

UNIVERSITY

OF

CALIFORNIA

—

GENERAL

CATALOGUE

1961 - 62

DAVIS

R. Baier

**Office of the Registrar
University of California
Davis, California**



U.C./DAVIS

GENERAL CATALOGUE

Fall and Spring Semesters 1961-1962

AUGUST 20, 1961

UNIVERSITY OF CALIFORNIA, DAVIS

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General Catalogue

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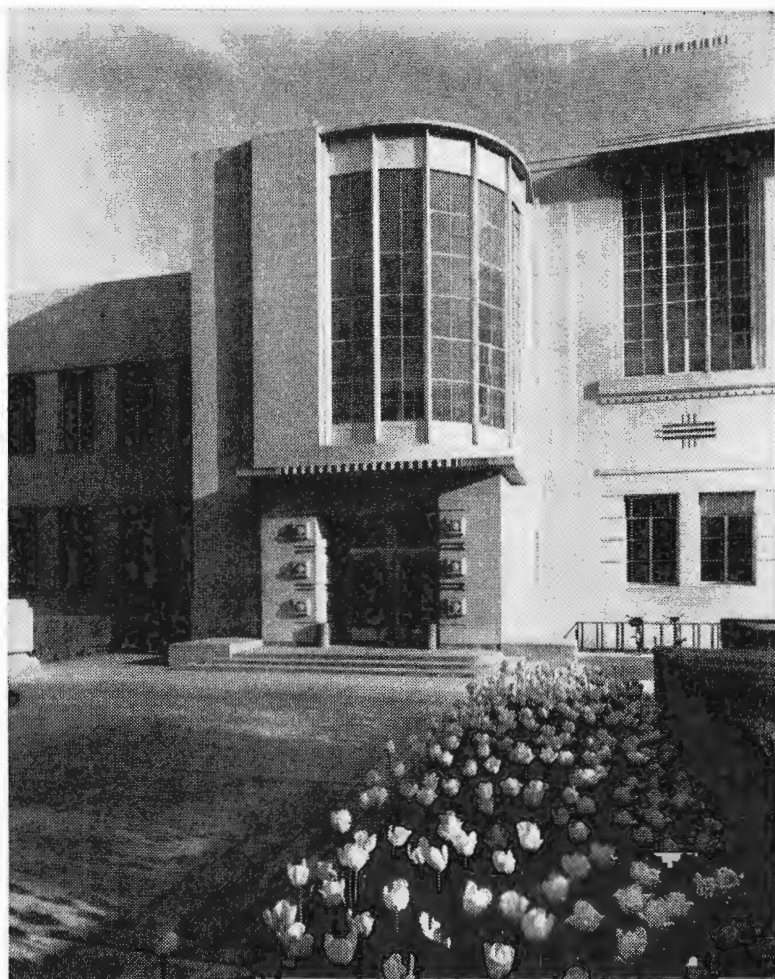
DAVIS

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UNIVERSITY OF CALIFORNIA, DAVIS



**Entrance to administrative section of
Library-Administration Building**

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University Calendar

1961-1962

Davis Campus

Fall Semester 1961-1962

July 14, 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, Tuesday	Applications for admission to undergraduate standing, including applications for intercampus transfer and for graduate change of station, 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. 25, Friday	Last day for filing applications for readmission to undergraduate and graduate status with the Registrar.
Sept. 4, Monday	Labor Day—academic and administrative holiday.
Sept. 11, Monday	Fall semester begins.
Sept. 11, Monday	} Orientation and testing.
Sept. 15, Friday	
Sept. 14, Thursday	} Registration.
Sept. 15, Friday	
Sept. 18, Monday	Instruction begins.
Sept. 29, Friday	Last day for filing applications in candidacy for master's degrees to be conferred in January 1962.
	Last day for filing applications and programs in candidacy for the certificates of completion of teacher training curricula to be received in January 1962.
Oct. 2, Monday	Last day for all candidates who expect to complete the work for A.B. and B.S. degrees in January 1962, to file, without fee, announcement of candidacy with the Registrar before 5 p.m.
Oct. 6, Friday	Last day for filing applications in candidacy for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1962.
	Last day to enroll or petition to add courses to study lists.
Oct. 13, Friday	Last day to drop courses without scholarship penalty.
Oct. 26, Thursday	Last day to file applications to take engineering examinations required for admission in the spring semester 1962.
Nov. 3, 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 1962.
Nov. 4, Saturday	Engineering examinations, lower division and upper division.
Nov. 23, Thursday	} Thanksgiving holiday—academic and administrative holiday.
Nov. 24, Friday	
Nov. 23, Thursday	} Fall recess—an academic holiday.
Nov. 25, Saturday	
Dec. 15, Friday	Last day for filing credentials and applications for admission to graduate standing in the spring semester with the Dean of the Graduate Division.
	Last day for filing in final form with the committees in charge theses for the master's degrees to be conferred in January 1962.
Dec. 18, Monday	} Christmas recess—an academic holiday.
Jan. 1, Monday	
Dec. 22, Friday	} Christmas holiday—academic and administrative holiday.
Dec. 25, Monday	
Dec. 29, Friday	} New Year's holiday—academic and administrative holiday.
Jan. 1, Monday	

1962

- Jan. 2, Tuesday Instruction resumes.
- Jan. 3, Wednesday Last day for filing theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1962.
- Jan. 12, Friday Last day for filing applications for readmission to undergraduate and graduate status with the Registrar.
- Jan. 13, Saturday Instruction ends.
- Jan. 15, Monday Applications for admission to undergraduate standing, including applications for intercampus transfer and for graduate change of station, in the spring semester must be filed, with complete credentials, with the Registrar on or before this date.
- Last day for filing applications for fellowships and graduate scholarships for 1962-1963.
- Jan. 15, Monday } Final examinations.
- Jan. 24, Wednesday } Fall semester ends.
- Jan. 24, Wednesday Last day for filing theses for master's degrees to be conferred in January 1962.

Spring Semester 1962

- Jan. 29, Monday Spring semester begins.
- Jan. 29, Monday } Orientation and testing.
- Feb. 2, Friday } Last day for students enrolled in the current session to file applications for undergraduate scholarships for 1962-1963.
- Feb. 1, Thursday } Registration.
- Feb. 1, Thursday } Instruction begins.
- Feb. 2, Friday } Lincoln's Birthday—academic and administrative holiday.
- Feb. 5, Monday Last day for filing applications in candidacy for all master's degrees to be conferred in June 1962.
- Feb. 12, Monday Last day for filing applications and programs in candidacy for the certificates of completion of teacher training curricula to be received in June 1962.
- Feb. 16, Friday Last day for all candidates who expect to complete the work for A.B. and B.S. degrees in June 1962, to file, without fee, announcement of candidacy with the Registrar before 5 p.m.
- Feb. 19, Monday Last day for filing applications in candidacy for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in January 1963.
- Feb. 23, Friday Last day to enroll or add courses to study lists.
- Feb. 28, Wednesday Applications for admission to the School of Veterinary Medicine must be filed with the Registrar on or before this date.
- Mar. 1, Thursday Last day for entering students to file applications for undergraduate scholarships for 1962-1963.
- Mar. 2, Friday Last day to drop courses without scholarship penalty.
- Mar. 16, Friday 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 1962.
- Mar. 27, Tuesday Last day to file applications to take engineering examinations required for admission in the fall semester, 1962.
- April 7, Saturday Engineering examinations, lower division and upper division.
- April 16, Monday } Spring recess—an academic holiday.
- April 21, Saturday } Last day for filing in final form with the committees in charge theses for master's degrees to be conferred in June 1962.
- May 8, Tuesday Last day for filing theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1962.
- May 17, Thursday Instruction ends.
- May 26, Saturday } Final examinations.
- May 28, Monday } Memorial Day—academic and administrative holiday.
- June 7, Thursday Spring semester ends.
- May 30, Wednesday Commencement.
- June 7, Thursday Last day for filing theses for master's degrees to be conferred in June 1962.

First Summer Session 1962

June 18, Monday Registration and first day of instruction.
July 4, Wednesday Independence Day—academic and administrative holiday.
July 27, Friday First Summer Session instruction ends.

Special Summer Session 1962

July 2, Monday Registration and first day of instruction.
July 4, Wednesday Independence Day—academic and administrative holiday.
Aug. 10, Friday Special Summer Session instruction ends.

Second Summer Session 1962

July 30, Monday Registration and first day of instruction.
Sept. 3, Monday Labor Day—academic and administrative holiday.
Sept. 7, Friday Second Summer Session instruction ends.

The Regents of the University

REGENTS EX OFFICIO

His Excellency, EDMUND G. BROWN, LL.B.
Governor of California and President of
the Regents
State Capitol, Sacramento 14

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

RALPH M. BROWN, A.B., LL.B.
Speaker of the Assembly
State Capitol, Sacramento 14

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President of the University
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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.

EDWIN W. PAULEY, B.S., LL.D. (1970)
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Los Angeles 5

WILLIAM M. ROTH, A.B. (1968)
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OFFICERS OF THE REGENTS

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President
State Capitol, Sacramento 14

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Ten Thousand Santa Monica Blvd,
Los Angeles 25

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Stanley J. Thomson, A.B.
Assistant Treasurer
615 University Hall, Berkeley 4

Miss Marjorie J. Woolman, Secretary
689 University Hall, Berkeley 4

Mrs. Elizabeth O. Hansen, A.B.
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689 University Hall, Berkeley 4

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LL.D.
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590 University Hall, Berkeley 4

John E. Landon, A.B., LL.B.
Associate Counsel
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John P. Sparrow, A.B., LL.B.
Associate Counsel
590 University Hall, Berkeley 4

Robert C. Field, A.B., LL.B.
Assistant Counsel
590 University Hall, Berkeley 4

Milton H. Gordon, A.B., LL.B.
Assistant Counsel and
Assistant Secretary of the Regents
590 University Hall, Berkeley 4

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

University of California

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Robert Gordon Sproul, B.S., LL.D., Litt.D., *President of the University, Emeritus.*

Harry R. Wellman, Ph.D., *Vice-President of the University.*

Claude B. Hutchison, M.S., LL.D., D.Agr. (hon.c.), *Vice-President of the University and Dean of the College of Agriculture, Emeritus.*

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Thomas J. Cunningham, A.B., LL.B., LL.D., *Vice-President and General Counsel.*

Raymond W. Kettler, M.A., *Vice-President—Finance.*

Elmo R. Morgan, B.S., *Vice-President—Business.*

John W. Oswald, Ph.D., *Vice-President—Executive Assistant.*

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General Administrative Officers—Davis Campus

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†Everett Carter, Ph.D., *Vice-Chancellor.*

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William C. Weir, Ph.D., *Dean of Students.*

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James D. Andrews, M.S., *Dean of Men and Associate Dean of Students.*

J. Price Gittinger, Ed.M., *Associate Director of Relations with Schools.*

Glen Burch, Ed.D., *Head, University Extension.*

Alyce W. Lowrie, Ph.D., *Public Affairs Officer.*

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

J. Richard Blanchard, M.S., *University Librarian.*

Cecil C. Norris, *Business Manager.*

Fred S. Wyatt, B.S., *Gifts and Endowments Officer.*

Thomas Y. Cooper, M.D., *Director, Student Health Service.*

Edmund T. Price, B.S., *Residence Halls Administrator.*

Administrative Officers of the Colleges and Schools

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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., *Acting Dean of the Graduate Division.*

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.*

† Absent on leave, 1961–1962.

The University of California

Founded 1868

HISTORY

The Beginning

In 1868 the University of California was established, with the governor's signing of the Organic Act passed by the State Legislature. The following year the University opened its doors on the Oakland campus of the College of California. Five years later the University moved to Berkeley, when the first buildings were completed.

Today

The University, currently serving the State of California with seven campuses—Berkeley, Davis, Los Angeles, Riverside, San Diego, San Francisco, and Santa Barbara—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. The University's steady increase in quality as well as in size has won it general recognition 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, The Regents of the University of California, consisting of twenty-four members. Sixteen 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, a general campus of the University, continues to offer more courses each year in the letters and sciences and engineering. Davis remains the University's principal campus for teaching and research in the agricultural sciences and veterinary medicine.

The College of Agriculture and the College of Letters and Science account for over 75 per cent of the undergraduate enrollment, while the College of Engineering and the School of Veterinary Medicine make up the remainder. 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 3,000-acre Davis campus is essentially a residential campus with 1,400 students living in new University halls. Flat terrain makes bicycles a favorite mode of travel, both on campus and in town.

The city of Davis, a college town of 10,000, lies on main rail and highway junctions 13 miles west of the State capital, Sacramento. Davis is also about 90 minutes away from metropolitan San Francisco and surrounding cities.

SURVEY OF CURRICULA

Instruction is offered in the College of Agriculture; the College of Letters and Science; the College of Engineering; the School of Veterinary Medicine; and 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	Animal Science
Agricultural Economics	Animal Husbandry
Agricultural Education	Animal Physiology
Agricultural Production	Genetics
Agricultural Economics	Poultry Husbandry
Agronomy	Entomology and Parasitology
Animal Husbandry	Food Science
Dairy Industry	Home Economics
Enology	Design
Food Technology	Dietetics
General Agriculture	Foods
Irrigation	General Home Economics
Landscape Horticulture	Nutrition
Pest Control	Textile Science
Pomology	Irrigation Science
Range Management	Plant Science
Soils and Plant Nutrition	Agronomy
Vegetable Crops	Genetics
Viticulture	Landscape Horticulture

Park Administration	Range Management
Plant Pathology	Soil Science
Pomology	General Soil Science
Vegetable Crops	Pedology and Soil Survey
Viticulture	Plant Nutrition and Soil Fertility
Preforestry	Soil Management and
Preveterinary Science	Conservation

Preprofessional training in forestry and veterinary medicine is offered.

The College of Engineering, Berkeley-Davis, in cooperation with the College of Agriculture, offers a curriculum in engineering which permits specialization in agricultural power and machinery, processing, and structure; food processing; and irrigation, drainage, and water resources.

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	Philosophy
Anthropology	Physical Education
Art	Physical Sciences
Biological Sciences	Physics
Botany	Political Science
Chemistry	Preprofessional Training
Dramatic Art and Speech	Pre dental
Economics	Pre legal
English	Pre medical
French	Pre medical Technology
Geography	Pre nursing
Geological Sciences	Pre optometry
German	Pre pharmacy
History	Pre physical Therapy
International Relations	Pre social Welfare
Mathematics	Psychology
Medical Sciences	Sociology
Microbiology	Spanish
Music	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.

* No new students registering during the academic year 1961-1962 may declare American Civilization as a major.

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 Catalogue 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 offered are Master of Education (M.Ed.), Master of Engineering (M.Eng.), Doctor of Engineering (D.Eng.), and Doctor of Veterinary Medicine (D.V.M.).

More detailed information may be found in the specialized bulletins and publications and in the graduate announcements of the individual schools and departments, obtainable on request from the Office of the Registrar, University of California, Davis.

SUMMER SESSIONS

In 1962 there will be two regular six-week Summer Sessions beginning on June 18 and on July 30. The first regular Summer Session will offer a number of lower division courses, upper division and graduate courses, many of which will be of interest to 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 2 to August 11 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 on the respective campuses.

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.

* For information concerning admission to the University through University Extension, see page 23.

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

Admission to the University

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

All communications concerning admission should be addressed to the Office of Admissions.

Application for Admission

Formal application must be filed with the Admissions Officer, University of California, Davis, California. Application blanks will be supplied by the Office of Admissions 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 23. Admission requirements are uniform on all campuses of the University. Admission to the University entitles the student to attend the campus of his choice if the facilities to meet his needs are available there. Since applications will be processed and acted upon in only one Office of Admissions, *applications for admission to more than one campus serve no purpose and should not be filed.*

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 Admissions, 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 Admissions 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 completion of the 11th grade, 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 1961-1962

<i>Test Dates</i>	<i>Application Deadlines</i>
Saturday, December 2, 1961	November 4, 1961
Saturday, January 13, 1962	December 16, 1961
Saturday, March 3, 1962	February 3, 1962
Saturday, May 19, 1962	April 21, 1962
Wednesday, August 8, 1962	July 11, 1962

Vaccination Certificate

Every new student (and every student returning to the University after an absence), must present a certificate establishing the fact that he has been successfully vaccinated against smallpox within the last three years; this certificate must be presented at the time a request is made for an examination by the University medical examiner. A form for this purpose will be furnished by the Admissions Officer. 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 Offices of Admissions.

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

These requirements also apply to applicants from out-of-state high schools who are bona fide residents of California.

College Entrance Examination Board Scholastic Aptitude Test

See above.

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 University Dean of Educational Relations, University Hall, University of California, Berkeley. If the high school from which the applicant graduated is not accredited, the Office of Admissions will, upon request, instruct the student regarding the procedure he should follow.

Admission

METHOD I (See also "Alternate Methods of Admission" 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 foreign language that has an organized written grammar and a substantial literature.

(f) Advanced Course (from one of the following)—1 or 2 Units

Mathematics. A total of 1 unit composed of intermediate or advanced algebra, trigonometry, solid geometry, or other course for which trigonometry is a prerequisite.

Foreign Language. Either 1 additional unit in the same foreign language offered under (e) or 2 units of a different foreign language that has an organized written grammar and a substantial literature.

Science. 1 unit of either chemistry or physics in addition to the science offered under (d) above.

Also required are 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 that 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 of 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.

Alternate Methods of Admission

(For students who do not qualify under Method I)

METHOD II

Subject Requirements

Students must 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.

Scholarship Requirements

Students must achieve a scholarship rank in the highest ten per cent of the graduating class.

METHOD III

Subject Requirements

Students must complete not less than 12 high school units of grade A or B in the work in 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, ROTC, and religion are not to be counted under this method.

Scholarship Requirements

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

METHOD IV

Subject Requirements

Students must 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.)

Scholarship Requirements

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

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.

Experimental Methods 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 concerning these programs may be obtained from the Admissions Officer or from the University Dean of Educational Relations, University Hall, University of California, Berkeley.

Agricultural Experimental Plan

(Applicable to students who started their high school 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* two years of agriculture or home economics *or* 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.

Minor Deficiencies

The Admissions Officer has authority and responsibility for waiving minor deficiencies when justification is evident in the form of unusual academic records or recommendations.

Requirements for Out-of-State Applicants

(See also page 23.)

College Entrance Examination Board Scholastic Aptitude Test

An average score of 500 or above in the Aptitude Test is required. (See detailed statement on page 16.) Beginning with the fall semester 1962, the applicant must present a score of 550 or above to meet this requirement.

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.

Subject Requirements

The same subject pattern as the one for California residents is required. (See Method I on page 18.)

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; 1 unit of A counts 4 points, 1 unit of B counts 3 points, 1 unit of C counts 2 points, and 1 unit of D counts 1 point. E and F yield no points.

Alternate Methods of Admission

The alternate methods of admission given on page 19 are not applicable to out-of-state applicants.

Admission by Examination

Admission by examination is applicable only to high school graduates who are 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 17 for information as to dates and places of examinations for 1961-1962.)

To qualify by examination, the tests must be taken no earlier than the applicant's senior year in high school. 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 Director of Admissions, 521 University Hall, University of California, Berkeley 4.

Examinations for California Residents

An applicant who is a resident of California and who has completed all the (a) to (f) subjects with grades of at least C but who 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.)

(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 Admissions on the campus on which he intends to register 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 Admissions regarding the required tests.

Examinations for Out-of-State Applicants

Beginning with the fall semester of 1962, an out-of-state applicant who has completed all of the (a) to (f) subjects with grades of at least C may qualify by attaining scores as follows:

1. A total of 1,100 on the combined scores of the Scholastic Aptitude Test (Verbal and Mathematical).

2. A total of 1,725 on the combined scores of each of any three achievement tests in subject fields (but an applicant may not present examinations in both Intermediate and Advanced Mathematics).

3. No single score on an achievement test can be less than 500 regardless of the total.

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

Preparation for University Curricula

Certain high school subjects are required for admission to the University (see page 18). In addition, certain high school subjects are recommended to give the student a more adequate background for his chosen field of study and to avoid delay of his graduation from the University. Details of these recommendations will be found in the circular, *Prerequisites and Recommended Subjects*, which may be obtained from the Office of Relations with Schools.

It is recommended that students pursue a full program of academic subjects during their senior year.

A statement of the requirements for the bachelor's degree is contained in this circular 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.

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

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 may be admitted at any time if he presents evidence that:

1. He has satisfied, either through high school or college courses, the subjects required for admission of high school graduates in freshman standing (see page 18).
2. His advanced work, in institutions of college level, has met the minimum scholarship standard required of transferring students, in no case lower than a C average in the last college attended, and an over-all C average in all college work attempted.
3. He is entitled to return as a student in good standing to the last college attended.
4. He has earned a satisfactory score in the College Entrance Examination Board Scholastic Aptitude Test (see page 16).

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.

1. 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. The applicant must also 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. *Beginning with the fall semester of 1962, the applicant must present a minimum of 56 units of transfer credit to meet this requirement.*

2. 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.

"Scholarship standard" is expressed by a system of grade points and grade-point averages in courses acceptable for transfer to the University of California; 1 unit of A counts 4 grade points, 1 unit of B counts 3 grade points, 1 unit of C counts 2 grade points, 1 unit of D counts 1 grade point. E and F yield no grade points. The grade-point average is determined by dividing the total number of acceptable units attempted into the number of grade points earned on those units. Courses completed with a grade lower than C may be repeated but units and grade points count each time the course is taken.

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 the lower division requirements of the college in which they wish to register.

Requirements for Out-of-State Applicants

(See also page 20)

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 of 500 or above on the College Entrance Examination Board Scholastic Aptitude Test. Beginning with the fall semester of 1962, the applicant must present a score of 550 or above to meet this requirement.

2. An advanced standing applicant who presents fewer than 30 units of acceptable transfer courses must also meet both the subject and scholarship requirements set for applicants from out-of-state high schools listed on page 20.

Credit for Work Taken in Other Colleges

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

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. 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 Admissions. 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 of the Office of Admissions 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 records fail 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 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 present satisfactory scores on both the Engineering Examination—Lower Division, and the Scholastic Aptitude Test of the College Entrance Examination Board. 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 Colleges of Engineering, Berkeley, Davis, or Los Angeles, and the Pre-engineering Program at Santa Barbara.

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.

Application blanks and a schedule of the places and times for the engineering examinations may be obtained from the Office of Admissions at Berkeley, Davis, or Los Angeles. Both examinations will be given in November 1961 and April 1962 (see "University Calendar").

No fee is charged for the Engineering Examination—Lower Division (when taken at a regularly scheduled time) if the applicant is also required to take the Scholastic Aptitude Test. An applicant who is not required to take the Scholastic Aptitude Test is charged a fee of \$5 if the test is taken with a group of three or more persons or at a regularly scheduled time and location. A fee of \$10 is charged for an individual test. A \$5 fee is charged for the Engineering Examination—Upper Division if taken with a group of three or more persons at a regularly scheduled time and location; otherwise the fee is \$10.

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 on pages 20 and 23 are designed to admit approximately the upper half of candidates eligible for admission under regular rules as measured by scholastic record and aptitude tests.

INTERCAMPUS TRANSFER

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 completed 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. Only cases of very unusual merit will be considered.

The conditions of the admission of each applicant under this classification are assigned by the 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 Admissions Officer, and is subject at all times to satisfactory scholastic achievement.

No person under 21 years of age 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. A student admitted to regular status, if not a candidate for a degree, may, with the approval of the dean of his college, 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

A limited student is one with a bachelor's degree who is not a candidate for an advanced degree or one without a bachelor's degree who has 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 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 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. 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 OF APPLICANTS 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 in accordance with the general regulations governing admission. An application, official certificates, and detailed transcripts of record should be submitted to the Admissions Officer several months in advance of the opening of the semester in which the applicant hopes to gain admittance. This will allow time for exchange of necessary correspondence relative to entrance and, if the applicant is admitted, will assist him in obtaining the necessary passport visa.

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 is sufficient to permit him to profit by instruction in the University. An applicant's knowledge of English is tested by an oral and written examination given by the University of California. This regulation applies to both graduate and undergraduate foreign students. Admission of an applicant who fails to pass this examination will be deferred until he has acquired the necessary proficiency in the use of English.

Language Credit for a Foreign Student

College credit for the mother tongue of a foreigner and for its literature is given only for courses taken in native institutions of college level or for upper division or graduate courses actually taken in the University of California 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 Entrance Examination Board, not to the University of California. An applicant should request that his

scores in the tests be forwarded to the Director of Admissions, 521 University Hall, University of California, Berkeley 4.

Foreign Student Adviser

Advisers are 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.

SUBJECT A: ENGLISH COMPOSITION

The University requires that every accepted student pass an examination in English composition (the Subject A examination), or complete in college an acceptable course in English composition with a satisfactory grade. Students who enter the University with credentials showing the completion elsewhere of acceptable college level training in composition or with a satisfactory score in the College Entrance Examination Board Achievement Test in English Composition are considered to have met the Subject A requirement. To secure exemption, the College Board English Achievement Test must be taken not earlier than the senior year in high school. An examination by the University is required of all other students and, while not a condition of admission, must be taken at the opening of the semester of first attendance, if not taken previously.

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 graduate 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. *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. The application blank may be obtained from the Office of the Dean of the Graduate Division, 268A Hunt Hall, University of California, Davis, and must be filed, 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 payment of the application fee.† *The application fee is chargeable to every person who files an application and is not returnable*

† 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.

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 three years. A form for this purpose will be furnished by the University. Vaccination should be completed prior to registration.

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 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 Dean of the Graduate Division.

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

All students must register with the Registrar before undertaking any work or examination for credit toward a University degree. This registration must also be accepted by the proper faculty before the work is undertaken.

Prospective students should plan to arrive early in the registration week. During that period, certain examinations, including Subject A, are scheduled for all new undergraduates. Students who fail to take required examinations at the prescribed time will be charged a \$1 fee.

Students in good standing carrying a limited amount of regular classwork may be permitted, on the basis of private study outside 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 examinations is begun.

