Jameson  
Lectures and laboratory.  
Prerequisite: course 1B.  
Fishes, amphibians and reptiles; identification and classification; ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and western North America.
- 134. Biology of Birds and Mammals.** (4) II. Mr. Jameson  
Lectures and laboratory.  
Prerequisite: course 1B.  
Identification, ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and Western North America.  
Field trips included.
- 140. Limnology.** (2) I. Mr. Goldman  
Prerequisite: junior standing in one of the biological sciences. (Laboratory strongly recommended in conjunction with lecture course.)  
The biology and productivity of inland waters with emphasis on the physical and chemical environment.
- 140L. Limnology Laboratory.** (2) I. Mr. Goldman  
Laboratory.  
Prerequisite: course 140 (may be taken concurrently).  
Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.
- 194H. Special Study for Honors Students.** (2-3) I and II. The Staff
- 195H. Honors Thesis in Zoology.** (1) I and II. The Staff  
Prerequisite: course 194H and second-semester senior standing.  
A comprehensive paper incorporating the studies undertaken in Zoology 194H.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. The Staff

## GRADUATE COURSES

201. **Zoology Seminar.** (1) I and II. Mr. Jameson
290. **Seminar on Systematic Zoology and Evolution.** (1) II. Mr. Hildebrand  
Prerequisite: consent of the instructor.  
Reports and discussion on principles of animal classification, speciation, and the evolution of higher categories, with emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.
- \*291. **Seminar in Protozoology.** (1) II. Mr. Rosenberg  
Prerequisite: course 110 or consent of the instructor.  
Reports and discussion on selected topics in the field of protozoology.
- \*292. **Seminar on Development.** (1) I. Mr. Hildebrand  
Prerequisite: consent of the instructor.  
Reports and discussion on embryology, morphogenesis, and developmental mechanisms.
293. **Seminar in Invertebrate Zoology.** (1) I. Mr. Miller  
Prerequisite: course 112 or consent of the instructor.  
Reports and discussion on selected topics in invertebrate zoology with emphasis on recent advances.
294. **Seminar in Animal Ecology.** (1) I. Mr. Salt  
Prerequisite: course 125 or consent of the instructor.  
Discussion of advanced topics in the field of animal ecology.
295. **Seminar in Limnology.** (1) II. Mr. Goldman  
Prerequisite: course 140 or consent of the instructor.  
Reports and discussion on recent developments in limnology and related advances in oceanography.
299. **Research in Zoology.** (1-6) I and II. The Staff

\* Not to be given, 1960-1961.

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**Administrative Bulletins of the University of California  
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The administrative bulletins of the University of California present information concerning the colleges, schools, and departments of the University. Copies of general bulletins and other information concerning instruction may be obtained from the following: at Berkeley, the Registrar of the University of California, Berkeley 4; at Davis, the Registrar of the University of California, Davis; at Los Angeles, the Registrar of the University of California, Los Angeles 24; at Goleta, the Registrar of the University of California, Santa Barbara; at Riverside, the Registrar of the University of California, Riverside. The bulletins of the schools and colleges at the University of California, San Francisco Medical Center, San Francisco 22, may be obtained by contacting the deans in charge.



## PURPOSES OF A UNIVERSITY...

... to explore the world  
of men and things  
and ideas

\*The ability and the willingness to take responsibility, to go to the lonely outposts of thought and action, and to persuade others to follow you there—truly, this ability is the rarest of commodities in the world . . . We live in a world of tremendous numbers, of mass pressures, of enormous forces working for the leveling out of talent and conformity of opinion. The only way to keep this world a good world, and to make it better, is to assert creative and constructive individualism, which is to me another way of saying “leadership.”

EMIL M. MRAK  
Chancellor at Davis

\*From his address at Commencement, Davis, June 10, 1960