Students or prospective students should consult the *Registration Circular* for the dates to register and begin work. Registration later than the announced dates requires special permission. Late registration creates difficulties for students in making out their programs and retards their progress as well as that of the classes they are attending.

Students who register after the opening of the session and who later are found deficient in their work may not plead late admission as an excuse for deficiencies.

A \$10 fee 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 a detailed study list approved by a faculty adviser or other designated authority. Any changes in this program must then be made only with formal permission from the dean of the student's college. Otherwise, the student is 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 Catalogue.

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.

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; 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.

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 has the necessary preparation in course work to ensure completion and 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.

MEDICAL AND PHYSICAL EXAMINATION

To safeguard the health of the student and the University community, every new student, as part of registration, must pass an examination by University Medical Examiners. Every new student must have at the time of registration a certificate of successful vaccination against smallpox within the past three 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 may 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.

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 directed that every undergraduate male student, unless excused, must study military science during the first two years of residence. The University has an Army ROTC unit that offers courses in general military science.

A student must list the prescribed courses in military science on his study card 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 a student may be excused, may be obtained from the Registrar. Failure to comply with the requirement will result in the student's dismissal.

On February 17, 1961, the Regents granted authorization to exempt students from military training courses on the same basis provided under the Selective Service System for nonstudent exemption from military training.

Prospective students seeking exemption for reasons of conscientious objection should file their application for exemption with the Dean of Students not less than three months before the opening of the semester so that the necessary study and investigation can be made before the beginning of instruction.

The Reserve Officers' Training Corps

The Reserve Officers' Training Corps, established by Act of Congress in 1916, trains junior officers and develops the 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 ROTC program has been divided into four phases:

1. The required basic course (lower division) of 6 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.

4. Elective units outside the Military Science Department:

a. Freshman: A total of 3 units of academic subjects in the general areas of science, psychology, effective communication, or political science. The subject chosen may be one that is required in the student's normal curriculum, and must be approved by the Professor of Military Science.

b. Upper division: A total of 6 units as shown in paragraph 4a. The 6 units may fulfill dual requirements for the bachelor's degree in the colleges as well as for commissioning in the U. S. Army Reserve. Elective subjects will be taken during the advanced course, and must be evaluated and approved by the Professor of Military Science.

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 that 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.

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 ROTC 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

Exact figures for the budget of a student 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 in Resident Matters as a nonresident pays a tuition fee of \$250 per semester in addition to the incidental fee. Every student entering the University for the first time should carefully note "Rules Governing Residence" on page 33.

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 students who do not make use of these privileges.

Student Body Membership Fee

The student body membership fee of \$7.50 each semester must be paid by all undergraduates 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 to others. *The student body membership fee is optional 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 39).

Parking Fee

A parking fee of \$3 each semester is required of students who park 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.

RULES GOVERNING RESIDENCE

The term "nonresident student" is construed to mean any person who has not been a bona fide resident 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 University Attorney 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 of Sections 23055 and 23057 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 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.*

Special Commutation of the Nonresident Tuition Fee

Exemption from payment of the nonresident fee may be granted to an unmarried minor whose parent is in the active military service of the United States and is stationed in California on the opening day of the semester during which the unmarried minor proposes to attend the University. Exemption from payment of the nonresident fee may be granted to an unmarried minor or to a spouse of a member of the University faculty. A student who believes he qualifies under either of these measures should request further information from the Attorney in Residence Matters during registration or at the address given below.

Any person who has been incorrectly classified as a resident student shall be subject to reclassification as a nonresident student. If any student classified as a resident is determined to have been erroneously so classified, he shall be reclassified as a nonresident; if his incorrect classification is 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 California is directed to the fact that presence in California for a period of more than one year immediately preceding the opening day of the semester during which he proposes to attend the University, does not, of itself, entitle the student to classification as a resident.

The attention of a veteran who was not a resident of California at the time of his entrance into the armed forces is directed to the fact that presence in California under military orders does not, of itself, entitle him to classification as a resident student.

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—if he has been so admitted—has been changed is classified as a nonresident.

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

Every person who is classified as a resident student but who becomes a nonresident at any time by virtue of a change of residence by his own action or by the person controlling his residence is obliged to notify the Attorney in Residence Matters at once.

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

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 on 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 and financial need. 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, 1962, entering scholarship applicants for the academic year 1962–1963 must take the Scholastic Aptitude Test of the College Entrance Examination Board not later than the January 13, 1962, test date. Applicants must register for this test not later than December 16, 1961, 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 test taken since January 1, 1958.*

Information about fellowships for graduate students may be obtained from the 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, Davis, not later than *January 15* 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.

Loans

All loans for both graduate and undergraduate students are initiated in the Office of Dean of Students. At various times numerous individuals and organizations have made contributions to student loan funds. These are administered by the University according to the wishes of the donors and are not usually available during the 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. Prospective students and students in their first semester of residence may apply for the NDEA loans. The number of such loans available will depend upon federal allocation of funds. Repayment can be extended over eleven years after graduation or leaving the University. Loan applications should be submitted three months in advance of need. Small amounts for short periods may be obtained in less time.

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. 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 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 babysitting. Private homes occasionally provide room in exchange for assistance within the home.

The Student and Alumni Placement Center assists students in finding part-time employment both on and off the campus. No charge is made 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 assists students in becoming part of the life of the University and acts as liaison with certain veterans and veterans' dependents agencies, the Veterans Administration, the State Department of Veterans Affairs, and others offering veterans educational benefits. This office is located in Room 120, Library-Administration Building. 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 ("Korea" G.I. Bill) should obtain from the United States Veterans Administration a Certificate for Education and Training and file it 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 interested in careers in agriculture are without previous agricultural experience. The Farm Practice Program, organized as a result of a grant by the late Fred H. Bixby, provides students an opportunity to supplement their academic training with a program of supervised work experience.

Experience is provided in both productive agriculture, i.e., the farming or ranching segment, and in agricultural business, which encompasses the processing and distribution elements of the industry. Laboratory instruction provides students an opportunity to learn the proper operation and care of agricultural equipment and to acquire the basic manipulative skills involved in crop and livestock production.

For the summer periods assistance is given to students in finding employment in agricultural enterprises related to their field of major interest. During the period of employment a representative of the Farm Practice Division makes frequent visits to the student and his instructor-employer to develop records and recommendations of value to him when he seeks permanent employment. Students frequently find that these experiences provide contacts that lead to permanent positions upon graduation.

To insure sufficient time for the development of job opportunities that best meet the requirements of training in agriculture, students with limited agricultural experience are encouraged to contact the Farm Practice Office soon after registration.

LIVING ACCOMMODATIONS

The University maintains residence halls and dining units for men and women and emergency housing apartments for married students. In providing meals and living accommodations for students, the University is mindful of two responsibilities: to assure wholesome living conditions and to make residence living contribute specifically to the educational experience of the student.

Within the framework of the ASUCD, the student government functions in the residence halls; each hall maintains its own council to act on 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 \$420 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 residence halls. Information about fraternities may be obtained by addressing the Dean of Students.

STUDENT HEALTH SERVICE

The Student Health Service, by preventing and treating acute illnesses, conserves the time of students for their classwork and studies. This service is made possible in part by the general funds of the University and in part by the staff physicians. It is not a health insurance; 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 Student 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. Hospitalization 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 contains about 220,000 books and receives annually about 5,000 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. As the 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 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 five 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 ROTC program should consult 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 academic effectiveness are common topics of consideration in the counseling interview. The counselor attempts to help the student make the best use of his own resources 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 advisers upon request.

Short-term, noncredit classes in developmental reading and effective study habits are offered by the staff.

Further information about the Counseling Service and appointments for counseling interviews are available through the Counseling Office, Room 116, Library-Administration Building.

SUBJECT A: ENGLISH COMPOSITION

Every entering undergraduate (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 a coherent 500-word composition in 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 fee is charged 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. He is not permitted to enroll in English 1A, 1B or Speech 1A, 1B until he has passed Subject A with a grade of C or better.

A student must satisfy the Subject A requirement before he will be granted the bachelor's degree. 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 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 and passes a special examination with a grade of 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. (Provisions for refund of fee are covered in the Subject A course section on page 298.) 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.

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 3 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, 170A, 170B, 171, 172A, 172B, 174A, 174B, 176A, 176B, 178A, 178B, 179, 180, 183; Political Science 1A, 1B, 102, 105, 113, 128A, 157A, 157B, 163, 166.

3. Other:

a. By the automatic equivalence granted for courses offered by collegiate institutions in 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 257, 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 1961-1962 these dates are: Monday, October 2, 1961, for candidates who expect to complete their work in January 1962; and Monday, February 19, 1962, for candidates for graduation in June 1962.

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

† 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.

within the University. Of the 120-124 units required for the bachelor's degree, at least 24 must be completed at the 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.

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 1 unit for three hours of work by a 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.

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 that may be raised, without repetition of the course, by success in a further examination or by performing other tasks the instructor requires. 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 that 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 for each unit of credit as follows: A, 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.

MINIMUM UNDERGRADUATE SCHOLARSHIP REQUIREMENTS

College of Agriculture and College of Letters and Science

The following provisions apply to all undergraduate students in the College of Agriculture and the College of Letters and Science.

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.

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 the 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.

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

3. If after two semesters 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 the 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 its supervision, or, by suspending the provisions of this regulation it 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 provisions apply to all undergraduate 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 semester 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.

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

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

The following provisions apply to all undergraduate students in the College of Engineering.

Dismissal

A student will be subject to dismissal from the University:

1. 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.

2. 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:

1. In courses offered in the University without formal enrollment in them.

2. 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; no student is allowed to exceed this maximum time. The time for examination sessions will be not more than three hours. Leave to be absent from a final examination must be obtained by written petition to the proper faculty.

If a final examination is among the regular requirements in a course, no individual exemption can be made, 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. 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.

Re-examinations 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 re-examination 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 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. No fee is charged for a re-examination (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, 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 re-examination 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 the grade assigned that 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 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 use 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, official 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's 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 on 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 to the Office of the Dean of Students for a *brief leave of absence*, which expires on a definite date. An excuse for absence will not 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 obtained 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 must 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 submitted it. 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 it, as here provided, there shall be no obligation on the part of the University to hold or safeguard it, 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 Catalogue.

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 undergraduate 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. A major effort of all students is Picnic Day, an open house held each spring.

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

Opportunity to participate in many forms of athletics is presented. The University of California, Davis, is a member of the Far Western Intercollegiate Athletic Conference and stresses both intercollegiate and intramural athletics. Sports include football, basketball, boxing, track, baseball, 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, chorus, dramatics, a rifle team, and student forums.

The California Club, an organization of student leaders, emphasizes the unity of student life on all campuses of the University. 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 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 and Phi Kappa Phi.

THE JUNIOR YEAR ABROAD

Undergraduate students may spend a year of their college career studying in Europe. The University does not itself conduct programs abroad but accepts the academic credits toward the requirements for graduation.

Because of the time needed to prepare for the study 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. S. Keller, Department of Foreign Languages.

Requirements and Curricula

COLLEGE OF AGRICULTURE*

The prospective student should read the requirements and recommendations for admission on pages 16-28.

Faculty Advisers and Study-List Requirements

Freshman 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 that 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 a total of 9 units of mathematics, which may include high school courses required for matriculation, and 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 39.
 - b. *Air, Military, or Naval Science*. See page 30.
 - 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 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.

Agriculture in California represents a complex of many types of production units, such as ranches, farms, orchards, vineyards, nurseries, and greenhouses. Each of these production units is part of an interrelated economic system that 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 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

<i>a. 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
<i>b. Agriculture</i>	
Agriculture (other than agricultural economics and botany)	12
<i>c. 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
	124

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	1	1	Physics 2A .....	..	3
Psychology 1A .....	..	3	Military Science	2	2
Elective .....	..	2	Soil Science 1	3	..
			Elective	2	3
	15	15		16	16

AGRICULTURAL ECONOMICS

This curriculum is concerned with the economics of the agricultural industry. 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 beginning 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 curriculum 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 51).

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 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

	<i>Units</i>
<i>a. General</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
<i>b. Agriculture</i>	
Agriculture, other than agricultural economics.....	8
Upper division agricultural economics	18
<i>c. Electives (restricted)</i>	
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 3a).....	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
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5. Certain courses are required for the major and where applicable may be used in partial satisfaction of 3b above: Agricultural Economics 100A, 100B, and 106.

Example of Agricultural Economics 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>
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	1	1	Military Science	2	2
Vegetable Crops 1 or elective ..	..	2 or 3	Physics 2A .....	..	3
Elective .....	..	2 or 3	Soil Science 1	3	..
			Elective	2	..
	15	14 or 16		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:

	<i>Minimum</i>	<i>Recommended</i>
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 117-122.

Curriculum in Agricultural Education

(Major: Agricultural Education)

1. General University requirements. (See page 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

	<i>Units</i>
<i>a. General</i>	
Botany and zoology (laboratory courses).....	9
Chemistry (including organic)	8
Economics	3
Education	3
English and/or speech	6
Physics	4
Psychology	3
<i>b. 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
<i>c. 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.)

* In addition to University requirements.

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: Microbiology 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	Physics 2A-3A	4	..
English 1A, 1B	3	3	Psychology 1A .....	..	3
Zoology 1A .....	..	4	Soils 1	3	..
Military Science	1	1	Vegetable Crops 1, 1L.....	..	3
Elective	3	3	Military Science	2	2
			Elective	3	1
	16	16		15	15

AGRICULTURAL PRODUCTION

This curriculum provides agricultural training for students who wish to go into diversified farming or business 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: agri-

cultural 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.

Landscape Horticulture

With rapid urbanization throughout the country, and the development of residential, commercial, industrial, and public properties, the field of landscape horticulture is becoming increasingly important. A student may emphasize one or more of the following: design and construction of landscaped areas; commercial production of nursery and flower crops; private and public grounds management, including parks, street trees, school grounds, golf courses, etc.; as well as a general training for sales and service of landscape horticultural specialities.

The associated field of interest may be agricultural economics, agricultural engineering, entomology, irrigation, plant pathology, pomology, or 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, Landscape Horticulture, Pest Control, Pomology, Range Management, Soils and Plant Nutrition, Vegetable Crops, Viticulture.

1. General University requirements. (See page 50.)
2. College of Agriculture requirements. (See page 50.)

3. Curriculum requirements:

	<i>Units</i>
a. <i>General</i>	
Botany	5
Chemistry	8
Economics	3
English and/or speech.....	6
Physics	3
Zoology	3
b. <i>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, irrigation, landscape horticulture, pomology, poultry husbandry, range management, soils and plant nutrition, vegetable crops, viticulture.....	9
Additional agriculture	24
c. <i>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
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
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5. Certain courses are required and where applicable may be used in partial satisfaction of 3 above:

Agricultural Economics

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.

Agricultural Engineering

Primary Field: No primary field given.

Secondary Field: Nine units chosen from the following courses: Agricultural Engineering 12, 103, 104, and 105.

Agronomy

Primary Field: Botany 111; 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 111; 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.

* Not including Mathematics C or D.

† Beyond University requirements.

Animal Husbandry

Primary Field: Bacteriology 1; Chemistry 1A, 8; Biochemistry 101; Physics 2A, 3A; Microbiology 111; Zoology 1A, 1B; Animal Husbandry 7, 8, 103, 110, and 112 or 118.

Secondary Field: Chemistry 1A, 8; Animal Husbandry 7, 8, 103, and 112 or 118.

Dairy Industry: Dairy Plant Management

Primary Field: A minimum of 12 units in upper division food science and technology courses. At least 9 units in upper division courses chosen from economics, agricultural economics, or other fields with the approval of the adviser. Required courses: Food Science and Technology 1, 101, 108, 118A-118B.

Secondary Field: No secondary field given.

Enology

Primary Field: Bacteriology 1; Botany 1; Chemistry 5; Physics 2A, 2B; Viticulture 1, 3, and 9 units selected from Viticulture 124, 125, 140, and Food Science and Technology 107.

Secondary Field: Bacteriology 1; Chemistry 5; Viticulture 1, 3, and 6 units selected from Viticulture 124, 125, 140.

Food Technology

Primary Field: Bacteriology 1; Chemistry 1A, 1B, 8; Physics 2A, 2B. Also 12 units selected from upper division courses in Food Science and Technology.

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 which must include 3 upper division units; 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; General Plant Nematology 100; Plant Pathology 120; Soil Science 1; Microbiology 111.

Irrigation

Primary Field: Botany 111; Mathematics 16A; Soil Science 1, 107; and 12 units of irrigation including Irrigation 10 or 110, and 100.

Secondary Field: Botany 111; Soil Science 1, 107; and 9 units of irrigation including Irrigation 10 or 110, and 100.

Landscape Horticulture

Primary Field: Botany 1, 111; Entomology 124 or Plant Pathology 120; Irrigation 10 or Soils 1; Pomology 9; Landscape Horticulture 3, 105A-105B, and 4 additional upper division units in Landscape Horticulture.

Secondary Field: 9 units of upper division courses in landscape horticulture approved by the departmental adviser.

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; Botany 119 and/or Plant Pathology 120, 122, 125A, 125B, 199. In addition, students must complete 4 of the

following courses: Agricultural Engineering 104; Botany 8, 107, 111, 117; Chemistry 8; General Plant Nematology 100; Soil Science 1 or 109; Zoology 116.

Pomology

Primary Field: Botany 1, 111; 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 Microbiology 111.

Range Management

Primary Field: Engineering 1A; Botany 111; Range Management 1; 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, 117; Range Management 100, 133; Soil Science 1; and the following courses offered at Berkeley: Forestry 103; Range Management 101, 102, 123.

Secondary Field: Range Management 1; 6 additional units selected from the listing of courses under the primary field above.

Soils and Plant Nutrition

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

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

Vegetable Crops

Primary Field: Botany 111; 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 111; 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	1	1	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
	15	15		16	17

ANIMAL SCIENCE

The animal science curriculum, which covers a very broad field, is designed to train men in the fundamentals of animal production, including handling and processing animal products. 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:

1. Employment in certain fields related to animal production.
2. Graduate studies, particularly in the field of animal physiology.
3. Other occupations that 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 71), 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

This major provides the student with basic training in the biological and physical sciences to prepare him for leadership and service in the numerous

industries related to poultry, such as commercial egg production, meat production, breeding, hatchery management, feed manufacturing, pharmaceuticals, meat processing, and agricultural journalism as well as positions in federal and state regulatory agencies.

The emphasis on basic sciences and their application in this major provides a broad training that enables the student to adjust to changing industry needs.

The introductory courses include the application of biology, chemistry, and physics to poultry science. Laboratory instruction deals with the biology of the fowl, breeding and selection methods, modern flock management, disease control, and poultry products. Advanced courses in the application of genetics, embryology, physiology, and biochemistry to poultry problems, develop the basis of modern methods in breeding, incubation, nutrition, and environmental control. Special studies designed to be taken by qualified undergraduates or graduates provide opportunities to become acquainted with experimental methods through research in any of the specialty fields.

The elective choices in this major allow some specialization within the field and orientation of the course of study toward industrial work or further study toward a career in research, teaching, or extension work. The major can provide excellent preparation for graduate study in the related fields of genetics, embryology, nutrition, comparative biochemistry, and physiology and can also serve as preparation for study in veterinary medicine.

Curriculum in Animal Science

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

1. General University requirements. (See page 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

<i>a. General</i>	<i>Units</i>
Bacteriology	4
Botany	4
Chemistry and/or biochemistry.....	16
Economics	3
English and/or speech.....	6
Physics	4
Zoology	10
<i>b. 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; Bacteriology 1; Botany 1; Microbiology 111. Animal Husbandry 105 satisfies the animal nutrition requirement and Microbiology 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 Biochemistry 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 a student is advised 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.) Animal husbandry majors are advised to select as many courses as possible from the following list: Agricultural Economics 140; Agricultural Engineering 103, 104; Agronomy 1 or 112; Irrigation 110; Range Management 1; 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 3A, 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, 105A-105B. Recommended: Botany 130; Mathematics 3A, 3B; German 1, 2.

Poultry Husbandry

Bacteriology 1; Chemistry 1A, 1B, 8 and Biochemistry 101; Avian Medicine 112, which satisfies the pathology requirement. Poultry Husbandry 105 satisfies the nutrition requirement. Poultry Husbandry 1 and Zoology 100, 100L are additional requirements in the poultry husbandry major.

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	1	1	Economics 1A .....	..	3
Zoology 1A-1B	4	4	Military Science	2	2
Elective	3	3	Physics 2A-3A	4	..
			Elective .....	..	4
	15	16		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	1	1	Economics 1A	3	..
Zoology 1A-1B	4	4	Military Science	2	2
			Physics 2A-2B, 3A-3B...	4	4
			Elective .....	..	3
	16	16		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
Military Science	1	1	Economics 1A	..	3
Zoology 1A-1B	4	4	Military Science	2	2
Elective	3	3	Physics 2A-3A	..	4
			Elective	..	4
	15 or 14	16		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	1	1	Chemistry 1B, 8	..	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
	14	16		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 *Announcement of the Graduate Division, Northern Section.*)

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 50.)
2. College of Agriculture requirements. (See page 50.)

3. Curriculum requirements:

a. <i>General</i>	<i>Units</i>
Bacteriology	4
Botany and zoology.....	19
Chemistry	13
English and/or speech.....	6
Geography, geology or paleontology.....	3
Physics	3

b. *Agriculture*

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.....	22
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.).....38 or 39

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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	1	1	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
	15	15		16	16

FOOD SCIENCE

The curriculum in Food Science is intended to prepare students for service and leadership in the food industries—for careers in plant operation, plant management, quality control, research, and teaching. Graduates are employed by milk-processing plants, wineries, breweries, canneries, freezing plants, dried-fruit-packing plants, etc., and by allied industries (manufacturing containers and processing equipment, etc.) Many are engaged as technical sales representatives to the various food industries and some carry on food inspection programs for governmental and private organizations.

Facilities

Modern well-equipped laboratories are maintained for instruction and research in the application of chemistry, biochemistry, physics, biology, statistics, and engineering to the manufacture, utilization, preservation, and sensory evaluation of foods. There are excellent facilities for pilot-plant scale

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

food and beverage processing; these include equipment for the processing of fruits, vegetables, meats, wines, beer, and dairy products. In addition to the general library of the University, libraries in the departments offering this curriculum have specialized textbooks and journals available to the students.

Areas of Interest

The prescribed curriculum provides a broad general education with a good foundation in science and technology and is sufficiently flexible to permit the student to select, in consultation with his adviser, courses which suit his particular needs and interests.

No formal subdivisions have been made in the curriculum, but, with the approval and advice of the faculty adviser, a student may plan a curriculum directed toward one of the following areas of interest: graduate study; plant management; or processing technology, including quality control. The program in the last two specializations can be directed to a particular commodity field, if desired, such as animal products (including meat, dairy, poultry, and marine products) or plant products (including fruits, vegetables, cereals, wine, beer, and other beverages). Students who wish to receive training for a specific industry will be assigned a special adviser in this field.

Graduate instruction leading to the M.S. degree is offered in Food Science and to the Ph.D. degree in the related fields of Agricultural Chemistry, Microbiology, Comparative Biochemistry, Nutrition, Engineering, Animal Physiology, and Plant Physiology.

Curriculum in Food Science

(Major: Food Science)

1. General University requirements. (See page 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements.

a. General

	<i>Units</i>
Bacteriology	4
Biochemistry	6
Botany or zoology.....	5 or 3
Chemistry	19
English and/or speech.....	6
Mathematics (including differential calculus).....	9
Physics (including laboratory).....	8

b. Agriculture

Courses in the field of food science with approval of the major adviser

20

c. Electives (restricted)

Anthropology, art, economics, English, foreign language, geography, geology, history*, music, political science*, philosophy, psychology, or sociology.....

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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 or 40

5. Certain courses are required and may be used in partial satisfaction of 3b, above: Food Science and Technology 1 and 110 and a course in food chemistry and food microbiology.

* In addition to University requirements.

Example of Food Science Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1 or Zoology 1A...	5 or 4	..	Bacteriology 1 .....	..	4
Chemistry 1A-1B	5	5	Chemistry 5 .....	..	3
Chemistry 8 .....	..	3	Mathematics 16A-16B ..	3	3
Food Science and Technology 1	2	..	Physics 2A-2B	3	3
Speech 1A or English 1A..	..	3	Physics 3A-3B	1	1
Military Science	1	1	Speech 1B or English 1B.	3	..
Elective	3	3	Military Science	2	2
			Elective	4	..
	16 or 15	15		16	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 that requires an understanding of the needs of the family, knowledge of how to solve home and family problems, plus training that is in demand for interesting and worth-while positions. A university degree in home economics has aided many women in carrying out this dual role successfully.

Curriculum in Home Economics

(Majors: Design, Dietetics, Foods, General Home Economics, Nutrition, Textile Science)

1. General University requirements. (See page 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

a. General	Units
Natural sciences	18
One course in each of the following: chemistry, physics, statistics or mathematics§	
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. Home economics and closely related fields	
Lower division	6-12
Upper division	19-27

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

§ Not including Mathematics C or D.

Units

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:

Design

Art 16; 2 courses in history of art; 2 courses in painting or sculpture; Design 6A, 6B, 8, 191, 192A-192B or 196A-196B, 193 or 195; Philosophy 137; Psychology 131. A total of 20 units of upper division design courses.

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

Design 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.

*General Home Economics**

Design 6A, 130A; 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.

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.

Textile Science

Bacteriology 1; Chemistry 1A-1B, 5, 8; Economics 1A-1B; Mathematics 13; Home Economics 6, 6L, 7, 7L, 124, 141, 160, 162; Physics 2A-2B; Psychology 1A.

Example of Design Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Art 1A, 1B, 1C, or 1D....	3	3	Art 2A, 2B, 14A, or 14B..	2	2
Design 6A, 6B	2	2	Art 16 .....	..	..
English 1A, 1B	3	3	Chemistry 1A .....	..	5
Mathematics 1, 13, 16A, or 36	3	..	Design 8 .....	..	2
Physics 2A or 10.....	..	3	Natural science elective.....	3-5	..
Elective	4	5	Psychology	3	..
			Social science elective.....	..	3
			Elective	3-4	4
	15	16		13-16	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, 175 and Design 130L.

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
Design 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
	<hr/> 16	<hr/> 15		<hr/> 15	<hr/> 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
Design 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
	<hr/> 15	<hr/> 16		<hr/> 15	<hr/> 16

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
Design 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	..
	<hr/> 15	<hr/> 16	Elective	3 or 4	3 or 4
				<hr/> 14 or 16	<hr/> 15 or 17

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
Design 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
	<hr/> 16	<hr/> 15		<hr/> 15	<hr/> 16

Example of Textile Science Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Chemistry 1A, 8	5	3	Bacteriology 1	..	4
Design 6A	2	..	Chemistry 1B, 5	5	3
English 1A, 1B	3	3	Economics 1A, 1B	3	3
Home Economics 7, 7L	3	3	Home Economics 6, 6L	..	3
Physiology 1	3	..	Physics 2A, 2B	3	3
Psychology 1A	..	3	Elective	4	..
Elective	3	3		<hr/> 15	<hr/> 16
	<hr/> 16	<hr/> 15			

IRRIGATION SCIENCE

The development and use of water resources in agriculture is one of today's most challenging fields of study. The agricultural development of arid and semi-arid regions probably depends more on water resources than on any other single factor. Looking into the future, as the world's population expands and more land comes under cultivation, agriculture will move onto poorer soils in more arid regions, thereby vastly increasing the importance of wise use of water resources and the application of sound irrigation and drainage principles.

Through irrigation, the modern farmer can control the supply of water available to crops. However, efficient distribution and use of water in agriculture increasingly depends upon professional personnel who have studied the scientific management of water and soil resources.

Irrigation scientists are prepared to apply modern developments in the basic sciences—physics, chemistry, and mathematics—as well as a knowledge of engineering, plant science, soil science, and economics. Irrigation specialists are being called upon increasingly to assist or direct the achievement of improved use of water throughout the world.

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 at Davis are irrigated and provide demonstrations of many types of systems on a variety of crops.

Employment

Many irrigation science graduates work with local, state, and federal agencies dealing with the supply, use, control, and conservation of water. More advanced students find positions in teaching and research and as specialists in the Agricultural Extension Service.

Graduates in irrigation science may also be employed by irrigation districts and water companies as water masters and in managerial positions. Graduates find positions with private consulting firms in water development projects. Others work for irrigation equipment companies, pump manufacturers, and public utilities. Some become irrigation specialists in industry and business, managers of large farm enterprises, or operators of their own farms.

Program of Study

The irrigation science curriculum provides undergraduate instruction in surface and groundwater supply hydraulics; wells and pumps; water rights; water quality and salinity; irrigation systems; water-soil-plant relationships and crop water requirements; irrigation management and water conservation; drainage in irrigation enterprises.

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

In addition to instruction in irrigation, this curriculum includes courses in soils, crops, engineering, economics, and the basic sciences of mathematics, chemistry, and physics.

A knowledge of mechanical drawing is required of all students in this curriculum. The requirement may be satisfied by a high school or University Extension course or by demonstrated proficiency.

The first two years may be taken at the Berkeley, Davis, Los Angeles, or Riverside campuses or at a recognized junior college or state college. The last two years are offered only at Davis.

Students wishing to emphasize the engineering aspects of irrigation, drainage, and water resources should refer to the *Announcement of the College of Engineering* or this bulletin.

Typical programs leading to the Bachelor of Science degree are shown below.

Curriculum in Irrigation Science
(Major: Irrigation)

1. General University requirements. (See page 50.)	
2. College of Agriculture requirements. (See page 50.)	
3. Curriculum requirements:	
a. <i>General</i>	<i>Units</i>
Botany	9
Chemistry	13
Economics or agricultural economics.....	3
Engineering (Surveying or Measurements).....	3
English and/or speech.....	6
Geology	3
Mathematics	6
Physics	8
b. <i>Agriculture</i>	
Crops and soil science.....	14
Irrigation science and engineering.....	20
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.).....	39
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5. Certain courses are required by the major and where applicable may be used in partial satisfaction of 3 above: Botany 1, 111, or 120A, 121A; Engineering 1A or 10; Mathematics 16A-16B; Physics 2A-2B, 3A-3B; Soil Science 107.

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>	<i>Fall Units</i>	<i>Spring Units</i>	<i>Course</i>	<i>Fall Units</i>	<i>Spring 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 1A	4	..	Mathematics 16A-16B.....	3	3
Military Science	1	1	Military Science	2	2
Elective	3	..	Physics 2A-2B	3	3
			Physics 3A-3B	1	1
			Soil Science 1	3	..
	16	14		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 ornamental 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 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, or 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 phase 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 in graduate work should note the requirements for science specialization in their agronomy major (see page 76). 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; in physiological and chemical problems of crops as related to factors such as light, heat, drought, and disease resistance; and in crop and soil interrelations with special reference to fertility, legumes, crop residues, enzymes, and crop sequence.

Genetics

Various combinations of courses may be arranged 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 genetics 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 landscape 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 a plant materials laboratory, drafting laboratory, shop, head house, 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 landscape plant materials, arboriculture, nursery management, turfgrass 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 planning to enter teaching or research fields may complete their training in the Graduate Division.

Park Administration

Park and public grounds administration is becoming an increasingly important field as urbanization spreads and park and recreation areas are more intensively used. Park administrators are concerned with planning, acquisition, development, and maintenance of public grounds, including parks, street plantings, golf courses, school grounds, cemeteries, and other landscaped areas. The work of park administrators brings them into contact with land, structures, plants, and people.

The park administration major offers a thorough training in landscape horticulture, including soils, irrigation, entomology, plant pathology, turfgrass culture, arboriculture, and ornamental plant identification and ecology. In addition to basic courses in botany, chemistry, physics, and the social sciences, training is given in several other fields. Public administration, city and regional planning, landscape architecture, and recreation are all interrelated in the successful solution and execution of public grounds programs.

Students are encouraged to make use of the opportunities for gaining experience through summer work with park and recreation departments.

Graduates in park administration may enter city, county, regional, and state park and recreation departments. Other responsible positions open to the graduate are in city street tree departments; in golf course and recreation area management; and in the administration of grounds development and maintenance for schools, cemeteries, and other landscaped areas. Opportunities are available for teaching, extension, and consulting work.

Plant Pathology

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

Students planning to enter teaching or research fields 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; for a position as field representative of a fertilizer or spray company or as 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 lathhouse 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, mechanical 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, for employment with seed, fertilizer, shipping, and processing companies; for graduate study; or for 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, Park Administration, Plant Pathology, Pomology, Vegetable Crops, Viticulture)

1. General University requirements. (See page 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

<i>a. General</i>	<i>Units</i>
Botany and plant physiology.....	9
Chemistry	13
Economics	3
English and/or speech.....	6
Physics	3
 <i>b. 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
c. <i>Electives</i> (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, 111; 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, 111 (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 117; Economics 11A-11B; Engineering 1A; Pomology 1 or 2.

Park Administration

Botany 1, 111; Chemistry 1A, 8; Landscape Horticulture 3, 105A-105B, 108, 111, 134, 140; Engineering 1A; City and Regional Planning 110; Physical Education 140; Public Administration (6 units). Recommended: Agricultural Economics 18; Architecture 3N; Botany 107; Irrigation 10; Soils 1.

Plant Pathology

Bacteriology 1; Botany 119; Chemistry 1A-1B, 5, 8; Entomology 124; Irrigation 100 or 110; Soil Science 1 or 108; Zoology 1A or 10.

Pomology

Bacteriology 1; Botany 1, 111 (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.

* Not including Mathematics C or D.

† In addition to University requirements.

Vegetable Crops

Botany 1, 111; Chemistry 1A-1B, 8; Vegetable Crops 101, 190. Recommended: Agricultural Economics 140; Botany 107; Irrigation 110; Physics 2B.

Viticulture

Botany 1, 111; 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 111	..	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	1	1	Physics 2A	3	..
Zoology 10	..	3	Soil Science 1	3	..
Elective	3	3	Elective	3	3
	15	15		16	15

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 111	..	4
Chemistry 1A	..	5	Chemistry 1B, 8	5	3
Economics 1A	3	..	Mathematics 13	3	..
English 1A-1B	3	3	Military Science	2	2
Military Science	1	1	Physics 2B	3	..
Physics 2A	..	3	Elective	3	3
Elective	..	3			
	15	15		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 111	..	4
Chemistry 1A	..	5	Chemistry 1B, 8	5	3
Economics 1A	3	..	Engineering 1A	3	..
English 1A-1B	3	3	Landscape Horticulture 1A-1B	3	3
Landscape Horticulture 4, 3	3	3	Physics 2A	3	..
Military Science	1	1	Pomology 9	..	2
Elective	..	3	Military Science	2	2
	15	15	Elective	..	2
				16	16

Example of Park Administration Program

FRESHMAN YEAR			SOPHOMORE YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Botany 1	5	..	Botany 111	..	4
Chemistry 1A	..	5	Chemistry 1B, 8	5	3
Economics 1A	3	..	Engineering 1A	3	..
English 1A-1B	3	3	Physics 2A	3	..
Landscape Horticulture 3, 4	3	3	Political Science 1A-1B	3	3
Military Science	1	1	Pomology 9	..	2
Elective	..	3	Military Science	2	2
	15	15	Elective	..	2
				16	16

Example of Plant Pathology Program

FRESHMAN YEAR			
Course	Fall Units	Spring Units	
Agronomy 1	3	..	
Botany 1	5	..	
Chemistry 1A .....	..	5	
English 1A-1B	3	3	
Vegetable Crops 1 and 1L ..	..	3	
Military Science	1	1	
Elective	3	3	
	15	15	

SOPHOMORE YEAR			
Course	Fall Units	Spring Units	
Bacteriology 1 .....	..	4	
Botany 111 .....	..	4	
Chemistry 1B, 8	5	3	
Economics 1A	3	..	
Physics 2A	3	..	
Pomology 2	3	..	
Military Science	2	2	
Elective .....	..	3	
	16	16	

Example of Pomology Program

FRESHMAN YEAR			
Course	Fall Units	Spring Units	
Agronomy 1 or Soil Science 1	3	..	
Botany 1	5	..	
Chemistry 1A .....	..	5	
Economics 1A	3	..	
English 1A-1B	3	3	
Military Science	1	1	
Pomology 9 or Vegetable Crops 1 and 1L .....	..	2 or 3	
Elective .....	..	3	
	15	14 or 15	

SOPHOMORE YEAR			
Course	Fall Units	Spring Units	
Botany 111 .....	..	4	
Chemistry 1B, 8	5	3	
Military Science	2	2	
Physics 2A-2B	3	3	
Pomology 2	3	..	
Pomology 9 or Vegetable Crops 1 and 1L .....	..	2 or 3	
Electives	2 or 3	2	
	15 or 16	16 or 17	

Example of Vegetable Crops Program

FRESHMAN YEAR			
Course	Fall Units	Spring Units	
Agronomy 1	3	..	
Botany 1	5	..	
Chemistry 1A .....	..	5	
Economics 1A	3	..	
English 1A-1B	3	3	
History 17A .....	..	3	
Military Science	1	1	
Vegetable Crops 1 and 1L ..	..	3	
	15	15	

SOPHOMORE YEAR			
Course	Fall Units	Spring Units	
Botany 111 .....	..	4	
Chemistry 1B, 8	5	3	
History 17B .....	..	3	
Military Science	2	2	
Physics 2A	3	..	
Psychology 1A	3	..	
Soil Science 1	3	..	
Elective .....	..	3 or 4	
	16	15 or 16	

Example of Viticulture Program

FRESHMAN YEAR			
Course	Fall Units	Spring Units	
Botany 1	5	..	
Chemistry 1A .....	..	5	
Economics 1A	3	..	
English 1A-1B	3	3	
Military Science	1	1	
Viticulture 1, 3	2	2	
Elective .....	..	3	
	14	14	

SOPHOMORE YEAR			
Course	Fall Units	Spring Units	
Agronomy 1, or Vegetable Crops 1 and 1L .....	..	3	
Botany 111 .....	..	4	
Chemistry 1B, 8	5	3	
Military Science	2	2	
Physics 2A	3	..	
Pomology 2	3	..	
Elective	3	3	
	16	15	

PREFORESTRY

The preforestry curriculum is administered by the College of Agriculture and is designed to offer a broad basic training that 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 *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 c. (See page 50.)
2. College of Agriculture requirement c. (See page 50.)
3. Curriculum requirements:

<i>a. General</i>	<i>Units</i>
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
 <i>b. Forestry</i>	
Summer field program	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.)	14
	70

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 program, Forestry 46, 47, 48, 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		
<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>	<i>Course</i>	<i>Fall Units</i>	<i>Spring Units</i>
Chemistry 1A .....	..	5	†Botany 1	5	..
Economics 1A-1B	3	3	Chemistry 8 .....	..	8
English 1A-1B	3	3	Engineering 1A	3	..
Mathematics 16A	3	..	Geology 1A	4	..
Military Science	1	1	Mathematics 13 .....	..	3
Zoology 10 .....	..	3	Military Science	2	2
Elective	3	..	Physics 2A-2B	3	3
			Elective .....	..	3
	13	15		16	14

* 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).

PREVETERINARY MEDICINE

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

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 112.

Curriculum in Preveterinary Medicine

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

2. Curriculum requirements:

(a) <i>General</i>	<i>Units</i>
Animal Husbandry**	3
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

9

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>
Animal Husbandry 7	3	..	Chemistry 8, 5	3	3
Chemistry 1A, 1B	5	5	Military Science	2	2
English 1A, 1B	3	3	Physics 2A, 2B	3	3
Military Science	1	1	Zoology 1A, 1B	4	4
Elective	2	5	Elective	3	3
	14	14		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

** Requirement may be fulfilled after admission to the School of Veterinary Medicine.

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

‡ Mathematics beyond trigonometry.

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 for a student entering this field to have some training in several or all of the following fields: animal husbandry, agronomy, range management, soils, forestry, watershed management, and wildlife.

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 permit the student to exercise considerable selection in the courses he wishes. For example, if the student wants 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 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

<i>a. General</i>	<i>Units</i>
Botany	16
Chemistry	8
Economics and/or agricultural economics	3
Engineering	3
English and/or speech	6
Physics	6
Zoology	8
 <i>b. Agriculture</i>	
Agronomy and range management	12
Animal husbandry	10
Soil science and/or geology	6
Summer field practice course	0
 <i>c. Electives (restricted) additional units in botany, chemistry, genetics, geology, statistical methods, zoology.....</i>	
Anthropology, art, economics, English, foreign language, geography, music, sociology, speech, history*, political science*, philosophy, psychology	9

4. Additional courses chosen by the student with approval of major advisor. (These electives may be used to satisfy course requirements under 1 and 2 above.)..... 31

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

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 112 and Range Management 1, 100, 102, 123, 133.

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, 111	5	4
Chemistry 1A	5	5	Botany 8 . . . . .	..	2
Economics 1A . . . . .	..	3	Chemistry 8 . . . . .	..	3
English 1A-1B	3	3	Engineering 1A	3	..
Military Science	1	1	Geology 1A or Soil Science 1	4 or 3	..
Zoology 1A-1B	4	4	Military Science	2	2
Elective	3	..	Physics 2A-2B	3	3
			Elective . . . . .	..	3
	15	16		17 or 16	17

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 for 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 micro-organisms that 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 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 50.)
2. College of Agriculture requirements. (See page 50.)
3. Curriculum requirements:

<i>a. General</i>	<i>Units</i>
Bacteriology	4
Botany (including plant physiology)	9
Chemistry	16
English and/or speech	6
Geology	3
Physics	8
 <i>b. Agriculture</i>	
Crop science (agronomy, pomology, vegetable crops, viticulture) or plant ecology	3
Soil science courses required for major	20-27
 <i>c. 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.....	
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 requirements under 1 and 2 above.)	
	25-24

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

General Soil Science

Chemistry 109; Geology 1A, 103; Mathematics 16A-16B or equivalent; Plant Nutrition 116. A total of 23 units of soil science including Soil Science 105.

* In addition to University requirements.

Pedology and Soil Survey

Engineering 1A; Geography 1 and 3; Geology 1A, 1B, 103; Irrigation 135; 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 1A	4	..	Military Science	2	2
Mathematics 16A-16B	3	3	Physics 2A-2B	3	3
Military Science	1	1	Physics 3A-3B	1	1
			Soil Science 1	3	..
			Elective (restricted) .....	..	3
	<hr/>	<hr/>		<hr/>	<hr/>
	16	17		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 1A, 1B	4	4	Physics 2A-2B	3	3
Military Science	1	1	Physics 3A-3B	1	1
			Soil Science 1	3	..
			Elective (restricted) .....	..	3
	<hr/>	<hr/>		<hr/>	<hr/>
	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 1A	4	..	Military Science	2	2
Mathematics 16A-16B	3	3	Physics 2A-2B	3	3
Military Science	1	1	Physics 3A-3B	1	1
			Soil Science 1	3	..
			Elective (restricted) .....	..	3
	<hr/>	<hr/>		<hr/>	<hr/>
	15	17		15	16

Example of Soil Management and Conservation 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>
Botany 1 .....	..	5	Agronomy 1	3	..
English 1A-1B	3	3	Bacteriology 1 .....	..	4
Geology 1A	4	..	Chemistry 1A-1B	5	5
Military Science	1	1	Chemistry 8 .....	..	3
Physics 2A-2B	3	3	Military Science	2	2
Physics 3A-3B	1	1	Soil Science 1	3	..
Pomology 1	3	..	Vegetable Crops 1 .....	..	2
Elective (restricted) .....	..	3	Elective (restricted)	3	..
	<hr/>	<hr/>		<hr/>	<hr/>
	15	16		16	16



The Chemistry Building

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 they 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.

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 16-28) and must take an engineering examination (see page 89). 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

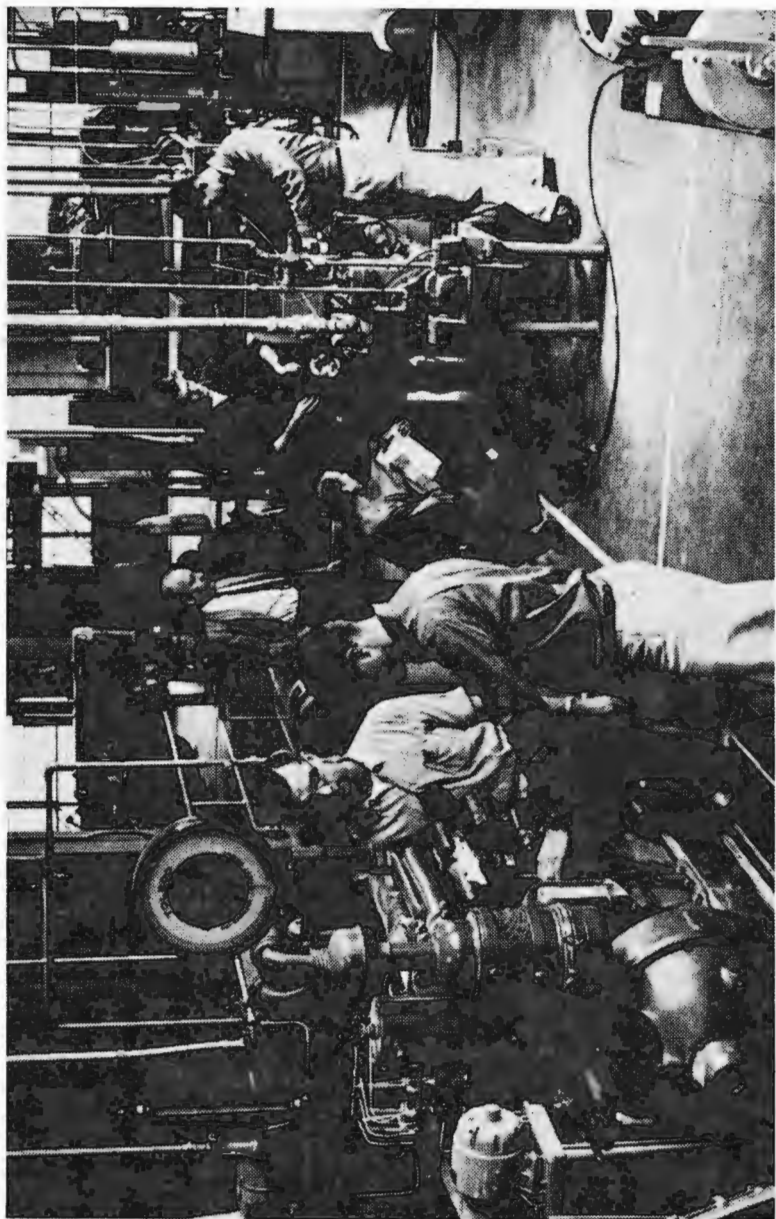
These subjects are prerequisite to certain basic courses in the freshman engineering program. A student who is admitted without all this preparation will be required to make up equivalent work while in college. As a result, the student probably will be delayed in advancement to upper division status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

Upper Division

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
Humanistic-social 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 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

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. Further information regarding these examinations may be found on page 24.

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.
3. Satisfactorily complete the subjects and units prescribed in one of the engineering curricula.
4. Satisfy the requirement in English (see page 92).
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.

* 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.

Honors with the Bachelor's Degree

Upon the recommendation of the Committee on Undergraduate Study, 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 Associate 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 Associate Dean of the College of Engineering.

Curriculum in Engineering

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. 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 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 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 forms, 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 such agricultural enterprises 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	5	..
Mathematics 3A-3B	3	3	Mathematics 106, 107	..	5
Physics 4A	..	4	Physics 4B, 4C	4	4
Humanistic-social studies	3	..	Humanistic-social studies†	3	3
Military Science	1	1	Military Science	2	2
	16	16		17	17
JUNIOR YEAR			SENIOR YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Engineering 100A-§100B	4	4	Engineering 120	..	3
Engineering 102, 103	3	3	Engineering 190	..	1
Engineering 105A-§105B	3	3	Humanistic-social studies	3	3
Engineering 130, 111	4	..	Technical electives	14	9
Humanistic-social studies	..	3			
Technical electives	3	3			
	17	16		17	16

* 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 Humanistic-social studies to the upper division.

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

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 Associate Dean of the College of Engineering and will be in addition to the normal program of study.

Humanistic-Social 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 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 6 units of upper division courses must be completed after the student has been advanced to upper division status in the College of Engineering. The courses must be selected from an approved list that is reviewed annually by the College. The list will include courses from such fields as history, economics, government, literature, sociology, and fine arts; it will not include such courses as accounting, hygiene, industrial management, finance, and personnel administration.

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 equivalent) 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 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. Programs leading to scientific or

professional engineering degrees can be arranged in the following areas of study.

Master of Science

Doctor of Philosophy

Applied mechanics
Applied thermodynamics
Fluid mechanics
Heat and mass transfer
Hydrology

Master of Engineering

Doctor of Engineering

Agricultural power and machinery,
processing, and structures
Food processing
Irrigation, drainage, and water re-
sources
Microclimatology and environment

For admission and program requirements write to the Associate Dean of the College of Engineering, University of California, Davis, or the Dean of the Graduate Division.

COLLEGE OF LETTERS AND SCIENCE

The College of Letters and Science offers curricula that enable the student to pursue fundamental knowledge primarily for its own sake and to learn basic intellectual disciplines 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. (See page 108.)

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 of 1958) and who wish to graduate under the rules in effect at the time of their entrance will need to consult the General Catalogue, 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.

To achieve its educational objectives, the college 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 this 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 planning 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 C average in upper division courses required for the major program, together with a C average for all courses completed in the University. 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 sophomore student accepted to pursue a major program may, with the approval of his adviser, enroll in upper division courses required for that program if he has completed the prerequisites for such courses.

Students admitted to senior standing in the College of Letters and Science on the basis of credit from other institutions, or other Colleges within the University of California, must complete in residence on this campus, 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 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 equivalent in subject matter and unit credit to courses offered in fall and spring sessions and 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 certain specific requirements. *Each student is responsible for seeing that he meets the University, College, and departmental requirements for graduation.* The specific requirements are as follows:

UNIT REQUIREMENT

The candidate must complete at least 120 units, of which 105 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 or, 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.

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.

MATHEMATICS REQUIREMENT

Students must meet the mathematics requirement by *either* of the following:

1. Passing the mathematical section of the College Entrance Examination Board Scholastic Aptitude Test with a score of 400 or higher.
2. Passing any course given on this campus by the Department of Mathematics or an equivalent course taken in college.

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:

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.

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 to satisfy this requirement in that language. *No college credit will be given for work in foreign languages that technically duplicates high school credit offered for matriculation.*

Humanities, Social Science, and Natural Science

The candidate must complete 12 units in each of the following fields: humanities, including at least 6 units elected from Group I; social science; and natural science. The requirement in natural science must include at least one course of not fewer than 3 units in a biological science, at least one course of not fewer than 3 units in a physical science, and at least one laboratory science course that either requires more than 1 unit of laboratory or has as its prerequisite a course requiring at least 1 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; however, this waiver will not reduce the requirement of 12 units of college courses in natural science.

The requirements may be fulfilled by courses chosen from the following list. No courses marked with an H or numbered 198 or 199 may be included. Any combination of courses in history and political science used to satisfy

the American History and Institutions requirement shall be counted as 3 units of social science and 3 units of humanities toward the breadth requirement.†

Humanities

Group I (at least 6 units)

Art. All undergraduate courses except 16, 17. Performance courses: 2A*, 2B*, 3A-3B*, 12*, 14A*, 14B*, 101A-101B*, 102A-102B*, 107*, 129*, 141*, 142*.

Classics. All undergraduate courses.

Dramatic Art. All undergraduate courses except 124. Performance course: 190*.

English. All undergraduate courses except 1A, 1B.

French. All undergraduate courses except 1, 2, 3.

German. All undergraduate courses except 1, 2, 3.

Latin. All undergraduate courses except 1, 2, 3.

Music. All undergraduate courses except 10. Performance courses: 41*, 42*, 43*, 44*, 46A-46B*, 141*, 142*, 143*, 144*.

Philosophy. All undergraduate courses.

Spanish. All undergraduate courses except 1, 2, 3.

Speech. All undergraduate courses except 25, 26. Performance course: 141*.

Group II

American Civilization. 196.

History. 4A, 4B, 131, 175, 178A, 178B.

Political Science. 118A, 118B, 119.

Social Sciences

Anthropology. All undergraduate courses except 1, 152, 153, 195, 196.

Economics. All undergraduate courses except 11.

Education. 110.

Geography. All undergraduate courses except 1, 3, 105, 161.

History. All undergraduate courses except 4A, 4B, 131, 175, 178A, 178B.

Political Science. All undergraduate courses except 118A, 118B, 119.

Psychology. All undergraduate courses except 108, 150, 165.

Sociology. All undergraduate courses except 185.

Natural Sciences

The following courses or sequences of courses satisfy the laboratory science requirement: Botany 1, Entomology 1, Physiology 1L, Zoology 1A. Chemistry 1A; sequence Geology 1A (formerly 1), 1B; Geology 103 (formerly Geochemistry 100); sequence Physics 3A, 3B; sequence Physics 4A, 4B; sequence Physics 4A, 4C.

Biological Sciences (at least 3 units)

Anthropology. 1, 152, 153.

Bacteriology. All undergraduate courses except 105A, 105B.

Botany. All undergraduate courses except 8, 107, 131, 155.

Entomology. 1.

Genetics. 100.

Geology. 111, 112.

Physiology. 1, 1L.

Psychology. 108, 150.

Zoology. All undergraduate courses except 104, 116.

Physical Sciences (at least 3 units)

Chemistry. All undergraduate courses.

Geography. 1, 3.

Geology. All undergraduate courses except 102, 111, 112.

Mathematics. All undergraduate courses except C, D, 129.

Physics. All undergraduate courses.

* A total of not more than 4 units of performance courses may be counted.

† American History and Institutions examination for which 3 units of credit is granted will not constitute credit toward the breadth requirements.

THE MAJOR REQUIREMENT

The candidate must complete a major program that 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 fewer than 30 or more than 60 units and must include at least 24 units in upper division courses. The types of major programs are the following:

Departmental Major

Departmental major programs consist of not fewer than 24 or more than 30 units of upper division courses together with such lower division courses as the department deems necessary for a coordinated 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.

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.

Individual Group Major

Individual group majors may be established on petition of individual students. Such programs require 30 to 36 units in upper division courses.

The Bachelor of Science Degree

The Bachelor of Science degree will be granted upon the completion of certain specific requirements. *Each student is responsible for seeing that he meets the University, College, and departmental requirements for graduation.* The specific requirements are as follows:

UNIT REQUIREMENT

The candidate must complete not fewer than 120 units, of which 105 must be in courses chosen from the College of Letters and Science List of Courses (see page 108), including not fewer than 36 units in upper division courses. The candidate must also complete not fewer 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.

GENERAL UNIVERSITY REQUIREMENTS

The candidate must satisfy the general University requirements: Subject A; Military Science, 6 units, 4 semesters (men); American History and Institutions.

ENGLISH REQUIREMENT

The candidate must complete English 1A-1B.

FOREIGN LANGUAGE REQUIREMENTS

The candidate must complete course 3 of a foreign language or 8 units of one foreign language taken in college.

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.

MATHEMATICS REQUIREMENT

Students must meet the mathematics requirement by *either* of the following:

1. Passing the mathematical section of the College Entrance Examination Board Scholastic Aptitude Test with a score of 400 or higher.
2. Passing any course given on this campus by the Department of Mathematics or an equivalent course taken in college.

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. However, other suitable programs are possible; a student may present an alternate 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.

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 123.

*American Civilization	French	Philosophy
Anthropology	Geography	Physical Education
Art	Geological Sciences	Physical Sciences
Biological Sciences	German	Physics
Botany	History	Political Science
Chemistry	International Relations	Premedical Curriculum
Dramatic Art	Mathematics	Psychology
and Speech	Microbiology	Sociology
Economics	Music	Spanish
English		Zoology

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

Students who are interested in obtaining teaching credentials are referred to pages 117-122 of this bulletin.

AMERICAN CIVILIZATION

Only those students registered for the American Civilization program prior to the fall semester of 1961 will be accepted as majors during the academic year 1961-1962.

Chairman and Adviser: Mr. R. A. Wiggins.

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.

* No new students registering during the academic year 1961-62 may declare American Civilization as a major.

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

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.

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 138.

BIOLOGICAL SCIENCES

Major Advisers: Mrs. M. Riley 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

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 1; Geology 1A, 1B; Mathematics 13; Physics 2A-2B, 3A-3B.

Upper Division Courses

A total of 24 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

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 1A, 1B; Mathematics 13; Psychology 1A-1B.

Upper Division Courses

A total of 30 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 109). 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.
2. A comprehensive examination on completion of a special study course (197H).

For further information see page 109.

INTERNATIONAL RELATIONS

Major Adviser: Mr. V. J. Puryear.

International relations embraces those social relationships which transcend the boundaries of national states. The major in international relations is devised to meet the needs of students interested in acquiring an understanding of the forces and influences conditioning present-day world politics, as well as the main problems and policies of organized states in their relations with one another in the twentieth century. Because these problems and policies must be dealt with and determined by governments, the major is built around courses dealing with inter-governmental diplomatic and economic relations. This major cuts across departmental lines, for foreign policies are made in relation to political, geographic, economic, and social conditions, and in the light of historical precedents.

The Major Program*Lower Division Courses*

Required: Economics 1A-1B; History 4A-4B, 17A-17B; Political Science 1A-1B, 2, 3; course 4 or the equivalent in a foreign language (French, German, or Spanish).

Upper Division Courses

Additional 3 units in the foreign language offered in preparation for the major; Economics 190A-190B; Political Science 124 or 144, 128A-128B; 6 units of history exclusive of United States history; 6 additional units in related courses selected in consultation with the adviser.

Attention is directed to the following courses as useful in the study of certain aspects of this field: Agricultural Economics 125 (Comparative Agriculture); Anthropology 139 (Peoples of Africa); Economics 116 (Comparative Economic Systems); Geography 123 (Geography of Europe); Geography 143 (Political Geography); History 136 (The Soviet Union in World Affairs); History 146 (Europe since 1870).

The student should also prepare himself for history of the arts, literature, and philosophy.

PHYSICAL SCIENCES

Chairman and Major Adviser: Mr. H. Reiber.

The major in physical sciences is designed primarily for students who wish to obtain a general secondary credential. The lower division course requirements are similar to those of the major in chemistry or physics. The requirements for the Bachelor of Arts or the Bachelor of Science degree may be satisfied.

The Major Program*Lower Division Courses*

Required: Chemistry 1A-1B, 5 or 7A-7B; Physics 4A, 4B, 4C; Mathematics 16A-16B.

Upper Division Courses

A total of 24 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 equivalents, 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 or more departments must consist of not fewer than 30 upper division units or more than 36. 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: restorative dentistry or orthodontics. 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 1962, may be filed between January 1, 1961, and December 30, 1961. For application for admission write to the office of Admissions, Room 62A, U. C. Hospital, University of California, San Francisco Medical Center, San Francisco 22.

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 at least C 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. Provided there is sufficient demand, one test will be given in Boulder, Colorado. 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.

PRE DENTAL CURRICULUM

Adviser: Mr. R. L. Rudd.

Requirements for First and Second Years

1. General University requirements.
 - Subject A (see page 39).
 - Military Science (men)..... 6 units
 - The requirement 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 pre dental program. (See page 40.)
2. English 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 of mathematics (in addition to the required trigonometry).

Applicants for admission to the School of Dentistry in 1962 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, 1961-1962*).

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 2-9 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 while enrolled in the School of Dentistry, but it is preferable to satisfy the requirement in the pre-dental hygiene program. (See page 40.)

- | | |
|--------------------------------------|----------|
| 2. English 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, psychology (in addition to the required 6 units), and sociology may be used to satisfy this requirement.

- | | |
|-------------------------|----------|
| 7. Humanities | 12 units |
|-------------------------|----------|

Courses in the field 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 1962 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 *Announcement of the School of Dentistry, 1961-1962*).

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.

PREMEDICAL CURRICULUM

Advisers: Mr. D. O. Banks, Mr. A. T. Bottini, Mr. E. P. Painter.

Preliminary Preparation

Completion of ninety semester hours of college work is a minimum requirement for admission to the University of California School of Medicine, San Francisco. This must include the subjects listed below; the corresponding courses offered at the University of California, Davis, are given in parentheses.

One year of English (English 1A-1B).

One year of general chemistry, with laboratory (Chemistry 1A-1B).

Three semester hours of quantitative chemical analysis (Chemistry 5).

Three semester hours of organic chemistry (Chemistry 8).

One year of college physics, with laboratory (Physics 2A-2B, 3A-3B).

One year of general zoology or biology, with laboratory (Zoology 1A-1B).

Three semester hours of vertebrate embryology (Zoology 100, 100L).

Eight semester hours of one modern foreign language.

All students who are candidates for the bachelor's degree must demonstrate a knowledge of American History and principles of American Institutions under the federal and state constitutions.

Courses beyond the minimum listed above can be selected to fit the interests and needs of the undergraduate student as well as fulfill the requirements of his particular college or university. College mathematics through calculus is practically mandatory for those seeking a career in medical research and, in the opinion of the faculty, is desirable for all medical students. Any course or group of courses in the physical, biological, behavioral, or social sciences or in the humanities is acceptable in the opinion of our admissions committee. Duplication of courses provided by the medical curriculum is not advised. For example, elementary human anatomy, physiology, or bacteriology would be considered undesirable as premedical courses.

The admissions committee encourages premedical students to take a four-year undergraduate curriculum, leading to a baccalaureate degree. Such a course has many advantages. First, it gives the student an opportunity to pursue an integrated program leading to a senior year in which he is able to do independent work. In addition, it offers a wider choice of electives, thus broadening the student's general educational experience. At least half the students entering the University of California School of Medicine, San Francisco, have received a baccalaureate degree. For practical reasons, however, many students must enter medical school at the end of three years of undergraduate work. The faculty of our School of Medicine recognizes this need and does not in any way discriminate against those who may apply for admission after the completion of the third year of undergraduate study. If the student has not received a baccalaureate degree prior to entering the School of Medicine, it is possible for him to receive the Bachelor of Science

degree in medical sciences on successful completion of the first year of the School of Medicine curriculum.

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 TECHNOLOGY CURRICULUM

Adviser: Mr. D. M. Reynolds.

Students interested in this field should consult with Mr. D. M. Reynolds of the Department of Bacteriology.

PRENURSING CURRICULUM

Advisers: A-L, Mr. G. W. Salt; M-Z, Mr. R. L. Rudd.

The prenursing or preprofessional program consists of two years preprofessional training to be taken at any accredited college or junior college where the appropriate courses are offered. The preprofessional program is followed by six semesters in the basic curriculum of the School of Nursing at the University Medical Center in San Francisco. Students graduate from the basic curriculum with a B.S. degree and are prepared to take the California State Board examination for a license as a registered nurse.

The two years (four semesters) of prenursing training at Davis must consist of a program that contains a minimum of 60 units, satisfies the breadth requirements (see page 96) of the College of Letters and Science, and includes the preparatory courses required by the School of Nursing. These latter are: Chemistry 1A, Bacteriology 1, Physiology 1 and 1L, Zoology 25, Psychology 1A, Sociology 1, English 1A, 1B, and satisfaction of the American History and Institutions requirement.

PREOPTOMETRY CURRICULUM

The curriculum of the School of Optometry leading to the Bachelor of Science degree and the Certificate of Completion and Master of Optometry degree consists of three years of professional study. To be eligible for admission to the School, two years of preprofessional study, comprising a minimum of 60 units of collegiate work including the subjects listed below, must have been completed with an average grade of C or better.

Required courses:

Bacteriology. 2 and 4, or 1 and 4.

Chemistry. 1A, 8

English. 1A-1B.

*Foreign Languages.

Mathematics. 3A or 16A.

Physics. 2A-2B, 3A-3B.

†Physiology. 1, 1L.

Psychology. 1A, 33 or 1A-1B.

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

* Students must also meet the requirements of the College of Letters and Science as they apply to the freshman and sophomore years.

† While Physiology 1, 1L constitute the preferable biological science sequence, this requirement may be satisfied for admission purposes by any one of the following, listed in order of preference: Zoology 1A, 1B; Anatomy 25; Comparative Anatomy.

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		
<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	5	History 17A-17B	3	3
Chemistry 1A-1B	5	5	¹ Mathematics 3A-3B or		
¹ Elective	3	..	16A-16B	3	3
² Elective	3 or 4	3	Military Science	2	2
English 1A-1B	3	3	Physics 2A-2B	3	3
Military Science	1	1	Physics 3A-3B	1	1
			Zoology 1A-1B	4	4
	15 or 16	17		16	16

PREPHYSICAL THERAPY CURRICULUM

Adviser: Mr. G. W. Salt.

Students interested in these fields should consult Mr. Salt for requirements.

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 293).

Letters and Science List of Courses

Of the 120 units required for the degree of Bachelor of Arts, at least 105 units must be in courses chosen from the Letters and Science List of Courses. Any course not included in the Letters and Science List of Courses, but required, or accepted, as part of a major program or as a prerequisite therefor, or accepted in partial satisfaction of the breadth requirement, shall for students offering that major at graduation, or for students offering that course in partial satisfaction of the breadth requirement, 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, 1961-1962.

American Civilization. All undergraduate courses.

Anthropology. All undergraduate courses.

Art. All undergraduate courses except 16, 17. Performance courses: 2A*, 2B*, 3A-3B*, 12*, 14A*, 14B*, 101A-101B*, 102A-102B*, 107*, 129*, 141*, 142*.

Bacteriology. All undergraduate courses except 105A, 105B.

¹ Trigonometry and Intermediate Algebra are prerequisite to Mathematics 3A and 16A.

² 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.

* A total of not more than 8 units in performance courses may be counted.

- Biological Sciences. All undergraduate courses.
 Botany. All undergraduate courses except 8, 107, 131, 155.
 Chemistry. All undergraduate courses.
 Classics. All undergraduate courses.
 Dramatic Art. All undergraduate courses. Performance courses: 124*, 190*.
 Economics. All undergraduate courses except 11.
 Education. 110.
 English. All undergraduate courses.
 French. All undergraduate courses.
 Geochemistry. All undergraduate courses.
 Geography. All undergraduate courses.
 Geology. All undergraduate courses.
 German. All undergraduate courses.
 Greek. All undergraduate courses.
 History. All undergraduate courses.
 Latin. All undergraduate courses.
 Mathematics. All undergraduate courses except 129.
 Military Science. All 6 units of lower division courses.
 Music. All undergraduate courses. Performance courses: 41*, 42*, 43*, 44*, 46A-46B*, 141*, 142*, 143*, 144*.
 Paleontology. All undergraduate courses.
 Philosophy. All undergraduate courses.
 Physics. All undergraduate courses.
 Physiology. 1, 1L.
 Political Science. All undergraduate courses.
 Psychology. All undergraduate courses.
 Russian. All undergraduate courses.
 Sociology. All undergraduate courses.
 Spanish. All undergraduate courses.
 Speech. All undergraduate courses. Performance course: 141*.
 Zoology. All undergraduate courses except 104.

Honor Students

An honor list is prepared each semester and is made public. It includes the names of students who have completed at least 12 units and have a grade average of at least B for all work undertaken in the College and other students specially approved for inclusion in the honor list by the Committee on Honors.

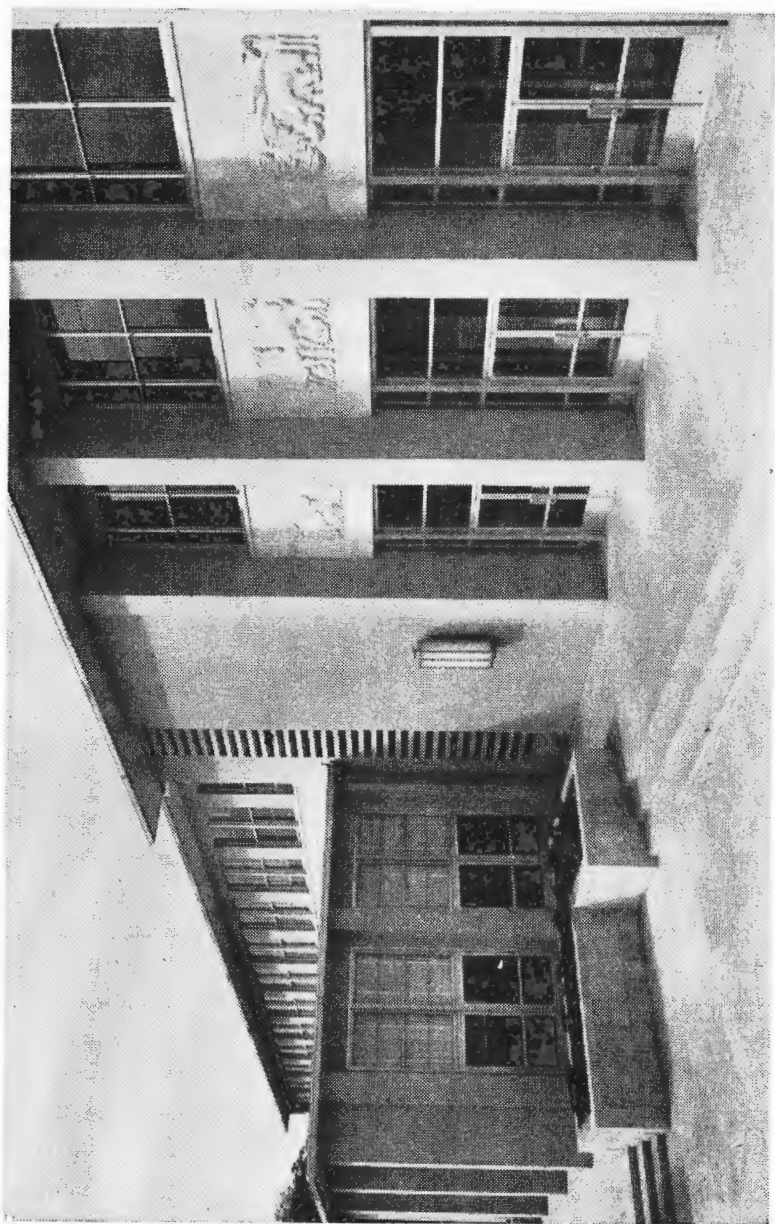
Honor students may take the special courses of Honors Program subject to the approval of the instructor. Except with special permission of the Dean, these courses may be taken only by students whose names are on the honor list.

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 have the privilege (subject to the approval of the instructor concerned) of taking each semester one course not submitted in satisfaction of the requirements of the major program in which they are marked "passed" or "not passed." In calculating grade-point standing, units gained in this way are not 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 have the following additional privileges:

* A total of not more than 8 units in performance courses may be counted.



Main entrance to Haring Hall, showing reading room on the left

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.

Honors with the Bachelor's Degree

Honors at graduation are conferred upon those students who have completed an Honors Program to the satisfaction of the department or major committee concerned and 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 have all the privileges of honor students and are 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, and 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; Military or Naval Science; mathematics, 6 units**, and Subject A, as required.

	<i>Units</i>
2. Curriculum requirements (General):	
Animal Husbandry†	3
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	9
	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 to demonstrate scholastic achievement.

The preveterinary curriculum offers a well-balanced basic training in natural science and the humanities that will prepare the candidate not only 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 serve as a basis for the study of veterinary medicine and to justify their desire to work with animals. Deficiencies in scholastic work and animal experience should not deter the candidate from filing an application, since all factors are reviewed by the Admissions Committee. 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 February 28. All the requirements need not be completed at that time, but the student must supply a transcript showing work in progress.

* Prospective students should consult the *Announcement of the School of Veterinary Medicine*, obtainable without charge from the Registrar, University of California, Davis.

** May be completed in high school—trigonometry is prerequisite to physics at the University.

† Requirement may be fulfilled after admission to the School of Veterinary Medicine.

§ Mathematics beyond trigonometry.

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 California prior to the beginning of his preveterinary work. An exception to this rule may be made in the case of applicants 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 with the result that so many students were necessarily being assigned to limited numbers of cases that accreditation of the schools 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 administered 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 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. *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.

b. *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.

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 at least 36 of which must be in upper division courses* (courses numbered 100-199). Not more than 4 of the 124 units may be in lower division physical education courses.

2. Complete, in the School of Veterinary Medicine, the following 74 units of prescribed courses. This total may be reduced in the case of students with advanced standing.

	<i>Units</i>
a. Botany	2
b. Embryology	2
c. Genetics	3
d. Histology	4
e. Veterinary courses offered by the departments in the School of Veterinary Medicine	63
	<hr style="width: 100%; border: 0.5px solid black;"/> 74

Requirements for the Degree of Doctor of Veterinary Medicine

1. 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.

2. He must give satisfactory evidence of possessing a good moral character.

3. 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 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
Animal Husbandry 7	3	..	Chemistry 8, 5	3	3
Chemistry 1A, 1B	5	5	Military Science	2	2
English 1A, 1B	3	3	Physics 2A, 2B	3	3
Military Science	1	1	Zoology 1A, 1B	4	4
Elective	2	5	Elective	3	3
	<hr/> 14	<hr/> 14		<hr/> 15	<hr/> 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 the third and fourth years.

FIRST YEAR			SECOND YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Anatomy 120	10	..	Botany 8	..	2
Genetics 100	..	3	Microbiology 121, 124	10	6
Physiological Sciences 101	..	5	Microbiology 125	..	2
Physiological Sciences 101L	..	2	Pathology 122A-122B	5	5
Physiological Sciences 140	..	6	Physiological Sciences 123A-		
Physiological Sciences 140L	..	3	123B	4	4
Veterinary Medicine 100	0	..		<hr/> 19	<hr/> 19
Veterinary Medicine 110	1	..			
Zoology 107	4	..			
*Zoology 100	2	..			
	<hr/> 17	<hr/> 19			

THIRD YEAR			FOURTH YEAR		
Course	Fall Units	Spring Units	Course	Fall Units	Spring Units
Anatomy 220	..	4	Clinical Pathology		
Avian Medicine 208	3	..	251A-251B	½	½
Clinical Pathology 201, 202	3	3	Clinical Pathology 270A-		
Veterinary Medicine 203,			270B	0	0
205	4	5	Pathology 251A-251B	½	½
Veterinary Medicine 206	..	3	Public Health 240	..	5
Veterinary Medicine 210,			Veterinary Medicine 204	..	5
220	2	4	Veterinary Medicine 207	4	..
Veterinary Medicine 230,			Veterinary Medicine 223	4	..
250	4	1	Veterinary Medicine 224	2	..
Veterinary Medicine 254	..	..	Veterinary Medicine 225,		
Veterinary Medicine 260	2	..	235	1	2
	<hr/> 18	<hr/> 20	Veterinary Medicine 245	2	..
			Veterinary Medicine 251A-		
			251B	5	5
			Veterinary Medicine 256A-		
			256B	1	1
				<hr/> 20	<hr/> 19

* Students are encouraged to take the laboratory course in embryology, Zoology 100L.

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, Los Angeles, La Jolla, Riverside, and Santa Barbara. Graduate study and research is administered by a Graduate Council on each campus and by a statewide Coordinating Committee on Graduate Affairs. The office of the Dean of the Graduate Division, Davis is located in 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	History
Agricultural Economics	Home Economics
Agricultural Education	Horticulture
Agronomy	Irrigation
Animal Husbandry	Mathematics
Animal Physiology	Microbiology
Botany	Nutrition
Chemistry	Physics
Comparative Biochemistry	Plant Pathology
Comparative Pathology	Plant Physiology
Comparative Pharmacology and Toxicology	Political Science
Education	Poultry Science
*Engineering	Range Management
English	Soil Science
Entomology	Vegetable Crops
Food Science	Veterinary Medicine
Genetics	Zoology

The School of Veterinary Medicine offers a curriculum leading to the degree of Doctor of Veterinary Medicine (see page 114).

For complete information concerning opportunities for graduate study and research, students should confer with the department concerned.

* The College of Engineering graduate study and research offerings are discussed on page 92.

Curricula for Teacher Education

Curricula leading to credentials in the general elementary, the general secondary, and certain special secondary fields are offered. In the secondary credential field the teaching majors and minors offered are those listed in the section below.

Agriculture	Mathematics
Art	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 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 three 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. Non-citizens 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, 268A Hunt Hall, University of California, Davis. This application should 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 ap-

plication must be accompanied by a bank draft or money order for the \$5† application fee made 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 of the Graduate Division and the Chairman of the Department of Education or the Department of Agricultural Education when he files his preliminary application.

SPECIFIC REQUIREMENTS

Special Secondary Credentials

The student who plans 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 are 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 obtain 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.

* A special summer session for high school teachers of vocational agriculture will be offered on the Davis campus beginning July 2, 1962, and ending August 10, 1962. 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.

† 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.

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 specific requirements, in addition to the general requirements stated above. These requirements are fulfilled by the general education requirement for the bachelor's degree and are as follows:

1. Forty semester hours of general education with a minimum of 6 semester hours in each of the following areas:

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 sciences.

d. The communicative arts—languages, literature, speech arts, and similar fields.

2. A bachelor's degree from one of the academic colleges of the University or its equivalent.

3. Two semesters of graduate work including 6 semester hours in subject fields commonly taught in elementary schools.

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) Fourteen semester hours of elementary education courses including:

(a) Two semester hours of introduction to elementary teaching.

(b) Four semester hours of methods of teaching basic elementary school subjects.

(c) Two semester hours in principles of elementary school curriculum.

(d) Three semester hours of psychological foundations of education.

(e) Three semester hours of social foundations of education.

(2) Eight semester hours of directed teaching. (This requirement can be met, subject to the approval by the Department of Education, by internship in an elementary school. Students intending to apply for the internship program are advised to contact the Department of Education at the beginning of their senior year).

(3) Two semester hours of a professional course (300 series or equivalent) in a subject matter department. The applicant may take this course as an undergraduate.

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.

6. One semester course from each of the following areas is to be completed by the end of the fifth year. It is presumed that most of these, if not all, will be taken in the undergraduate program. Recommended courses to satisfy these requirements are indicated in parentheses for each area:

Art (Art 198).

California History (History 189A or 189B).

Child Development (Home Economics 131).

English (English 1A or 1B).
 Geography (Geography 2 or 131).
 Mathematics (Math 36).
 Music (Music 10).
 Physical Education (Course 1 or 26).
 Psychology (Course 1A).
 Sociology or Anthropology (Soc. 1 or Anthropology 2).

General Secondary Credentials

This credential authorizes the holder to teach any or all subjects in all grades of any junior college¹, 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 specific requirements, in addition to the general requirements stated above. 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. The specific requirements are as follows.

1. Forty semester hours of general education with a minimum of 6 semester hours in each of the following four areas:

- 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 sciences.
- d. The communicative arts—languages, literature, speech arts, and similar fields.

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. Two semesters of graduate work including 6 semester hours in subject fields commonly taught in junior and senior high schools.

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 22 semester hours of professional work in education. This work is to include:

- (1) Eight semester hours of education courses including:
 - (a) Three semester hours of psychological foundations of education.
 - (b) Three semester hours of social foundations of education.
 - (c) Two semester hours of methods and curriculum.

(2) Six semester hours of directed teaching.

(3) Eight semester hours, including a professional course (300 series or equivalent) in both the major and minor subject matter department, if offered. Additional electives sufficient to bring the total to eight semester hours must be chosen from the following: Education 115, 150, 163, and 320A.

b. Psychology 1A or its equivalent is prerequisite to all education courses.

The above course requirement in directed teaching can be met, subject to the approval by the Department of Education, by internship in a secondary school. Students intending to apply for the internship program are advised to contact the Department of Education at the beginning of their senior year.

* See page 117.

¹ Preference is given to holders of the master's or doctor's degree in appointment to junior college faculties.

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 Departments of Education or of Agricultural 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.

*College of Agriculture***Agriculture**

Subject Representatives: Sidney S. Sutherland, Elwood M. Juergenson.

Major: See pages 53 and 55.

Minor: A minimum of 20 units in agricultural subjects. Students should consult with subject representatives.

Homemaking

Subject Representative: Arline Johnson.

Major: See pages 67 and 69.

Minor: A minimum of 20 units in home economics.

*College of Letters and Science***Art**

Subject Representative: Roland C. Petersen.

Major: See "Art," page 153.

Minor: 20 units in the field of art. Not less than 9 units in this total in upper division courses (except as recommended by the Department of Art).

English

Subject Representative: Gwendolyn B. Needham.

Major: See "English," page 196.

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.

French

Subject Representative: Merle L. Perkins.

Major: See "French," page 209.

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 211.

Minor: Four semester German courses in the lower division, or their equivalents. 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 214.

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 101.

Minor: Botany 1; Zoology 1A-1B. At least 8 units of advanced work in zoology and botany; a laboratory course in a physical science.

Mathematics

Subject Representative: Albert C. Burdette.

Major: See "Mathematics," page 238.

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 254.

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 265.

Minor: 20 units of physical education. Students should consult with representatives of the department as early as possible in their University programs.

Physical Sciences

Subject Representative: Harold G. Reiber.

Major: See page 102.

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, Richard N. Schwab.

Major: A degree in one of the social sciences or an interdepartmental major may be offered (see page 98 and the course section of this Catalogue under the headings of Anthropology and Geography, Economics, History and Political Science, Psychology and Sociology). Students should consult with subject representatives in arranging their programs.

Minor: 20 units in the social sciences, of which 9 are in upper division courses.

Speech Arts

Subject Representatives: Theodore J. Shank, John T. Goldthwait.

Major: See "Dramatic Art and Speech," page 177.

Minor: 20 units in dramatic art or speech including Speech 1A or 2A or 140 or 141; and Dramatic Art 10 or 10B or 128.

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 normally taken by freshmen and 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 normally taken by juniors and seniors. Students will not be permitted to register in upper division courses unless they have completed the courses named as prerequisites. 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 groups of undergraduates (numbered 198) and for individual undergraduates (numbered 199) should be restricted to senior 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 198 or 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.

SYMBOLS

The following symbols and their accompanying footnotes are used throughout the course section:

† Absent on leave, 1961-1962.

‡ Absent on leave, fall semester 1961-1962.

§ Absent on leave, spring semester 1962.

¹ Sabbatical leave in residence, 1961-1962.

² Sabbatical leave in residence, fall semester 1961-1962.

³ Sabbatical leave in residence, spring semester 1962.

* Not to be given, 1961-1962.

⁴ Not to be given, fall semester 1961-1962.

⁵ Not to be given, spring semester 1962.

* To be given if a sufficient number of students enroll.

AGRICULTURAL CHEMISTRY

Clinton O. Chichester, Ph.D., *Chairman of the Executive Committee.*

(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.*

Eric E. Conn, Ph.D., *Associate Professor of Plant Biochemistry.*

Luther D. Davis, Ph.D., *Professor of Pomology.*

Walter L. Dunkley, Ph.D., *Professor of Food Science and Technology.*

Robert E. Feeney, Ph.D., *Professor of Food Science and Technology.*

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.*

Lloyd L. Ingraham, Ph.D., *Associate Professor of Enzyme Chemistry.*

Eugene L. Jack, Ph.D., *Professor of Food Science and Technology.*

Walter G. Jennings, Ph.D., *Associate 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, Emeritus.*

George L. Marsh, M.S., *Professor of Food Science and Technology.*

Tommy Nakayama, Ph.D., *Lecturer in Food Science and Technology.*

Thomas A. Nickerson, Ph.D., *Associate Professor of Food Science and Technology.*

Edgar P. Painter, Ph.D., *Professor of Chemistry.*

†Pauline C. Paul, Ph.D., *Professor of Home Economics.*

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., *Associate Professor of Food Science and Technology.*

Clarence Sterling, Ph.D., *Professor of Food Science and Technology.*

George F. Stewart, Ph.D., *Professor of Food Science and Technology.*

†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.*

Gunter Zweig, Ph.D., *Lecturer in Entomology.*

† Absent on leave, 1961–1962.

GRADUATE COURSES

290. **Seminar in Agricultural Chemistry.** (1) II. Mr. Jennings
One seminar is offered during the 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

George L. Mehren, Ph.D., *Chairman of the Department, Berkeley-Davis.*
Benjamin C. French, Ph.D., *Vice-Chairman of the Department.*

(Department Office, 118 Academic Office Building)

Daniel B. DeLoach, Ph.D., *Professor of Agricultural Economics.*
Trimble R. Hedges, Ph.D., *Professor of Agricultural Economics.*
†Chester O. McCorkle, Jr., Ph.D., *Professor of Agricultural Economics.*
George L. Mehren, Ph.D., *Professor of Agricultural Economics.*
†James M. Tinley, Ph.D., *Professor of Agricultural Economics.*
Edwin C. Voorhies, B.S., *Professor of Agricultural Economics, Emeritus.*
Gerald W. Dean, Ph.D., *Associate Professor of Agricultural Economics.*
J. Edwin Faris, Jr., Ph.D., *Associate Professor of Agricultural Economics.*
Jerry Foytik, Ph.D., *Associate Professor of Agricultural Economics.*
Benjamin C. French, Ph.D., *Associate Professor of Agricultural Economics.*
Gordon A. King, 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.*
Curtis C. Harris, Jr., Ph.D., *Assistant Professor of Agricultural Economics.*
Stephen H. Sosnick, Ph.D., *Assistant Professor of Agricultural Economics.*
———, *Assistant Professor of Agricultural Economics.*
Oscar E. Burt, B.S., *Acting Assistant Professor of Agricultural Economics.*



Stanley S. Johnson, M.A., *Lecturer in Agricultural Economics.*
Alyce Williams Lowrie, M.S., *Lecturer in Agricultural Economics.*
Warren K. Taylor, LL.B., *Lecturer in Business Law.*

Departmental Major Advisers.—Mr. Dean, Mr. Harris, Mr. Carter, Mr. Sosnick.

The Major.—See pages 52–53.

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. De Loach
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, 1961–1962.

100A. Economic Analysis in Agriculture. (3) I. Mr. Faris

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. Burt

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. Johnson

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) I. Mr. Johnson

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, 1961-1962.

- 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) II.** Mrs. Lowrie

Types of cooperative agencies; scope and objectives of agricultural co-operation, 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. Dean; II. Mr. Carter.

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

* Not to be given, 1961-1962.

and types of land use; resource conservation; land valuation; land tenure problems and policies.

180. Economic Analysis in Agricultural Policy. (3) II. Mr. Harris

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. Carter

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 required.

299. Special Study for Graduate Students. (1-4) I and II.

The Staff (Mr. Snyder 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

Sidney S. Sutherland, M.S., *Chairman of the Department.*

(Department Office, 272 Academic Office Building)

Sidney S. Sutherland, M.S., *Professor of Agricultural Education, Supervisor of Teacher Training—Vocational.*

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, Supervisor 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 53-55.

UPPER DIVISION COURSES

160. **Vocational Education.** (2) 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

- 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.

- 320B. **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.

- ‡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.

‡ 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, 1961, will begin on or about August 31 and end January 29. For the spring semester, 1962, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

AGRICULTURAL ENGINEERING

Clarence F. Kelly, M.S., *Chairman of the Department.*

(Department Office, 206 Walker Engineering Building)

Roy Bainer, M.S., *Professor of Agricultural Engineering.*
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.*
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.*
Robert B. Fridley, B.S., *Assistant Professor of Agricultural Engineering.*
John R. Goss, M.S., *Assistant Professor of Agricultural Engineering.*



Marvin J. Dvoracek, *Lecturer in Agricultural Engineering.*
Frederic C. Jacob, M.S., *Lecturer in Agricultural Engineering.*
Arthur S. Leonard, M.S., *Lecturer in Agricultural Engineering.*
Allan A. McKillop, M.S., *Lecturer in Agricultural Engineering.*
Stanton R. Morrison, *Lecturer in Agricultural Engineering.*
Michael O'Brien, Ph.D., *Lecturer in 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.

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.

Prerequisite: Physics 2A and 3A, or 4A.

Functional and structural design of unified physical plants for livestock production and other enterprises; principles of feed mills, materials conveying, water and electrical systems, feed storage; labor efficiency studies; materials and design of beams, columns, trusses, and tanks.

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

Laboratory.

Prerequisite: agricultural education major or consent of the instructor.

The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in even-numbered years.

314B. Agricultural Engineering Problems and Techniques for Teachers.

(2) I.

Mr. O'Brien

Laboratory.

Prerequisite: agricultural education major or consent of the instructor.

Course 314A is not prerequisite to 314B.

A continuation of course 314A. 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.

* Not to be given, 1961-1962.

AGRONOMY

R. Merton Love, Ph.D., *Chairman of the Department.*

(Department Office, 131 Hunt Hall)

Fredrick T. Addicott, Ph.D., *Professor of Agronomy.*
Robert W. Allard, Ph.D., *Professor of Agronomy.*
Fred N Briggs, Ph.D., *Professor of Agronomy.*
Paulden F. Knowles, Ph.D., *Professor of Agronomy.*
Horton M. Laude, Ph.D., *Professor of Agronomy.*
R. Merton Love, Ph.D., *Professor of Agronomy.*
Maurice L. Peterson, Ph.D., *Professor of Agronomy.*
Charles W. Schaller, 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.*
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.*
Dale G. Smeltzer, Ph.D., *Assistant Professor of Agronomy.*



Beecher Crampton, M.S., *Lecturer in Agronomy.*
Ray C. Huffaker, Ph.D., *Lecturer in Agronomy.*

Departmental Major Advisers.—Mr. Laude, Mr. Loomis, Mr. Mikkelsen, Mr. Schaller, Mr. Smeltzer, Mr. Stanford.

The Major.—See pages 72-77.

LOWER DIVISION COURSE

1. Introduction to Agronomy. (3) I. Mr. 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 1 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. Mr. Williams
Lectures and laboratory.

Prerequisite: course 1 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. Mikkelsen
Lectures and laboratory.

Prerequisite: course 1 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.

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 111.

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 105A-105B)

Diseases of Crop Plants (Plant Pathology 125A-125B)

Range Plants (Range Management 100)

Grassland Ecology (Range Management 133)

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.

Lectures and laboratory.

Mr. Huffaker, Mr. Zscheile

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.

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. Addicott

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

Robert A. Wiggins, Ph.D., *Chairman of the Committee*

(Committee Office, 178 Academic Office Building)

Only those students registered for the American Civilization program prior to the fall semester of 1961 will be accepted as majors during the academic year 1961-1962.

Committee in Charge:

Arthur Child, Ph.D., *Professor of Philosophy.*

David L. Jacobson, Ph.D., *Assistant Professor of History.*

John R. Owens, Ph.D., *Assistant Professor of Political Science.*

Richard N. Schwab, Ph.D., *Assistant Professor of History.*

Theodore J. Shank, Ph.D., *Assistant Professor of Dramatic Art.*

William W. True, Ph.D., *Assistant Professor of Physics.*

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 108).

Group Major Adviser.—Mr. Wiggins.

The Major Program.—See description, page 100.

The Major with Honors.—See description, page 100.

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.

* Not to be given, 1961-1962.

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.

ANATOMY

Logan M. Julian, D.V.M., Ph.D., *Chairman of the Department.*

(Department Office, 1045 Haring Hall)

Logan M. Julian, D.V.M., Ph.D., *Professor of Anatomy.*

Larry Z. McFarland, D.V.M., Ph.D., *Assistant Professor of Anatomy.*

Walter S. Tyler, D.V.M., Ph.D., *Assistant Professor of Anatomy.*

UPPER DIVISION COURSES

120. Functional Comparative Anatomy of Domestic Animals. (10) I.

Lectures and laboratory. Mr. Julian, Mr. McFarland, Mr. Tyler

Prerequisite: first-year standing in the School of Veterinary Medicine.

Systematic presentation of the gross and subgross anatomy of domesticated species.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

Laboratory.

The Staff

Prerequisite: course 120 or consent of the instructor.

GRADUATE COURSES

220. Surgical Anatomy. (4) II.

Mr. Julian, Mr. McFarland

Lectures and laboratory.

Prerequisite: course 120 or equivalent.

Topographical, radiological, and regional anatomy as it applies to the clinical sciences.

290. Seminar in Anatomy. (1) I and II.

The Staff

299. Research in Anatomy. (1-6) I and II.

The Staff

Laboratory.

ANIMAL HUSBANDRY

James H. Meyer, Ph.D., *Chairman of the Department.*

(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.*
Hubert Heitman, Jr., Ph.D., *Professor of Animal Husbandry.*
Glen P. Lofgreen, Ph.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.*
Max Kleiber, Sc.D., *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.*
Moses T. Clegg, Ph.D., *Associate Professor of Animal Husbandry.*
Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*
Robert C. Laben, Ph.D., *Associate Professor of Animal Husbandry.*
James H. Meyer, Ph.D., *Associate Professor of Animal Husbandry.*
†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.*



Jack R. Luick, Ph.D., *Lecturer in Animal Husbandry.*

Departmental Major Advisers.—Mr. Bradford, Mr. Heitman, Mr. Laben, Mr. Loy, Mr. Ronning, Mr. Spurlock.

The Major.—See pages 61–63.

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. Carroll, Mr. Spurlock
Laboratory.

Prerequisite: course 7.

The animal form in relation to its various functions.

UPPER DIVISION COURSES

102. **Animal Biochemistry Laboratory.** (3) I. Mr. Luick
Lectures and laboratory.

Prerequisite: Biochemistry 101 (may be taken concurrently).

† Absent on leave, 1961–1962.

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: Biochemistry 101.

A study of the fundamental principles of animal nutrition. Includes a survey of the role of carbohydrates, proteins, lipids, minerals, vitamins and 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.

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, 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. Bradford, Mr. Heitman.

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

Lectures and laboratory.

Prerequisite: courses 103 or 105, and 110; Genetics 100.

Feeding, breeding, and management of horses; application of the principles of basic animal sciences to problems of production of all classes of horses.

116. Advanced Type Evaluation in Dairy Cattle. (2) II. Mr. Mead

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. Boda

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. 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

Animal Hygiene
(Microbiology 111)

GRADUATE COURSES

201. Protein Biochemistry. (3) I. Mr. Geschwind
Prerequisite: Biochemistry 101 and Chemistry 109.

Introduction to the chemical, physical and biological properties of amino acids, peptides, and proteins. The biological aspects include protein function, biosynthetic and biodegradative pathways, and nutritional requirements for amino acids.

230. Biochemical Aspects of Endocrinology. (2) II. Mr. Geschwind
Prerequisite: course 110 or equivalent; Biochemistry 101.

The chemistry and function of animal hormones, with special reference to the isolation and structure of those of vertebrate origin. Assay, mechanism of action, biosynthesis, and metabolism of hormones. Biochemical lesions in congenital and other endocrinopathies.

Offered in alternate years.

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

Frederick W. Lorenz, Ph.D., *Chairman of the Group.*

(Adviser's Office, 130 Poultry Husbandry Building)

Members of the Animal Physiology Group:

- Ursula H. Abbott, Ph.D., *Assistant Professor of Poultry Husbandry.*
Norman F. Baker, D.V.M., Ph.D., *Associate Professor of Parasitology.*
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., *Associate Professor of Animal Husbandry.*
Harold H. Cole, Ph.D., *Professor of Animal Husbandry.*
Charles E. Cornelius, D.V.M., Ph.D., *Assistant Professor of Clinical Pathology.*
†Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*
Irving I. Geschwind, Ph.D., *Associate Professor of Animal Husbandry.*
Frederic W. Hill, Ph.D., *Professor of Poultry Husbandry.*
Louis W. Holm, Ph.D., *Professor of Physiology.*
Jurgen H. H. Jacobs, Ph.D., *Assistant Professor of Zoology.*
Logan M. Julian, D.V.M., Ph.D., *Professor of Anatomy.*
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, Emeritus.*
Charles R. Kovacic, Ed.D., *Professor of Physical Education.*
Frederick W. Lorenz, Ph.D., *Professor of Poultry Husbandry.*
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.*
Edward A. Rhode, Jr., D.V.M., *Associate Professor of Veterinary Medicine.*
George W. Salt, Ph.D., *Associate Professor of Zoology.*
Arthur H. Smith, Ph.D., *Associate Professor of Poultry Husbandry.*
Wilbor O. Wilson, Ph.D., *Professor of Poultry Husbandry.*



- Emanuel Epstein, Ph.D., *Lecturer in Plant Nutrition.*
William J. Flocker, Ph.D., *Lecturer in Vegetable Crops.*
Chester L. Foy, Ph.D., *Lecturer in Agricultural Botany.*
Jack R. Luick, Ph.D., *Lecturer in Animal Husbandry.*
Edward C. Maxie, Ph.D., *Lecturer in Pomology.*

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.

Group Major Adviser.—Mr. Lorenz.

The Major.—See pages 61–63.

UPPER DIVISION COURSES

100. General Physiology. (4) I.

Lectures and laboratory.

Prerequisite: Chemistry IA–1B, 8; Physics 2A–2B; Physiology 1, 1L,

Mr. Smith

† Absent on leave, 1961–1962.

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 Physiological Sciences 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 Physiological Sciences 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.)

Mr. Black, Mr. Epstein, Mr. Flocker, Mr. Foy, Mr. Kleiber, Mr. Luick
Discussion of the use of isotopes as tracers in biological systems.

243L. Laboratory in Use of Isotopes as Tracers in Biological Research.

(2) I.

Mr. Black, Mr. Epstein, Mr. Flocker, Mr. Foy, Mr. Kleiber, Mr. Luick
Laboratory.

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.

291. Seminar in General Physiology. (1) II. The Staff (Mr. Smith in charge)

Discussion of selected topics concerning the physical and chemical processes of cells and tissues.

RELATED COURSES

Mammalian Physiology (Animal Husbandry 110, Physiological Sciences 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)

Biochemical Aspects of Endocrinology (Animal Husbandry 230)

* Not to be given, 1961-1962.

General Cytology (Botany 130)

Kinesiology (Physical Education 103A-103B)

Physiological Chemistry (Physiological Sciences 101, 101L)

Intermediary Metabolism of Animals (Physiological Sciences 105, Bacteriology 103, Biochemistry 150A, 150B, Clinical Pathology 203)

Experimental Physiology (Physiological Sciences 265)

Introductory Physiology (Physiology 1, 1L, see Zoology)

Avian Physiology (Poultry Husbandry 107, 108)

Environmental Physiology of Domestic Animals (Poultry Husbandry 149)

ANTHROPOLOGY AND GEOGRAPHY

†David L. Olmsted, Ph.D., *Chairman of the Department.*
Martin A. Baumhoff, Ph.D., *Acting Chairman of the Department.*

(Department Office, 324 Academic Office Building)

†David L. Olmsted, Ph.D., *Professor of Anthropology.*
Martin A. Baumhoff, Ph.D., *Assistant Professor of Anthropology.*
Daniel J. Crowley, 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.*
Philip L. Wagner, Ph.D., *Assistant Professor of Geography.*



Thomas H. Pagenhart, A.B., *Lecturer in Geography.*
Herbert B. Schultz, Ph.D., *Lecturer in Geography.*
Jack M. Whitehead, M.A., *Lecturer in Anthropology.*

ANTHROPOLOGY

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

Departmental Major Adviser.—Mr. Baumhoff.

The Major Program

(A) Lower Division Courses.—Required: Anthropology 1, 2, Geography 1, Psychology 1A, and Mathematics 13. Recommended: Geology 1A, 1B, Zoology 1A.

(B) Upper Division Courses.—Required: courses 102, 103, 110A–110B, 128, 195 and 7 units drawn from other upper division courses in anthropology or from Art 150, 154A, 154B; Sociology 126; Genetics 100; Geology 111.

LOWER DIVISION COURSES

1. **Physical Anthropology.** (3) I and II. Mr. Baumhoff, Mr. Whitehead
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.

2. **Cultural Anthropology.** (3) I and II. Mr. Crowley, _____
Prehistory and growth of culture; diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion.

UPPER DIVISION COURSES

102. **Ethnology.** (3) I. _____

Prerequisite: course 2 or consent of the instructor.

Major theories of culture; survey of principal culture types and their distribution; discussion of ethnological problems.

103A–103B. **Culture Growth.** (3–3) Yr.

Mr. Baumhoff

Prerequisite: consent of the instructor. Course 103A is not prerequisite to 103B.

Comparative prehistory and archaeology.

103A: Old World.

103B: New World.

† Absent on leave, 1961–1962.

105. The American Indian. (3) II. _____

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.

121. Folklore. (3) II.

Mr. Crowley

Prerequisite: course 2 or literary preparation acceptable to the instructor.

Theory and method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.

***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.

128. Kinship and Social Organization. (3) II. _____

Prerequisite: course 2.

Kinship systems and their significance in the organization of social life. Theories of kinship, marriage regulations, and kinship role patterns.

139. Peoples of Africa. (3) I.

Mr. Crowley

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.

***140. Peoples of Afroamerica. (3) I.**

Mr. Crowley

A study of the cultural implications of slavery and the contribution of Africans to the national cultures of the Americas.

147. Peoples of the Pacific. (3) I. _____

The aboriginal civilizations of Australia, Malaysia, Melanesia, Micronesia, and Polynesia in prehistoric and modern times; changes arising from European contact and colonization.

152. Human Evolution and Fossil Man. (3) I.

Mr. Whitehead

Prerequisite: course 1 or equivalent.

Nature and results of the evolutionary processes involved in the formation and differentiation of mankind.

Offered in odd-numbered years.

***153. Living Races of Man. (3) I.** _____

Prerequisite: course 1 or equivalent.

Physical characters, distribution, and relationships.

Offered in even-numbered years.

195. Field Course in Archaeological Method. (2) I.

Mr. Baumhoff

Prerequisite: consent of the instructor.

Lectures, museum preparation, and week-end excavations. Enrollment

* Not to be given, 1961-1962.

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. Baumhoff in charge)

GRADUATE COURSES

***250. Theory and Method of Anthropology. (2) II.** Mr. Baumhoff

***292. Seminar in Anthropological Linguistics. (2) I.** Mr. Olmsted

GEOGRAPHY

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

Departmental Major Adviser.—Mr. Gregor.

The Major Program

(A) Lower Division Courses.—Required: Geography 1, 2, 3; Anthropology 2; Economics 1B; Geology 1A.

(B) Upper Division Courses.—Required: 24 upper division units in Geography. Each program should normally include Geography 101 (Methods of Geographic Research), 105 (Cartography), and 151 (History of Geographic Thought).

It is recommended that selected courses be taken in agricultural economics, anthropology, botany, economics, geology, history, political science, sociology, statistics, and other fields. Course selection, as appropriate to the individual student's program, should be made in consultation with the adviser.

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. Wagner

A study of the basic cultural elements of geography (especially population distribution, general settlement and land-use patterns, and economics) 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.

* Not to be given, 1961-1962.

UPPER DIVISION COURSES

- *101. Methods of Geographic Research.** (3) II. Mr. Wagner
Lectures and laboratory.
Prerequisite: courses 1 and 2 and consent of the instructor.
Research methodology; field study of a unit area, with systematic mapping of the elements that constitute the natural region and of the forms of its utilization; field trips.
Offered in alternate years.
- 105. Cartography.** (3) I. Mr. Gregor
Lectures and laboratory.
Prerequisite: consent of the instructor.
Theory and construction of map projections; interpretation of maps; compilation and generalization of base-map data; symbolization and processing of map data; cartographic designing and lettering techniques; map reproduction.
- 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.
- 122. The Geography of Latin America.** (3) I. Mr. Wagner
Prerequisite: courses 1 and 2 or consent of the instructor.
A study of the physical and cultural characteristics of Latin America's geographical regions.
- 123. The Geography of Europe.** (3) II. Mr. Pagenhart
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.
- 124. The Geography of the Soviet Union.** (3) II. Mr. Wagner
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 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. Pagenhart
Areal differentiation of the natural and cultural phenomena that affect the world's political organization.
- *151. History of Geographic Thought.** (3) II. Mr. Wagner
Prerequisite: three upper division courses in geography.
Objectives, subdivisions, and development of geography.
Offered in alternate years.

* Not to be given, 1961-1962.

155. Urban Geography. (3) I.

Mr. Wagner

The origin, development, distribution, and regional variation of the world's cities, with emphasis on an analysis of the functions and patterns of American cities.

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. Gregor 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.

ART

‡Richard L. Nelson, M.A., *Chairman of the Department.*

Ralph M. Johnson, M.A., *Acting Chairman of the Department, Fall semester 1961-1962.*

(Department Office, 323 Academic Office Building)

‡Richard L. Nelson, M.A., *Professor of Art.*
Daniel J. Crowley, Ph.D., *Assistant 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.*



Joseph A. Baird, Jr., Ph.D., *Lecturer in Art.*
Richard D. Cramer, M.F.A. (Architecture), *Associate Professor of Design.*
Ruth J. Horsting, M.A., *Assistant Professor of Design.*
Charles Muskavitch, H.D., F.I.L.C., *Lecturer in Art.*
Daniel Shapiro, *Assistant Professor of Design.*

Letters and Science List.—All undergraduate courses except 16 and 17 are included in the Letters and Science List of Courses (see page 108).

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.
From the Stone Age to the end of the Roman Empire.
Field trips are included.

Mr. Howard

‡ Absent on leave, fall semester 1961-1962.

- 1B. History of Medieval, Renaissance, and Modern Art.** (3) II. ———
 Emphasis on Painting.
 Field trips are included.
- 1C. History of Medieval, Renaissance, and Modern Art.** (3) I. Mr. Howard
 Emphasis on Architecture and Sculpture.
 Field trips are included.
- 1D. History of Oriental Art.** (3) I. Mr. Crowley
 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.
- 12. Ceramics.** (2) I. Mr. Howard
 Laboratory.
 An introduction to ceramic forms and ceramic sculpture.
- 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 con-
 struction 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.

* Not to be given, 1961-1962.

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. Thiebaud
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.

Composition with the human figure as a basic motif. Paintings in various media including oil, tempera, gouache, and wax.

Field trips are included.

128. Graphic Design. (2) I. Mr. Shapiro
Laboratory.

Prerequisite: two semesters of art practice or design.

Studio projects in graphic symbolism.

129. Graphic Arts. (2) II. Mr. Petersen
Laboratory.

Prerequisite: course 2A-2B.

Methods of engraving, etching, aquatint, dry point, and lithography.

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.

142. The Human Figure in Sculpture. (2) II. Mr. Johnson
Laboratory.

Prerequisite: courses 3B, 14B; or consent of the instructor. Recommended: courses 131, 141.

Design exercises in three dimensions and relief, featuring the human figure as subject matter.

160. Architectural Design. (2) II. Mr. Cramer
Laboratory.

Prerequisite: two semesters of art practice or design.

Studio projects in architectural design.

Group B: Theory and Criticism

131. **Art Theory and Criticism.** (2) II. Mr. Nelson
Prerequisite: course 2A or 14A and one art lecture course.
Study of forms and symbols in historic and contemporary works of art.

Group C: History of Art

Open to nonmajors. General prerequisite: upper division standing and consent of the instructor.

150. **The Art of Primitive Peoples.** (3) II. Mr. Crowley
The arts of prehistoric peoples, and of the peoples of Africa, Oceania, Australia, and the Indians of the Americas.

- *154. **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. _____
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. _____
Field trips are included.

- *188A. **The Art of Latin America.** (3) I. _____
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.

- 188B. **The Art of the United States.** (3) I. 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.

190. **Museum Methods and Connoisseurship.** (3) II.
Lectures and laboratory. Mr. Baird, Mr. Muskavitch
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, 1961-1962.

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 re-
peated 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

PROFESSIONAL COURSES

300. **Practice and Principles of Art Education.** (2) I. _____
Lectures and laboratory.
Prerequisite: senior or graduate standing, or consent of the instructor.
Art education and practice of techniques used in elementary and secondary
schools.

AVIAN MEDICINE

Livio G. Raggi, D.V.M., Ph.D., *Chairman of the Department.*

(Department Office, 2079 Haring Hall)

Raymond A. Bankowski, D.V.M., Ph.D., *Professor of Veterinary Medicine.*

†Henry E. Adler, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*

Livio G. Raggi, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*



Leslie A. Page, Ph.D., *Lecturer in Avian Medicine.*

UPPER DIVISION COURSES

112. **Principles of Poultry Diseases.** (3) II.

Prerequisite: Zoology 1A; Bacteriology 1; junior standing or consent of the instructor.

Principles in the control of poultry diseases.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff (Mr. Raggi in charge)

GRADUATE COURSES

208. **Poultry Diseases.** (3) I.

Mr. Adler, Mr. Bankowski, Mr. Raggi

Prerequisite: third-year standing in the School of Veterinary Medicine. Other qualified students admitted with consent of the instructor.

The etiology, diagnosis, and control of the diseases of poultry.

290. **Seminar in Avian Medicine.** (1) I and II.

Mr. Raggi

299. **Research in Avian Medicine.** (1-6) I and II.

The Staff (Mr. Raggi in charge)

† Absent on leave, 1961-1962.

BACTERIOLOGY

Robert E. Hungate, Ph.D., *Chairman of the Department.*

(Department Office, 1076C Haring Hall)

Robert E. Hungate, Ph.D., *Professor of Bacteriology.*

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 108).

The Major in Microbiology.—The undergraduate major program is designed to provide a proper balance of studies in microbiology and the auxiliary chemical and biological sciences, with considerable latitude in the selection of individual courses.

A major in microbiology is appropriate for 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 Parasitology 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 109).—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 Labora-

† Absent on leave, 1961–1962.

tory, 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. Bacterial Ecology and Classification.** (4) I. Mr. Starr
Lectures and laboratory.
Prerequisite: course 1; Chemistry 8.
Principles of bacterial ecology and classification with intensive study of selected groups.
- 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.** (1-3) 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. 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.

***207. Bacterial Genetics. (3) II. Mrs. Riley**

Prerequisite: course 1; Biochemistry 101. Recommended: Genetics 100.

The mechanisms for transmission of hereditary traits in microorganisms, with emphasis on bacteria and bacteriophage.

***207L. Laboratory in Bacterial Genetics. (2) II. Mrs. Riley**

Laboratory.

Prerequisite: course 207 (may be taken concurrently).

Genetic analyses of bacteria and bacteriophage.

299. Special Study and Research in Microbiology. (1-6) I and II. The Staff

RELATED COURSES

Intermediary Metabolism (Biochemistry 150A-150B)

Enzymology (Biochemistry 210)

Biochemical Mechanisms (Biochemistry 205)

Comparative Morphology of Nonvascular Plants (Botany 114)

Mycology (Botany 119)

Food and Industrial Microbiology Laboratory (Food Science and Technology 105A-105B)

Microbiology of Milk and Dairy Products (Food Science and Technology 132)

Yeasts and Related Organisms (Food Science and Technology 216)

Medical Microbiology (Microbiology 127)

Advanced Immunology (Microbiology 270)

Soil Microbiology and Soil Biochemistry (Soils and Plant Nutrition 111)

Protozoology (Zoology 110)

* Not to be given, 1961-1962.

BIOCHEMISTRY AND BIOPHYSICS

Eric E. Conn, Ph.D., (*Acting Chairman of the Department*).

(Department Office, 265 Hoagland Hall)

†Paul K. Stumpf, Ph.D., *Professor of Plant Biochemistry.*

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.*

‡Richard S. Criddle, M.S., *Acting Assistant Professor of Physical Biochemistry.*

Department Major Adviser.—Mr. Conn.

The department does not offer an undergraduate major in this subject. For graduate study the Department of Biochemistry and Biophysics 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 and II.

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 limited experience in the use of biochemical techniques as laboratory tools.

150A. Intermediary Metabolism. (3) I.

Mr. Chaykin, Mr. Conn

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

Prerequisite: course 101 or equivalent. Recommended: Chemistry 150B.

Comparative metabolism of amino acids, proteins, porphyrins, and nucleic acids.

GRADUATE COURSES

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 biochemical techniques.

205. Biochemical Mechanisms. (2) I.

Mr. Ingraham

Prerequisite: course 101; Chemistry 109 or 110A–110B or equivalent, 131.

Bond structures of biochemical interests. Application of modern organic

† Absent on leave, 1961–1962.

‡ Absent on leave, fall semester 1961–1962.

and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

***206. Physical Biochemistry of Macromolecules.** (2) I. Mr. Criddle

Prerequisite: course 101; Chemistry 110A-110B.

Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest.

210. Enzyme Chemistry. (3) II. Mr. Ingraham

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

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)

Intermediary Metabolism of Animals (Physiological Sciences 105)

GRADUATE COURSES

Protein Biochemistry (Animal Husbandry 201)

Biochemical Aspects of Endocrinology (Animal Husbandry 230)

Selected Topics in Microbial Metabolism (Bacteriology 203)

Microbial Biochemistry (Bacteriology 204)

Plant Cell Metabolism (Botany 211)

Physical Biochemistry (Chemistry 213)

* Not to be given, 1961-1962.

BIOLOGICAL SCIENCES

Robert E. Hungate, Ph.D., *Chairman of the Committee*

(Committee Office, 277 Robbins Hall)

Committee in Charge:

Charles R. Goldman, Ph.D., *Assistant Professor of Zoology.*

Robert E. Hungate, Ph.D., *Professor of Bacteriology.*

Emile A. Pessagno, Jr., Ph.D., *Assistant Professor of Geology.*

C. Ralph Stocking, Ph.D., *Professor of Botany.*

T. Elliot 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 108).

Major Advisers.—Mr. Hungate, Mr. Pessagno, Mr. Weier.

The Major Program.—See description, page 101.

Honors and Honors Program (see page 109).—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. Weier in charge)

Prerequisite: enrollment limited to honors students.

Independent research and/or reading on selected topics.

195H. Honors Thesis. (1) I and II.

The Staff (Mr. Weier 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. Weier 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

Alden S. Crafts, Ph.D., *Chairman of the Department.*

(Department Office, 143 Robbins Hall)

Vernon I. Cheadle, Ph.D., *Professor of Botany.*
Alden S. Crafts, Ph.D., *Professor of Botany.*
†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.*
Robert Lepper, Jr., *Visiting 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.*
———, *Instructor in Botany.*



Floyd M. Ashton, Ph.D., *Lecturer in Botany and Assistant Professor of Agricultural Botany.*
Paul A. Castelfranco, Ph.D., *Lecturer in Botany.*
Chester L. Foy, Ph.D., *Lecturer in Botany and Assistant Professor of Agricultural Botany.*
Joe L. Key, Ph.D., *Lecturer in Botany.*
Jack Major, Ph.D., *Assistant Professor of Agricultural Botany.*
Gene R. Williams, B.S., *Lecturer in 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 108).

Departmental Major Adviser.—Mr. Wells.

The Major Program

The Bachelor of Science major program should be elected by those students who plan advanced study in botany, who wish to obtain general secondary teaching credentials, or who wish training for a position requiring a detailed knowledge of plants, e.g., seed analysts. Students who wish a less intensive program in botany, but one which acquaints the student with plant life and its importance, should elect the Bachelor of Arts major program.

Bachelor of Science Major Program

(A) Lower Division Courses.—Botany 1; Chemistry 1A, 8; Physics 2A–2B; plus 13 units in related natural science subjects; German or French is the required language; Bacteriology 1, Chemistry 1B, Zoology 10 or 1A–1B are recommended.

(B) Upper Division Courses.—Botany 108, 111, 114, 116; Genetics 100; 6 additional units in botany, plus 7 units in related natural science courses.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Botany 1; Zoology 10; Chemistry 1A. Chemistry 8 is recommended.

(B) Upper Division Courses.—Twenty-four units in botany and allied areas; 9 upper division units from the humanities or the social sciences, in addition to the college breadth requirements, are also required.

† Absent on leave, 1961–1962.

Honors and Honors Program (see page 109).—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.

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 Esar

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.

111. Introduction to Plant Physiology. (4) II.

Mr. Stocking

Prerequisite: course 1; Chemistry 8 (may be taken concurrently).
The fundamental activities of plants, such as absorption, transpiration, synthesis of foods, respiration, growth, and reproduction.

*114. Comparative Morphology of Nonvascular Plants. (4) II.

Lectures and laboratory. Mr. Gifford, Mr. Wells
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.

* Not to be given, 1961–1962.

117. Plant Ecology. (3) II.

Mr. Major

(Formerly course 110.)

Lectures and laboratory.

Prerequisite: course 111. 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 224)**Fruit Morphology** (Pomology 110)**Plant Physiology and Plant Biochemistry****120A-120B. Plant Physiology. (3-3) Yr.**

Mr. Key, Mr. Stocking

Prerequisite: course 111 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, enzyme action, photosynthesis, respiration, and various aspects of growth.

121A-121B. Plant Physiology Laboratory. (2-2) Yr.

Mr. Williams

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. Ashton, Mr. Foy
Survey and discussion of recent developments in the field of plant physiology at the graduate level.
- *210. Cell Physiology-Protozoology.** (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.
- 214. Mechanisms of Toxic Action.** (2) I. Mr. Castelfranco
Prerequisite: courses 107, 120B; Biochemistry 101, or consent of the instructor.
Physiological and biochemical mechanisms underlying toxicity and detoxification reactions.
Offered in alternate years.
- 216A. Advanced Morphology of Vascular Plants.** (3) II. Mr. Cheadle
Lectures and laboratory.
Prerequisite: course 116 or equivalent.
Evolution of form, structure, and reproduction of fossil and extant types through *Cycadophytes*.

* Not to be given, 1961-1962.

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, micurgy, 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.

Mr. Cheadle, Miss Esau, Mr. Gifford, Mr. Tucker, Mr. Weier

Survey and discussion of recent developments in the field of plant morphology.

299. Research in Botany. (1-6) I and II.

The Staff

CHEMISTRY

Lawrence J. Andrews, Ph.D., *Chairman of the Department.*

(Department Office, 32 Chemistry Building)

Lawrence J. Andrews, Ph.D., *Professor of Chemistry.*
†Robert K. Brinton, Ph.D., *Professor of Chemistry.*
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.*
Albert T. Bottini, Ph.D., *Assistant Professor of Chemistry.*
Gary E. Maciel, Ph.D., *Assistant Professor of Chemistry.*
Charles P. Nash, Ph.D., *Assistant Professor of Chemistry.*
George B. Savitsky, 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 108).

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.

Candidates for the bachelor's degree in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.

Bachelor of Science Major Program

(A) Lower Division Courses.—Chemistry 1A–1B, 5 or 7A, 7B; 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 or 7A, 7B; 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 109).—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

† Absent on leave, 1961–1962.

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 and Mr. Allen 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. Maciel in charge; II. Mr. Volman in charge)
Lectures and laboratory.

Prerequisite: course 1A.

5. Quantitative Analysis. (3) I and II. I. Mr. Savitsky; II. Mr. Nash
Lectures and laboratory.

Prerequisite: course 1B with grade of C or higher. Not open to students who have credit for Chemistry 7B.

A short course dealing with the principles and methods of quantitative analysis.

7A-7B. General Chemistry. (5-5) Yr. Mr. Nash, Mr. Savitsky
Lectures and laboratory.

Prerequisite: high school chemistry, Mathematics 3A or 16A (may be taken concurrently), and superior performance on an examination to be given during the week of registration. Enrollment to be limited.

The fundamental principles of chemistry with emphasis in the laboratory on quantitative work. Equivalent to the sequence Chemistry 1A-1B-5 as a prerequisite for further courses in chemistry.

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. Nash
Lectures and laboratory.
Prerequisite: course 5.
- 109. Physical Chemistry, Brief Course.** (3) II. Mr. Young
Prerequisite: course 5; one year of college physics; Mathematics 16B or equivalent.
Graduate students of high standing may, under exceptional circumstances, be admitted without the prerequisite 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) II. Mr. Keefer
Prerequisite: course 110A.
A continuation of course 110A.
- 111. Physical Chemistry.** (3) I and II. I. Mr. Warren; II. Mr. Maciel
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 109 or 110B.
Modern physicochemical concepts applied to selected groups of inorganic compounds.
- 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.

- 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.
- 130. Qualitative Organic Analysis.** (3) II. Mr. Kepner
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.

* Not to be given, 1961-1962.

- 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.
- 233. 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. Bottini
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 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.

* Not to be given, 1961-1962.

CLINICAL PATHOLOGY

Oscar W. Schalm, D.V.M., Ph.D., *Chairman of the Department.*

(Department Office, 1165 Haring Hall)

Donald E. Jasper, D.V.M., Ph.D., *Professor of Clinical Pathology.*
Oscar W. Schalm, D.V.M., Ph.D., *Professor of Clinical Pathology.*
Charles E. Cornelius, D.V.M., Ph.D., *Assistant Professor of Clinical Pathology.*
Jiro J. Kaneko, D.V.M., Ph.D., *Assistant Professor of Clinical Pathology.*
Gordon H. Theilen, D.V.M., *Assistant Professor of Clinical Pathology.*

UPPER DIVISION COURSES

198. **Directed Group Study.** (1-3) I and II. The Staff
Prerequisite: consent of the instructor.
Directed group study of selected topics in clinical pathology.
199. **Special Study for Advanced Undergraduates.** (1-4) I and II. The Staff

GRADUATE COURSES

201. **Clinical Hematology and Bacteriology.** (3) I. Mr. Kaneko, Mr. Schalm
Laboratory.
Prerequisite: third-year standing in the School of Veterinary Medicine or consent of the instructor.
Hematologic techniques and interpretation as applied to the study of disease in animals: morphologic and chemical characteristics of milk and bacteriologic techniques as applied to mastitis diagnosis.
202. **Clinical Biochemistry.** (3) II. Mr. Cornelius, Mr. Kaneko
Lectures and laboratory.
Prerequisite: third-year standing in the School of Veterinary Medicine or 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. **Biochemistry of Metabolic Diseases.** (3) I. Mr. Cornelius, Mr. Kaneko
Prerequisite: biochemistry and physiology or consent of the instructor.
The biochemistry of inborn and acquired errors of metabolism in animals and man.
Offered in even-numbered years.
- 251A-251B. **Clinical Pathology Laboratory.** (½) I and II. The Staff
Prerequisite: fourth-year standing in the School of Veterinary Medicine.
Application of laboratory methods to the diagnosis of animal disease.
- 270A-270B. **Jurisprudence.** (No credit) Yr. Mr. Jasper
Professional ethics and business law.
290. **Seminar in Clinical Pathology.** (1) I and II. The Staff (Mr. Cornelius in charge)
299. **Research in Clinical Pathology.** (1-6) I and II. The Staff

* Not to be given, 1961-1962.

DAIRY INDUSTRY

For courses in dairy industry, see "Food Science and Technology," page 204.

DESIGN

For courses in design, see "Home Economics" on page 227.

DRAMATIC ART AND SPEECH

Theodore J. Shank, Ph.D., *Chairman of the Department.*

(Department Office, 127A South Hall)

John T. Goldthwait, Ph.D., *Assistant Professor of Speech.*
Ralph S. Pomeroy, Ph.D., *Assistant Professor of Speech.*
Theodore J. Shank, Ph.D., *Assistant Professor of Dramatic Art.*
Alan A. Stambusky, Ph.D., *Assistant Professor of Dramatic Art.*
Benne B. Daniel, M.A., *Acting Instructor in Speech.*



Clifford C. Fellige, Jr., M.A., *Associate in Dramatic Art.*
Leonard G. Homann, A.B., *Associate in Speech.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

Departmental Major Advisers.—Mr. Goldthwait, Mr. Shank.

The Major Program

(A) Lower Division Courses.—Speech 1A or 40, 2A; Dramatic Art 10A or 10B, 20 are required; Speech 1B and an additional lower division course in dramatic art 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, 165.

Group B: Speech 101, 102, Dramatic Art 127, 160.

Group C: Speech 117, 130, 140.

In addition each major student 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 110, 114A, or 117J.

Dramatic Art 124 or 127 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 109).—The honors program comprises 6 units selected from Dramatic Art 194H, 195H, Speech 194H, 195H.

DRAMATIC ART

LOWER DIVISION COURSES

10A. Fundamentals of Acting. (3) I.

The Staff

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. The Staff
 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 theatre.
 Field trips included.

UPPER DIVISION COURSES

English 1A is prerequisite to all upper division courses.

124. Visual Aspects of Dramatic Presentation. (3) I. Mr. Fellage
 Lectures and laboratory.
 Dramatic emphasis as affected by theatre design, stage decor and lighting, make-up, and costuming.

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.

127. Principles of Directing. (3) I. Mr. Stambusky
 Theory of directing and directorial analysis of dramas from various periods.
 Offered in alternate years.

150. American Drama. (3) II. Mr. Stambusky
 Selected plays and the history of the theatre from Colonial times to the present.
 Offered in alternate years.

***158A. World Drama.** (3) I. Mr. Shank
 Selected plays and the history of the theatre 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 theatre from the Renaissance to the present time.
 Offered in alternate years.

159. Contemporary Drama. (3) I. Mr. Shank
 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.

165. Dramatic Theory and Criticism. (3) II. Mr. Shank
 Changing concepts of drama from Aristotle to the present.

* Not to be given, 1961-1962.

190. Theatre Laboratory. (1-3) I and II. The staff (Mr. Shank in charge) 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. 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.

Prerequisite: senior majors with honors standing.

The Staff

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 dramatic literature, acting, or play production.

SPEECH

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

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.

40. Fundamentals of Debate. (3) I.

Miss Daniel

Lectures and laboratory.

Principles and practice of formal and informal debate. Emphasis on identification and analysis of issues and logical presentation of evidence.

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, 40.

***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.

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.

The Staff

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.

Prerequisite: majors with senior standing.

The Staff

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.

Prerequisite: senior majors with honors standing. The Staff

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.

Prerequisite: consent of the instructor. The Staff

Advanced study of one phase of speech, such as public speaking, discussion, debate, oral interpretation.

ECONOMICS

Bruce Glassburner, Ph.D., *Chairman of the Department.*

(Department Office, 301 Academic Office Building)

Bruce Glassburner, Ph.D., *Associate Professor of Economics.*

‡Adam A. Pepelasis, Ph.D., *Associate Professor of Economics.*

¹Warren S. Gramm, Ph.D., *Assistant Professor of Economics.*

Martin P. Oettinger, Ph.D., *Assistant Professor of Economics.*



Gary W. Bickel, M.A., *Lecturer in Economics.*

Richard N. Farmer, Ph.D., *Lecturer in Economics.*

Letters and Science List.—All undergraduate courses in economics except Economics 11 are included in the Letters and Science List of Courses (see page 108).

Departmental Major Advisers.—Mr. Bickel, Mr. Glassburner.

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 109).—The honors program comprises at least 3 units of course 194H and an honors thesis in a field of study approved by two members of the faculty. This work normally will be completed as a fall-spring sequence during the student's senior year.

LOWER DIVISION COURSES

1A. Principles of Economics. (3) I and II.

Mr. Oettinger

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. Farmer

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.

‡ Absent on leave, fall semester 1961–1962.

¹ Sabbatical leave in residence, 1961–1962.

11. **Elementary Accounting.** (3) I and II. Mr. Oettinger
Lectures and laboratory.

The basic concepts of accounting; the history of accounting; the ledger, journals, income statement, and balance sheet; inventory evaluation; depreciation; introduction to cost accounting; analysis of financial statements; social accounting.

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. **Economic Theory.** (3) I. Mr. Glassburner
Scope and method of economic science and theory of income and employment.

- 100B. **Economic Theory.** (3) II. Mr. Bickel
Price and distribution theory.

- *101A. **History of Economic Thought.** (3) I. _____
Historical survey of economic doctrines, with emphasis on the classical school and its antecedents.

- 101B. **History of Economic Thought.** (3) II. Mr. Glassburner
Historical survey of economic doctrines, with emphasis on the classical school and neoclassical theory; their critics; current developments in economic thought.

- 110A. **Economic History.** (3) I. Mr. Gramm
Analysis of economic problems in their historical setting. Emphasis on development of economic institutions in Europe; implications for contemporary world economic relationships.

- 110B. **Economic History.** (3) II. Mr. Gramm
Course 110A is not prerequisite to 110B.
Analysis of economic problems in their historical setting. Examination of the evolution of economic institutions in the United States; their significance in the contemporary world economy.

115. **Economic Development.** (3) I. Mr. Bickel
Prerequisite: course 1A-1B or consent of the instructor. Theories of economic development and underdevelopment; economic policy for growth and development.

116. **Comparative Economic Systems.** (3) II. Mr. Glassburner
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 USSR, India, 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. Mr. Bickel
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.

* Not to be given, 1961-1962.

- 131. The Economics of Corporation Finance. (3) II.** Mr. Oettinger
The corporation as a form of business organization; financial aspects of promotion and organization, operation, expansion and consolidation, failure, and reorganization; the capital market, financial instruments and institutions; public regulation of security issues and security exchanges.
- 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. Farmer
Monetary and banking institutions; monetary theory, international monetary relations, monetary policy.
- 150A. Labor Economics. (3) I.** Mr. Oettinger
Historical and structural analysis of the growth of trade unionism; modern collective bargaining; labor legislation; wage determination.
- 150B. Labor Economics. (3) II.** Mr. Oettinger
Historical and structural analysis of the growth of trade unionism; modern collective bargaining; labor legislation; wage determination.
- 190A. International Economic Relations. (3) I.** Mr. Farmer
Course 190A is not prerequisite to 190B.
International trade theory and analysis of selected international and economic problems.
- 190B. International Economic Relations. (3) II.** Mr. Farmer
Course 190A is not prerequisite to 190B.
International finance; U. S. Foreign trade policies and their impact on the world economy.
- 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)

GRADUATE COURSES

- 200A. Economic Theory. (3) I.** Mr. Glassburner
Macrostatic and macrodynamic theoretical issues; theory of income and employment and theory of economic growth.
- 200B. Economic Theory. (3) II.** Mr. Bickel
Prerequisite: course 200A is not prerequisite to 200B.
Microstatic and microdynamic theoretical issues; theory of production, theory of the firm, and general theory of choice.
- 297. Supervised Individual Study. (1-5) I and II.** The Staff

EDUCATION

William F. Dukes, Ph.D., *Acting Chairman of the Department.*

(Department Office, 268 Academic Office Building)

_____, *Professor of Education.*

William F. Dukes, Ph.D., *Associate Professor of Psychology.*

Charles M. Garverick, Ph.D., *Acting Assistant Professor of Education.*



J. Richard Blanchard, M.S., *Lecturer in Education.*

Dorsey F. Davy, M.A., *Lecturer in Education, Supervisor of Teaching—Secondary.*

Douglas L. Minnis, M.A., *Lecturer in Education, Supervisor of Teaching—Elementary.*

Lawrence P. Newberry, Ed.D., *Acting Administrator of Teacher Training, Lecturer in Education, Supervisor of Teaching—Secondary.*

Margaret R. Sutherland, Ph.D., *Lecturer in Education, Supervisor of Teacher Training.*

Marjorie Brodt, M.A., *Lecturer in Education, Supervisor of Teaching—Elementary.*

Letters and Science List.—Education 110.

Credentials Counselors:

General Secondary.—Mr. Davy, Mr. Newberry, Miss Sutherland.

General Elementary.—Mrs. Brodt, Mr. Minnis.

UPPER DIVISION COURSES

110. Introduction to Educational Psychology. (3) I and II. Miss Sutherland
Prerequisite: Psychology 1A.

The learning process; physical, mental, and social development; individual differences and their measurement; mental hygiene; the role of the teacher in guidance and counseling.

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.

120. Educational Sociology. (3) I and II. Miss Sutherland
Prerequisite: course 110 (may be taken concurrently).

The school as a social institution; historical development of purposes and programs of education; the role of the teacher.

***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.

* Not to be given, 1961-1962.

- 163. Guidance and Counseling.** (3) I and II. Mr. Garverick
Prerequisite: course 110 (may be taken concurrently).
Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology with particular emphasis on educational and vocational adjustment.
- 198. Directed Group Study.** (1-5) I and II. Mr. Dukes
Prerequisite: consent of the instructor.
- 199. Special Study for Advanced Undergraduates.** (1-5) I and II. Mr. Dukes

GRADUATE COURSE

- 290. Education Seminar.** (2) I and II. _____

PROFESSIONAL COURSES

- 320A. Introduction to Teaching in Secondary Schools.** (1) I and II. Miss Sutherland
Lectures, conferences, and field work in secondary teaching. Observations and participation in some form of public school work.
- ‡**320C. Supervised Teaching in Secondary Schools.** (3) I and II.
Laboratory.
Prerequisite: course 320A. Course 320E must be taken concurrently.
Sec. 1. For student teachers. Mr. Davy
Sec. 2. For intern teachers. Mr. Newberry
Directed teaching for candidates for the general secondary credential.
- ‡**320E. Methods of Teaching in Secondary Schools.** (2) I and II.
Prerequisite: course 320C must be taken concurrently.
Sec. 1. For student teachers. Mr. Davy
Sec. 2. For intern teachers. Mr. Newberry
Methods of teaching in the secondary school; selection, organization, and evaluation of teaching materials including the use of audio-visual aids and the services of counseling and guidance programs.
- ‡**323. Practice in Supervised Teaching.** (2-4)
Prerequisite: course 320C (may be taken concurrently) or experience as a teacher and consent of the instructor.
Sec. 1. For student teachers. I and II. Mr. Davy
Sec. 2. For intern teachers. I. Mr. Newberry
An opportunity to obtain more extended and varied experience under supervision.
- ‡**330A. Introduction to Teaching in Elementary Schools.** (2) I. Mrs. Brodt, Mr. Minnis
Lectures and laboratory.
Sec. 1. For student teachers.
Sec. 2. For intern teachers.
Lectures, conferences, and field work; observation of and participation in classroom activities in the public elementary schools.

‡ Open only to apprentice teachers and graduate students. All 300 series courses are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the semester in the public schools. Thus teaching assignments in the fall semester, 1961, will begin on or about August 31 and end January 29. For the spring semester, 1962, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

‡330C. Supervised Teaching in Elementary Schools. (8) II.

Laboratory.

Mrs. Brodt, Mr. Minnis

Sec. 1. For student teachers.

Sec. 2. For intern teachers.

Directed teaching for candidates for the general elementary credential.

‡330E. Methods of Teaching in Elementary Schools. (4) II.

Sec. 1. For student teachers.

Mrs. Brodt, Mr. Minnis

Sec. 2. For intern teachers.

Selection, organization, and evaluation of teaching materials, including the use of audio-visual aids.

‡ Open only to apprentice teachers and graduate students. All 300 series courses are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the semester in the public schools. Thus teaching assignments in the fall semester, 1961, will begin on or about August 31 and end January 29. For the spring semester, 1962, they will begin on or about February 1 and end June 17. Students should make arrangements accordingly.

ENGINEERING

Roy Bainer, M.S., *Chairman of the Department.*

(Department Office, 204 Walker Engineering Building)

Roy Bainer, M.S., *Professor of Agricultural Engineering.*
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 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.*
Charles W. Beadle, Ph.D., *Assistant Professor of Engineering.*
William J. Chancellor, Ph.D., *Assistant Professor of Agricultural Engineering.*
Robert B. Fridley, B.S., *Assistant Professor of Agricultural Engineering.*
John R. Goss, 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.*
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.*
Arthur S. Leonard, M.S., *Lecturer in Agricultural Engineering.*
James N. Luthin, Ph.D., *Professor of Irrigation.*
Allan A. McKillop, M.S., *Lecturer in Agricultural Engineering.*
Stanton R. Morrison, *Lecturer in Agricultural 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.*
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.*
Herbert A. Young, Ph.D., *Professor of Chemistry.*

Departmental Major Advisers.—Mr. Davis, Mr. Fridley, Mr. Goss, Mr. Hart, Mr. Henderson, Mr. Jacob, Mr. Kelly, Mr. Kepner, Mr. Lamouria, Mr. Lorenzen, Mr. McKillop.

The Major.—See page 90.

† Absent on leave, 1961–1962.

LOWER DIVISION COURSES

Davis

1A. Plane Surveying. (3) I.

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) I and 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 and II. Mr. Dvoracek, Mr. Hart

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.

45. Properties of Materials. (3) I and II. 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 4B; Physics 4B.

Electrical instruments, circuit constants, single-phase and polyphase circuit analysis, single-phase transformers. Electric power sources and their characteristics; performance of electrical machinery (synchronous, induction, direct-current, and single-phase); electron tubes, semiconductors and their associated circuits.

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.

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.

Mr. Beadle

Laboratory.

Prerequisite: course 130 (may be taken concurrently).

Principles and methods of testing engineering materials. Physical tests of concrete, steel, and wood.

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.

* Not to be given, 1961-1962.

- 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. Engineering Economics.** (3) II. Mr. Lamouria
Prerequisite: senior standing in the College of Engineering.
The analysis, synthesis and evaluation of problems in engineering economics; operations research techniques; relevant differences between alternatives; discounted cash flow concept; income tax considerations; recovery of proposed investment plus return commensurate with the risk.
- 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.
- 130. Mechanics of Materials.** (3) I. Mr. Beadle
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.

* Not to be given, 1961-1962.

- 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.
- 160. Introduction to Field Theory.** (3) II. Mr. Powers
Prerequisite: Mathematics 106 and 107.
Use of vector calculus in the description of steady potential and solenoidal fields with illustrations in gravitational, electrostatic, magnetostatic, thermal, thermodynamic, elastic and fluid domains. Potential and stream functions. Precise and approximate methods of solution of Laplace's equation.
- *170. Introduction to Mechanical Vibrations.** (3) I. _____
Prerequisite: course 102, Mathematics 106 and 107.
Free and forced vibrations in simple lumped-parameter systems with and without damping. Vibrations in coupled systems. Equivalent electrical networks. Use of energy conservation principle and Lagrange's equations.
- 171. Water Supply.** (3) I. Mr. Burgy
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. Intermediate Fluid Mechanics.** (3) I. Mr. Strelkoff
Lectures and laboratory.
Prerequisite: course 103.
Flow in pipelines and open channels, nonuniform steady flow, water measurement, dimensional analysis and dynamic similitude with reference to irrigation and hydraulic problems. Laboratory experiments in pipe and open channel flow, structures, measuring devices, sedimentation and models.
- 185. Irrigation System Design.** (2) II. _____
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.

* Not to be given, 1961-1962.

- 189. Irrigation Engineering Laboratory.** (2) II. Mr. Scott
Lectures and laboratory.
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
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

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 106 and 107, 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 106 and 107, or equivalent.
Analytical treatment of steady state, transient, and periodic heat conduction; transfer of radiant energy; geometrical and spectral characteristics of radiating systems.
- 210. Field Theory.** (3) I. Mr. Powers
Prerequisite: course 160.
Energy relationships in fields; interaction of fields and matter; time-variant fields in acoustic, electromagnetic, and fluid domains; diffusion and radiation equations; the Navier-Stokes equation and some of its special integrals; introduction to tensor methods.
- *220. Mechanical Vibrations.** (3) II. _____
Prerequisite: course 170.
Systems with many degrees of freedom. Newton's and Lagrange's methods and Rayleigh-Ritz approximation. Vibration of beams, shafts, and machine elements. Nonharmonic vibrations. Solution by precise, graphical, and numerical techniques. Vibration of diaphragms. Autoexcitation. Vibration measurement.

***225. Theory of Elasticity. (3) I.**

Prerequisite: Mathematics 106 and 107.

Tensor formulation of the stress-strain field. Plane stress and strain in rectangular and cylindrical coordinates. Solution by complex variable method. Introduction to three-dimensional problems. Bending and torsion of prismatic bars and plates. Display and measurement of strain.

230. Engineering Analysis. (3) II.

Mr. McKillop

Prerequisite: Mathematics 106 and 107, or equivalent.

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 106 and 107, 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 106 and 107, 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.

* Not to be given, 1961-1962.

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

ENGLISH

Solomon Fishman, Ph.D., *Chairman of the Department.*

(Department Office, 176 Academic Office Building)

Solomon Fishman, Ph.D., *Professor of English.*
Gwendolyn B. Needham, Ph.D., *Professor of English.*
William V. O'Connor, Ph.D., *Professor of English.*
§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.*
Robert A. Wiggins, Ph.D., *Associate Professor of English.*
Alexander Chambers, Ph.D., *Assistant Professor of English.*
Jay L. Halio, Ph.D., *Assistant Professor of English.*
Hilton J. Landry, Ph.D., *Assistant Professor of English.*
Hugh B. Staples, Ph.D., *Assistant Professor of English.*



W. Georg Isaak, M.A., *Lecturer in English.*
Kate M. Thursby, B.A., *Associate in English.*

ENGLISH MAJOR

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

Departmental Major Advisers.—Mr. Chambers, Mr. Halio, Mr. Hanzo, 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 117J, fourth year, course 145A-145B. 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 109).—The honors program consists of course 194H in the senior year in addition to the regular major.

§ Absent on leave, spring semester 1962.

* Sabbatical leave in residence, fall semester 1961-1962.

† Absent on leave, 1961-1962.

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. Critical Reading of Poetry. (3) I and II. Mr. Landry, Mr. Staples
Prerequisite: course 1B.
Analysis and evaluation of works representing main types of English and American poetry.

45B. Critical Reading of Prose. (3) I and II. Mr. Hanzo, Mr. Landry
Prerequisite: course 45A.
Analysis and evaluation of works representing main types of English and American prose.

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. Mrs. Wright
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. Homann
From the miracle plays through Elizabethan drama.

* Not to be given, Fall Semester 1961-1962.

116. **The English Bible as Literature.** (3) I. Miss Van Norden
- 117J. **Shakespeare.** (3) I. Mr. Halio
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. O'Connor
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. Mr. Fishman
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. O'Connor
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. Mr. O'Connor
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. Mr. Chambers
Course 158A is not prerequisite to 158B.
166. **The Age of Swift and Pope.** (3) I. Mr. Hanzo
177. **The Romantic Period.** (3) I. Mr. Fishman
Wordsworth, Coleridge, Byron, Shelley, Keats, and their eighteenth-century precursors.

* Not to be given, Fall Semester 1961-1962.

187. **The Victorian Period.** (3) II. Mr. Staples
191. **Literature in English from 1900.** (3) II. Mr. Hanzo
- 194H. **Honors Tutorial.** (2) I and II. The Staff
Prerequisite: honors status.
Individual directed study leading to preparation of a long paper. May be repeated once for credit.
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. Mr. O'Connor
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. Mr. Halio
Prerequisite: graduate standing.
263. **Studies in Seventeenth-Century Literature Seminar.** (3) I. Mr. Hanzo
Prerequisite: graduate standing.
- *264. **Studies in Eighteenth-Century Literature Seminar.** (3) I. ———
Prerequisite: graduate standing.
265. **Studies in Nineteenth-Century Literature Seminar.** (3) I. Mr. Staples
Prerequisite: graduate standing.
266. **Studies in Twentieth-Century Literature Seminar.** (3) II.
Prerequisite: graduate standing. Mr. O'Connor
- *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.

ENOLOGY

For courses in enology see "Viticulture and Enology," page 301.

* Not to be given, 1961-1962.

ENTOMOLOGY AND PARASITOLOGY

Ray F. Smith, Ph.D., *Chairman of the Department, Berkeley-Davis.*

Richard M. Bohart, Ph.D., *Vice-Chairman of the Department.*

(Department Office, 122 Robbins Hall)

Stanley F. Bailey, Ph.D., *Professor of Entomology.*

Richard M. Bohart, Ph.D., *Professor of Entomology.*

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.*

Ray F. Smith, Ph.D., *Professor of Entomology (Berkeley campus).*

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).*

Frank E. Strong, Ph.D., *Assistant Professor of Entomology.*



James R. Douglas, Ph.D., *Professor of Parasitology.*

Albert A. Grigarick, Jr., Ph.D., *Lecturer in Entomology.*

Paul D. Hurd, Jr., Ph.D., *Lecturer in Entomology (Berkeley campus).*

Dewey J. Raski, Ph.D., *Professor of Nematology.*

Gunter Zweig, Ph.D., *Lecturer in Entomology.*

ENTOMOLOGY

Departmental Major Advisers.—Mr. Bacon, Mr. Grigarick.

The Major.—See pages 64–65.

LOWER DIVISION COURSES

1. **An Introduction to Entomology.** (4) II. 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.
- *10. **Natural History of the Insects.** (3) I. Mr. Smith
Prerequisite: designed for students not specializing in zoological sciences.
Not open for credit to students who have had course 1.
Principles of biology as illustrated by the taxonomy, morphology, and behavior of insects.

* Not to be given, 1961–1962.

- 49. Summer Field Course.** (No credit). Mr. Bohart, Mr. Hurd, Mr. MacSwain
Five weeks, daily.
Prerequisite: one course in entomology or consent of the 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. Mr. Laidlaw, Mr. Summers
Lectures and laboratory.
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. Bohart
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.
- *130A. Agricultural Entomology.** (3) I. Mr. Bacon, Mr. Lange
Prerequisite: course 124.
Bionomics and principles involved in control of insects and mites. Side effects on vertebrates and invertebrates following insecticide usage. Primary emphasis on field and vegetable crops.
- *130B. Agricultural Entomology.** (3) II. Mr. Bailey, Mr. Summers
Lectures and laboratory.
Prerequisite: course 124.
Complementary to 130A but emphasizing plot design, sampling techniques, control programs, and equipment. Examples primarily from deciduous fruit and nut pests.

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 odd numbered 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

Harry O. Walker, Ed.D., *Chairman of the Department.*

(Departmental Office, 2 TB 6)

Harry O. Walker, Ed.D., *Lecturer in Farm Practice.*

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

George F. Stewart, Ph.D., *Chairman of the Department.*

(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.*
Joseph M. Smith, Sc.D., *Professor of Food Science and Technology.*
Clarence Sterling, Ph.D., *Professor of Food Science and Technology.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*
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.*
Walter G. Jennings, 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.*
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.*
James F. Guymon, Ph.D., *Professor of Enology.*
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 (Berkeley Campus)*
Tommy Nakayama, Ph.D., *Lecturer in Food Science and Technology.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Donald M. Reynolds, Ph.D., *Associate Professor of Bacteriology.*
Edward B. Roessler, Ph.D., *Professor of Mathematics.*

Departmental Major Advisers.—Mr. Dunkley, Mr. Ingraham, Mr. Marsh, Mr. Vaughn.

FOOD SCIENCE AND TECHNOLOGY

LOWER DIVISION COURSES

1. Introduction to Food Science. (2) I.

Mr. Amerine, Mr. Stewart, Mr. Vaughn
Historical and philosophical aspects of food processing and its relationships

† Absent on leave, 1961–1962.

to man's health and well-being. World's food supply and its use by human populations. Trends in the processing, preservation, and utilization of food.

UPPER DIVISION COURSES

101. Chemistry and Biochemistry of Food Processing. (2) II.

Prerequisite: Biochemistry 101 or equivalent. Mr. Sterling, Mr. Tappel
Chemical and biochemical principles in relation to food processing problems: hydrophilic polymers, enzymes, lipids, proteins, and vitamins.

103. Physical and Chemical Methods for Food Analysis. (4) II.

Lectures and laboratory. Mr. Bernhard, Mr. Whitaker
Prerequisite: Chemistry 5 and Biochemistry 101L or their equivalents.
Theory and application of physical and chemical methods for analyzing foods.

105A. Food and Industrial Microbiology Laboratory. (2) I.

Laboratory. Mr. Vaughn, Mr. York
Prerequisite: Bacteriology 1; Chemistry 8. Bacteriology 105A must be taken concurrently.
Microbiology of food fermentations (including vinous fermentation, but not brewing), food processing, food spoilage and the disposal of wastes.

105B. Food and Industrial Microbiology Summer Laboratory. (2)

Laboratory. Mr. Nakayama, Mr. Phaff
Prerequisite: 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.
The course will be offered six hours a day, five days a week for three weeks (total: ninety hours).

107. Analysis of Foods by Sensory Methods. (3) II.

Lectures and laboratory. Mr. Amerine, Mr. Roessler
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.

108. Food Industry Sanitation. (3) II.

Lectures and laboratory. Mr. Jennings, Mr. Vaughn
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.

109. Quality Control for Food Processing Operations. (2) I.

Mr. Bernhard
Prerequisite: courses 101, 103, and 105A; Mathematics 13 or equivalent.
Principles of quality control for food processing operations: sample selection; method of analysis; application of analyzed data to control of quality. Statistical quality control.

110. Engineering Principles of Food Processing. (5) I.

Lectures and laboratory. Mr. Dunkley, Mr. Guymon, Mr. Smith
Prerequisite: Mathematics 16B; Physics 2B, 3B. Recommended: Chemistry 109.

Principles and applications of engineering to food processing: engineering

units and conventions, mass and energy balance, fluid flow and heat transfer; evaporation, distillation, dehydration, refrigeration and other unit operations.

114. Principles of Processing Fruit and Vegetable Products. (3) II.

Lectures and laboratory.

Mr. Marsh

Prerequisite: course 110; Chemistry 8; Bacteriology 1.

Technical principles relating to processing operations used in the commercial preservation of fruit and vegetable products; theory and practical applications; field trips.

116A-116B. Principles of Processing Dairy Products. (3-3) Yr.

Lectures and laboratory.

Mr. Dunkley, Mr. Nickerson

Prerequisite: courses 101, 110; Chemistry 8.

The principles of dairy processing 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.

118A-118B. Dairy Processing. (3-3) Yr.

I. Mr. Dunkley; II. Mr. Nickerson

Prerequisite: Biochemistry 101 or equivalent; Bacteriology 1.

Principles and technological processes involved in the preparation of dairy foods. Intended primarily for students in the Agricultural Production Curriculum.

122. Enzyme Technology. (3) II.

Mr. Whitaker

Lectures and laboratory.

Prerequisite: Biochemistry 101.

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.

130. Chemistry of Milk and Dairy Products. (2) II.

Mr. Tarassuk

Prerequisite: courses 101 and 103.

The physical and chemical properties of milk and milk products and their relationship to the manufacture and quality of dairy products.

132. Microbiology of Milk and Dairy Products. (2) II.

Mr. Collins

Lectures and laboratory.

Prerequisite: Bacteriology 105A.

Significance, control, and detection of bacteria and other microorganisms used in manufacturing and/or ripening dairy products; bacteriophage action and control; defects produced by microorganisms; destruction of microorganisms; protection of public health.

190. Recent Advances in Food Technology. (1) I.

Mr. Chichester

Prerequisite: two courses in food science and technology or equivalent.

Assigned topics, reports, and discussions concerning recent advances in food technology.

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)

RELATED COURSES

- Agricultural Business Management** (Agricultural Economics 115A-115B)
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)

GRADUATE COURSES

- 210. Proteins—Their Functional Activities and Interactions.** (3) II. Mr. Feency
Prerequisite: Biochemistry 101; Chemistry 109 or 110A-110B; or consent of the instructor. Recommended: Chemistry 112A-112B.
The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.
- 211. Chemistry of the Food Lipids.** (2) I. Mr. Jack
Prerequisite: Biochemistry 101 or equivalent.
Chemical constitution, molecular structure, and stereo chemistry of the fats, phospholipids and related compounds. Methods of isolation, characterization and synthesis. Relation of molecular structure to physical properties.
- 216. Yeasts and Related Organisms.** (4) II. Mr. Miller, Mr. Phaff
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
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 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

Siegfried B. Puknat, Ph.D., *Chairman of the Department.*

(Department Office, 378 Academic Office Building)

- Siegfried B. Puknat, Ph.D., *Professor of German.*
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.*
———, *Assistant Professor of German.*
Oliver T. Myers, Ph.D., *Instructor in Spanish.*
Donald M. Decker, Ph.D., *Instructor in Spanish.*
Russell L. Pfohl, M.A., *Acting Instructor in French.*
Raul Pimentel, M.A., *Acting Instructor in German.*



- Maria Edlinger, Ph.D., *Visiting Instructor in German.*
William P. Galvin, M.A., *Associate in Foreign Languages.*
Anthony S. Kawczynski, Mag. Phil., *Associate in Foreign Languages.*
Leonilla F. Strelkoff, A.B., *Associate in Russian.*

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 108.

LOWER DIVISION COURSES

- 39A. Greek Literature in Translation. (3) I.** Mr. Grimm
Prerequisite: English 1A.
The Homeric epic and fifth-century drama. Reading of the Iliad, Odyssey, and selected plays of Aeschylus, Sophocles, Euripides, and Aristophanes. Lectures on early Greek epic and classical Athenian drama.
- 39B. Greek Literature in Translation. (3) II.** Mr. Grimm
Prerequisite: English 1A or consent of the instructor.
Readings in Pindar, Herodotus, Thucydides, Plato, Menander, and the Hellenistic writers. Lectures on literary trends from the fifth century to the end of the Hellenistic period.
Offered in alternate years.
- *40. Roman Literature in Translation. (3) II.** Mr. Grimm
Prerequisite: English 1A or consent of the instructor.
Readings in Plautus, Terence, Lucretius, Roman lyric poets, Vergil, Livy, Seneca, Petronius, Tacitus, and Juvenal. Lectures on Roman literary history from Ennius to the late Empire.
Offered in alternate years.

† Absent on leave, 1961–1962.

* Not to be given, 1961–1962.

FOREIGN LANGUAGES

PROFESSIONAL COURSE

300. **The Teaching of a Modern Foreign Language.** (2) II. The Staff
Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Analysis and discussion of a variety of teaching techniques by representatives 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 108.

Departmental Major Adviser.—Mr. Perkins.

The Major Program

(A) Lower Division Courses.—French 1, 2, 3, and 4, or their equivalents. Recommended: one year of college Latin or the equivalent.

(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 109).—The honors program comprises two semesters of study under course 194H, which will include a research paper and a comprehensive examination.

Courses 130 and 134 are required for the General Secondary Teaching Credential in French.

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 150, 160: course 4 or its equivalent.

- *101A. **Advanced Grammar, Composition, and Conversation.** (3) I.
Offered in alternate years. Mr. Kanen
- 101B. **Advanced Grammar, Composition, and Conversation.** (3) I.
Course 101A is not a prerequisite to 101B. Mr. Perkins
Offered in alternate years.

* Not to be given, 1961–1962.

- 109A. A Survey of French Literature from the Middle Ages to the End of the Seventeenth Century.** (3) I. Mr. Kanen
Offered in alternate years.
- *109B. A Survey of French Literature from the Beginning of the Eighteenth Century to the Present.** (3) II. Mr. Kanen
Course 109A is not a prerequisite to 109B.
Offered in alternate years.
- *117. The Theater of the Seventeenth Century.** (3) I. Mr. Pfohl
Offered in alternate years.
- *118A. The Age of Voltaire and Rousseau.** (3) I. Mr. Perkins
A study of writings which helped 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. Kanen
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.
- 124. French Lyric Poetry.** (3) I. Mr. Lindsay
Prerequisite: one upper division course in French or consent of the instructor.
Study of French versification and poetic conventions; intensive analysis of the works of major poets.
Offered every third year.
- 130. Advanced Grammar and Composition.** (3) II. Mr. Bach
Prerequisite: courses 101A-101B or either course with grade B or better.
Offered in alternate years.
- *134. Survey of French Culture and Institutions.** (3) II. Mr. Bach
Offered in alternate years.
- 150. Masterpieces of French Literature.** (3) II. Mr. Lindsay
Prerequisite: English 1B.
Reading, lectures, and discussion in English. May not be counted as part of the major in French.
Offered in alternate years.
- *160. French Literature of the Twentieth Century.** (3) II. Mr. Lindsay
Representative readings from Proust, Gide, Valery, Sartre and others.

* Not to be given, 1961-1962.

Lectures in English; readings in English or French. Knowledge of French not required.

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 108.

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 109).—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 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 150, 160: course 4 or its equivalent.

- 101A. Advanced Grammar, Composition, and Conversation.** (3) I. _____
 (Formerly course 130A.) Mr. Puknat
 Offered in alternate years.
- *101B. Advanced Grammar, Composition, and Conversation.** (3) I. _____
 (Formerly course 130B.) Mr. Hoermann
 Course 101A is not a prerequisite to 101B.
 Offered in alternate years.
- 102. German Poetry.** (3) II. _____
 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. Puknat
 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.
- 114. Nineteenth-Century German Prose.** (3) I. Mr. Pimental
 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. _____
 (Formerly course 118B.)
 A survey of German literature from the Reformation to the end of the
 nineteenth century.
 Offered in alternate years.
- 150. Masterpieces of German Literature.** (3) I. Mr. Puknat
 Prerequisite: English 1B.
 Reading, lectures, and discussion in English. May not be counted as part
 of the major in German.
 Offered in alternate years.

* Not to be given, 1961-1962.

*160. **German Literature of the Twentieth Century.** (3) I. Mr. Puknat
Representative readings from Rilke, Kafka, Hesse, Brecht, Thomas Mann,
and others. Lectures in English; readings in English or German. Knowledge
of German not required.

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.** (1-3) I and II. The Staff

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 108.

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 108.

LOWER DIVISION COURSES

1. **Elementary Russian—Beginning.** (4) I. Mrs. Strelkoff

2. **Elementary Russian—Continued.** (4) II. Mrs. Strelkoff
Prerequisite: two years of high school Latin or course 1 or consent of the
instructor.

3. **Intermediate Russian.** (4) I. Mrs. Strelkoff
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 108.

LOWER DIVISION COURSES

1. **Elementary Russian—Beginning.** (4) I. Mrs. Strelkoff

2. **Elementary Russian—Continued.** (4) II. Mrs. Strelkoff
Prerequisite: course 1.

3. **Intermediate Russian.** (4) I. Mrs. Strelkoff
Prerequisite: course 2.

*1G. **Russian for Graduate Students.** (No credit) I and II. _____
A course designed to prepare students for the graduate reading examina-
tion.

* Not to be given, 1961-1962.

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 108.

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. Recommended: one year of college Latin or the equivalent.

(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 109).—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.

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) I and 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. The Staff
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 for all courses except 150: course 4 or its equivalent.

- *104A–104B. **Survey of Spanish-American Literature.** (3–3) Yr.
Course 104A is not prerequisite to 104B. Mr. Decker, Mr. Keller
Survey of major authors and important aspects of Spanish-American literary history from the Colonial Period to the present.
Offered in alternate years.

* Not to be given, 1961–1962.

105. **Peninsular Drama from the Romantic Movement to the Present.**
(3) I. Mr. Decker
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) II. Mr. Myers
Offered in alternate years.
111. **Cervantes.** (3) I. Mr. Castanien
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.
- *150. **Masterpieces of Spanish Literature.** (3) I. Mr. Bowen
Prerequisite: English 1B.
Reading, lectures, and discussion in English. May not be counted as part
of the major in Spanish.
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.** (1-3) I and II. The Staff

FOREIGN LITERATURE IN TRANSLATION

The following courses offered in the departments of language and literature do not require a reading knowledge of any foreign language.

CLASSICS

- 39A-39B. **Greek Literature in Translation.**
*40. **Roman Literature in Translation.**

FRENCH

150. **Masterpieces of French Literature.**
*160. **French Literature of the Twentieth Century.**

GERMAN

150. **Masterpieces of German Literature.**
*160. **German Literature of the Twentieth Century.**

SPANISH

- *150. **Masterpieces of Spanish Literature.**

* Not to be given, 1961-1962.

FRENCH

For courses in French see "Foreign Languages" on page 209.

GENETICS

G. Ledyard Stebbins, Ph.D., *Chairman of the Department.*

(Department Office, 222 Animal Science Building)

Melvin M. Green, Ph.D., *Professor of Genetics.*

G. Ledyard Stebbins, Ph.D., *Professor of Genetics.*

Sidney R. Snow, Ph.D., *Assistant Professor of Genetics.*

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.*

Melvin M. Green, Ph.D., *Professor of Genetics.*

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., *Associate 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., *Professor of Agronomy.*

Dale G. Smeltzer, Ph.D., *Assistant Professor of Agronomy.*

Francis L. Smith, Ph.D., *Professor of Agronomy.*

Sidney R. Snow, Ph.D., *Assistant Professor of Genetics.*

Ernest H. Stanford, Ph.D., *Professor of Agronomy.*

G. Ledyard Stebbins, Ph.D., *Professor of Genetics.*

Clyde N. Stormont, Ph.D., *Professor of Immunogenetics.*

Departmental Major Adviser.—Mr. Snow.

The Major.—See Animal Science Curriculum, pages 61-64, and Plant Science Curriculum, pages 71-78.

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)

Advanced Plant Breeding (Agronomy 221)

Quantitative Genetics and Plant Improvement (Agronomy 222)

The Genetics of Animal Breeding (Animal Husbandry 107)

Bacterial Genetics (Bacteriology 207)

Plant Cytology (Botany 130)

Applied Statistical Methods (Mathematics 105A-105B)

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 in Genetics. (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. Bradford in charge)

Weekly meetings for presentation of topics by members of the staff, visiting investigators, and graduate students.

GEOGRAPHY

For courses in geography see "Anthropology and Geography" on page 148.

GEOLOGICAL SCIENCES

Donald O. Emerson, Ph.D., *Chairman of the Department.*

(Department Office, 292 Academic Office Building)

Charles G. Higgins, Ph.D., *Associate Professor of Geology.*

Donald O. Emerson, Ph.D., *Assistant Professor of Geology.*

Emile A. Pessagno, Jr., Ph.D., *Assistant Professor of Geology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

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 1A–1B; Mathematics 3A–3B; Physics 4A, 4C. These courses should be completed in the freshman and sophomore years if possible.

(B) Upper Division Courses.—Geology 102, 103, 104A–104B, 107, 111, 112, 116, 117; 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 1A–1B; Mathematics C and one of the following: 3A, 13, or 36; Physics 2A or 4A; Zoology 1A or Chemistry 1B.

(B) Upper Division Courses.—Geology 102, 103, 104A, 116; and ten additional units in courses offered by the department.

LOWER DIVISION COURSES

1A. General Geology: Physical. (4) I.

Mr. Higgins

Lectures and laboratory.

An introduction to the earth's physical features and the changes they undergo through dynamic processes.

1B. General Geology: Historical. (4) II.

Mr. Pessagno

Lectures and laboratory.

Prerequisite: course 1A.

Origin and geological history of the earth and the evolution of its plant and animal inhabitants. Several of the lecture periods will be combined in all-day field trips.

UPPER DIVISION COURSES

- 102. Field Geology.** (3) II. Mr. Higgins
Lectures and laboratory.
Prerequisite: course 116. Recommended: course 103.
Principles and methods of making topographic and geologic field observations, measurements, and maps. Several all-day periods in the field.
- 103. Mineralogy and Petrology.** (4) I. Mr. Emerson
Lectures and laboratory.
Prerequisite: course 1A.
Properties, origins, and associations of important rock-forming and economic minerals and of the rocks in which they occur.
- 104A. 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.
- 104B. Optical Petrology.** (4) I. Mr. Emerson
Lectures and laboratory.
Prerequisite: courses 103 and 104A.
Origin, occurrence, and classification of rocks, and their description and interpretation by megascopic and microscopic means.
- *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.
- 111. Invertebrate Paleontology.** (4) I. Mr. Pessagno
Lectures and laboratory.
Prerequisite: course 1B or Zoology 1A or 10.
Morphology, systematics, paleoecology, and evolution of invertebrates common in the fossil record.
- 112. Stratigraphy.** (4) II. Mr. Pessagno
Lectures and laboratory.
Prerequisite: courses 1B and 111.
Principles of lithostratigraphy and biostratigraphy, with specific illustrations from the stratigraphic record.
- 116. Structural Geology.** (3) I. Mr. Higgins
Lectures and laboratory.
Prerequisite: course 1B and 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 1A.
Sculpture of the earth's surface by natural processes.
- 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

* Not to be given, 1961-1962.

GERMAN

For courses in German see "Foreign Languages" on page 208.

GREEK

For courses in Greek see "Foreign Languages" on page 208.

HISTORY

James H. Shideler, Ph.D., *Chairman of the Department.*

(Department Office, 161 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.*
Walter L. Woodfill, Ph.D., *Professor of History.*
Bertram D. Wolfe, M.A., *Visiting Professor of History.*
Craig B. Fisher, Ph.D., *Assistant Professor of History.*
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.*



George F. Giacomini, M.A., *Assistant in History.*
Rollie E. Poppino, Ph.D., *Lecturer in History.*

HISTORY

Letters and Science List.—All undergraduate courses in history are included in the Letters and Science List of Courses (see page 108).

Departmental Advisers.—Mr. Schwab, Mr. Shideler, Mr. Staudenraus, Mr. Woodfill.

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 40.

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 2 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 109).—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 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 De-

† Absent on leave, 1961-1962.

gree 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

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-one units of course work, of which:

a. twelve units must be in history courses.

b. at least nine units must be graduate courses, including two seminars and a minimum of three units of History 299.

2. Graduate course work must be done under at least two instructors.

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 the faculty committee in charge.

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. Fisher

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.

* Not to be given fall semester, 1961-1962.

- 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. Fisher
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.
- *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.** _____
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.
- 137A. History of Russian Civilization. (3) I.** Mr. Wolfe
An outline of Russian social, political and economic institutions and intellectual development from earliest times to the end of the nineteenth century.
- 137B. History of Russian Civilization. (3) II.** Mr. Wolfe
An outline of Russian social, political and economic institutions and intellectual development in the twentieth century.
- 138. History of Soviet Social and Political Thought. (3) I.** Mr. Wolfe
The Soviet Union's role in world affairs and its ideology.
- 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 to 1603. (3) I.** Mr. Woodfill
- 151B. History of England from 1603. (3) II.** Mr. Woodfill
Course 151A is not prerequisite to 151B.
- 152. English Constitutional History. (3) I.** Mr. Woodfill
The forming of English constitutional practices and institutions from Anglo-Saxon times to the Settlement of the Glorious Revolution.

- 153. English Society in the Early Modern Period.** (3) II. Mr. Woodfill
Reading in the sources and monographs for the sixteenth through the eighteenth centuries. Discussion and reports.
- 161A. Hispanic-American History.** (3) I. Mr. Poppino
Colonial History of Latin America.
- 161B. Hispanic-American History.** (3) II. Mr. Poppino
Course 161A is not prerequisite to 161B.
The National Period of Latin American History.
- 170A. Colonial America.** (3) I. Mr. Jacobson
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. Jacobson
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. Jacobson
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.
- 175. Proseminar in American Intellectual History.** (3) II. Mr. Jacobson
Intellectual history of the American people, with emphasis on social and political thought.
- *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. Mr. Shideler
Course 176A is not prerequisite to 176B.
1865 to the present.
Offered in alternate years.

* Not to be given, 1961-1962.

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.

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. Jacobson

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.

* Not to be given, 1961-1962.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff

GRADUATE COURSES

- *237. **Seminar in Russian History.** (3) 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.

242. **Seminar in European History.** (3) 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.

251. **Seminar in English History.** (3) I and II.

Mr. Woodfill

271. **Seminar in the History of the American West.** (3) I and II.

Mr. Jackson

- *272. **Seminar in the History of the United States to 1860.** (3) I and II.

Mr. Staudenraus

288. **Seminar in the Agricultural History of the United States.**

(3) I and II.

Mr. Shideler

299. **Directed Research.** (1-4) 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.

* Not to be given, 1961-1962.

HOME ECONOMICS

Fred N Briggs, Ph.D., *Acting Chairman of the Department.*

(Department Office, 148 Home Economics Building)

Gladys J. Everson, Ph.D., *Professor of Home Economics.*

†Pauline C. Paul, Ph.D., *Professor of Home Economics.*

Richard D. Cramer, M.F.A. (Architecture), *Associate Professor of Design.*

Marilyn M. Dunsing, Ph.D., *Associate Professor of Home Economics.*

Lucille S. Hurley, Ph.D., *Associate Professor of Nutrition.*

†Thomas M. Poffenberger, Ed.D., *Associate Professor of Home Economics.*

Elizabeth M. Elbert, Ph.D., *Assistant Professor of Home Economics.*

Ruth J. Horsting, M.A., *Assistant Professor of Design.*

Daniel Shapiro, *Assistant Professor of Design.*

_____, *Assistant Professor of Home Economics.*

Marion Bennion, Ph.D., *Visiting Assistant Professor of Home Economics.*

Claire M. Eastman, M.S.W., *Instructor in Home Economics.*



R. Lorene Dryden, M.A., *Lecturer in Home Economics.*

Doris F. Heineman, B.A.E., *Lecturer in Design.*

Arline Johnson, M.S., *Lecturer in Education.*

Anita M. Lear, M.S., *Lecturer in Home Economics.*

Jane S. Pirkey, B.S., *Lecturer in Home Economics.*

Departmental Major Advisers.—Mr. Cramer, Miss Dryden, Miss Dunsing, Miss Elbert, Miss Everson, Mrs. Heineman, Mrs. Horsting, Mrs. Hurley, Mrs. Lear, Mrs. Pirkey, Mr. Shapiro.

The Major.—See pages 67-70.

DESIGN

LOWER DIVISION COURSES

6A. Theory of Design. (2) I and II. The Staff
Laboratory.

Basic elements of form, texture, and color in two and three dimensions; studio exercises.

6B. Theory of Design. (2) I and II. The Staff
Laboratory.

Prerequisite: course 6A.

Basic elements of form, texture, and color in two and three dimensions; studio exercises.

7A-7B. Design and Color. (2-2) Yr. Mrs. Horsting, Mr. Shapiro
Laboratory.

Prerequisite: course 6B. Course 7A is not prerequisite to 7B.

Second-year problems emphasizing function, process, and the properties of materials.

8. Lettering. (2) II. Mr. Shapiro
Laboratory.

Prerequisite: course 6B or consent of the instructor.

Lettering and the use of letter and type forms in design; studio exercises.

† Absent on leave, 1961-1962.

UPPER DIVISION COURSES

- 130. 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 130 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.
- *160. Textile Design. (2) II.** Mrs. Heineman
Laboratory.
Prerequisite: course 6B or consent of the instructor.
Studio projects in textile printing.
- *191. History of Design. (3) I.** _____
Prerequisite: one semester of history of art.
From ancient to modern times.
- *192A-192B. Costume Design. (2-2) Yr.** _____
Laboratory.
Prerequisite: course 6B and Art 16 or consent of the instructor.
Studio projects in contemporary costume design.
- *193. History of Costume. (3) II.** _____
Laboratory.
Prerequisite: one semester of history of art.
From ancient to modern times.
- *195. History of Interior Design. (3) II.** _____
Prerequisite: one semester of history of art.
From ancient to modern times.
- *196A196B. Advanced Interior Design. (2-2) Yr.** Mrs. Heineman
Laboratory.
Prerequisite: courses 6B, 130L (may be taken concurrently) and Art 16 or consent of the instructor.
Studio projects in interior design.
- 198. Directed Group Study. (1-3) I and II.** The Staff
Prerequisite: upper division standing and consent of the instructor.
Group study of selected problems in design.

HOME ECONOMICS

LOWER DIVISION COURSES

- 1A-1B. Experimental Food Study. (2-2) Yr.** Miss Bennion
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 Bennion
Laboratory.
Prerequisite: course 1A-1B (should be taken concurrently).
Composition of food, and principles involved in food preservation, meal preparation, and management.

* Not to be given, 1961-1962.

- 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
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
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.** The Staff
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 Elbert
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.** 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.
- 112L. Nutrition and Dietetics Laboratory. (1-1) Yr.** Mrs. Hurley
Laboratory.
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. Advanced Nutrition. (4) II.** Miss Everson
Lectures and laboratory.
Prerequisite: elementary nutrition, quantitative chemistry, and biochemistry.
Second year study of nutrition.

- 121. Institution Food Study.** (4) I. Mrs. Pirkey
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. Mrs. 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. _____
Prerequisite: Psychology 1A.
The dynamics of human development from conception to adolescence.
- 133. Laboratory in Child Development.** (1) I. _____
Lectures and laboratory.
Course 133 must be taken concurrently with course 131.
Laboratory conducted at the nursery school.
- 136. Adolescent Development.** (3) II. _____
Prerequisite: Psychology 1A.
The dynamics of human development during the adolescent period.
- 137. The Contemporary American Family.** (3) II. _____
Sociological and psychological factors influencing marriage and the family in present-day society.
- 140. Home Management.** (3) I. Mrs. Eastman
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. Mrs. Eastman
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.
- 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.

***160. Textiles. (3) I.**

Lectures and laboratory.

Prerequisite: courses 6 and 6L.

The chemical and physical structure of textile fibers, and its relations to fiber and fabric properties.

***162. The Textile Economy. (3) I.**

Lectures and laboratory.

Prerequisite: courses 6, 6L; Economics 1A-1B.

Organization of the textile industry; production and consumption of textile products; principles involved in the maintenance of textile products.

175. Clothing Design and Construction. (3) I and II.

Mrs. Lear

Lectures and laboratory.

Prerequisite: courses 6, 7.

Wardrobe planning and problems in advanced clothing construction.

198. Directed Group Study. (1-3) I and II.

The Staff

Prerequisite: consent of the instructor.

Directed group study of selected topics in home economics for advanced undergraduates.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

RELATED COURSE

Extension Education in Agriculture and Home Economics (Agricultural Education 187)

GRADUATE COURSES

247. 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.

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 Elbert, Miss Everson, Mrs. Hurley
Research in foods, nutrition, or consumer economics.

PROFESSIONAL COURSES

300. Teaching Home Economics in Secondary Schools. (2) I and II.

Miss Johnson

Prerequisite: senior or graduate standing; major or minor in home economics.

Philosophy of homemaking education; organization of the curriculum; methods and techniques of teaching homemaking; selection and use of materials of instruction; evaluation procedures.

* Not to be given, 1961-1962.

IRRIGATION

Verne H. Scott, Ph.D., *Acting Chairman of the Department*

(Department Office, 113 Irrigation Building)

Lloyd D. Doneen, Ph.D., *Professor of Irrigation.*
†Robert M. Hagan, Ph.D., *Professor of Irrigation.*
James N. Luthin, Ph.D., *Professor of Irrigation.*
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.*
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.*
John R. Davis, Ph.D., *Lecturer in Irrigation.*
Brooke E. Sawyer, M.S., *Lecturer in Irrigation.*

Departmental Major Advisers.—Mr. Henderson, Mr. Vaadia.
The Major.—See pages 70–71.

LOWER DIVISION COURSE

10. **Introduction to Irrigation.** (3) II. Mr. Sawyer
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.

UPPER DIVISION COURSES

100. **Water-Soil-Plant Relationships.** (3) I. 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.

† Absent on leave, 1961–1962.

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.

Mr. Luthin

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. Sawyer

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.

Mr. Davis

Lectures and laboratory.

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. Biggar
 Prerequisite: consent of instructor.
 An advanced course on irrigation water quality emphasizing physio-chemical principles governing interactions of ionic constituents in water 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

Richard W. Harris, Ph.D., *Chairman of the Department.*

(Department Office, 106 Landscape Horticulture Building)

Richard W. Harris, Ph.D., *Associate Professor of Landscape Horticulture.*

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, Ph.D., *Lecturer in Landscape Horticulture.*

Departmental Major Adviser.—Landscape Horticulture, Mr. Danielson;
Park Administration, Mr. Harris.

The Major.—See pages 73-77.

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.) (Berkeley Campus)

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.

* Not to be given, 1961-1962.

- 105A. Identification and Ecology of Landscape Plants: Trees.** (3) I. Mr. Barker
Lectures and laboratory.
Prerequisite: Botany 1. (Not open for credit to students who have taken Ornamental Horticulture 131A-131B.) (Los Angeles Campus)
Identification based on morphological comparisons, evaluation, and environmental requirements of plants used for landscape purposes.
Field trips are included.
- 105B. Identification and Ecology of Landscape 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.) (Los Angeles Campus)
Course 105A is not prerequisite to 105B.
Identification based on morphological comparisons, evaluation, and environmental requirements of plants used for landscape purposes.
Field trips are included.
- 105C. Identification and Ecology of Landscape Plants.** (1) II. Mr. Barker
Prerequisite: course 105A and Botany 1. (Not open for credit to students who have taken Ornamental Horticulture 131A-131B.) (Los Angeles Campus)
Identification, cultural practices, and environmental requirements of desert, tropical and subtropical landscape 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 111 or consent of the 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 111.
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 111, 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 111 or consent of the 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 208.

MATHEMATICS

Charles A. Hayes, Jr., Ph.D., *Chairman of the Department.*

(Department Office, 227 Academic Office Building)

George A. Baker, Ph.D., *Professor of Mathematics.*
Curtis M. Fulton, Ph.D., *Professor of Mathematics.*
Charles A. Hayes, Jr., Ph.D., *Professor of Mathematics.*
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.*
¹Albert C. Burdette, Ph.D., *Associate Professor of Mathematics.*
Peter W. M. John, 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.*



Rudolph B. Merkel, M.A., *Associate in Mathematics.*
Takayuki Tamura, Ph.D., *Lecturer in Mathematics.*

Letters and Science List.—All undergraduate courses in mathematics except 129 are included in the Letters and Science List of Courses. (See page 108.)

Major Subject Advisers.—Mr. Krakowski, Mr. Kreith, Mr. Roessler, Mr. Stein.

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, and 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 106, 107, 108, 111, 127, 113 or 116, 119 or 185, and at least 6 additional units

¹ Sabbatical leave in residence, 1961-1962.

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 109).—The honors program comprises 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.

Graduate Study.—The Department of Mathematics offers programs of study and research leading to the M.A. and Ph.D. degrees in Mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.

Qualifying Examinations.—A student entering from high school who believes that he has had the equivalent of a course offered by the Department of Mathematics (e.g., analytic geometry and calculus) may demonstrate his proficiency in this course by examination. If, in the opinion of the department, his level of achievement is sufficiently high, he will be permitted to enter the next course in the sequence. No University credit is earned by passing such an examination. Arrangements for an examination must be made with the department secretary in Room 227, Academic Office Building, on or before the Monday of registration week.

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. The Staff

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.** 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) II.** The Staff
Prerequisite: course 4A.
Continuation of course 4A.
- 7. Introduction to Mathematical Structures. (3) II.** The Staff
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.** The Staff
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.** The Staff
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. Stein
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.

- 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; chi-square 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.
- 105B. Applied Statistical Methods: Matrix Algebra and Regression and Correlation Theory. (3) II.** Mr. Alder
Prerequisite: course 105A or Agricultural Economics 106.
Matrix algebra including addition, multiplication and inversion of matrices.

Linear regression and correlation theory. Multiple regression. The use of Gauss multipliers. Nonlinear regression. Analysis of covariance with one and two criteria of classification.

106. **Differential Equations.** (2) I and II. Mr. Arnold

Prerequisite: course 4B or 14.

An introduction to differential equations designed especially for students in engineering and related fields.

107. **Advanced Calculus.** (3) I and II. Mr. Banks

Prerequisite: course 4B or 14.

Vector analysis, series, functions of several variables.

108. **Linear Algebra.** (3) I. Mr. Krakowski

Prerequisite: courses 3B, 7.

Vector spaces, linear transformations 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.

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.

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.

* Not to be given, 1961-1962.

- *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. _____
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. Pope
Prerequisite: course 4B or 14.
Finite differences, interpolation, polynomial approximations, non-linear equations, integration of differential equations, partial differential and difference equations, large systems of linear equations, linear programming, programming for analog and digital calculators, large-scale methods.
Offered in alternate years.
- 129. Theory of Automatic Digital Computers.** (3) II. Mr. Pope
Lectures and laboratory.
Prerequisite: course 4B or 14.
Organization of a digital computer; instruction code for the University computer; elementary machine language coding; subroutines and assembly programs; code checking. Laboratory work on the University computer.
- 131A-131B. Statistics.** (3-3) Yr. Mr. John
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. Benson
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. Kreith
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.

202A-202B. Functional Analysis. (3-3) Yr. Mr. Benson
Prerequisite: courses 108, 127. Recommended: courses 200A-200B.

General theory of measure and integration; Hilbert and Banach spaces; linear operations.

205A-205B. Functions of a Complex Variable. (3-3) Yr. Mr. Arnold
Prerequisite: course 127.

Theory of analytic functions, Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions.

Offered in alternate years.

***208. Linear Algebra.** (3) II. Mr. Krakowski, Mr. Norton
Vector spaces, linear transformations, Euclidean spaces.

Offered in alternate years.

***215A-215B. Topology.** (3-3) Yr. Mr. Krakowski, Mr. Stein
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.

***216. Integral Equations.** (3) II. Mr. Kreith
Prerequisite: courses 108, 200B.

Volterra equations, Fredholm equations, symmetric kernels.

Offered in alternate years.

218. Partial Differential Equations. (3) I. Mr. Kreith
Prerequisite: courses 108, 200B.

Topics from the theory of first order hyperbolic and elliptic partial differential equations.

Offered in alternate years.

* Not to be given, 1961-1962.

- 219. Ordinary Differential Equations.** (3) II. Mr. Banks
Prerequisite: courses 185, 200A.
The study of ordinary differential equations in the real and complex domains, existence and uniqueness theorems, linear systems, analysis of singular points, Sturm-Liouville theory, asymptotic expansions.
- 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.
- 223A-223B. Theory of Groups.** (3-3) Yr. Mr. Tamura
Elements of group theory, structure and construction of composite groups, Sylow theory of groups, solvable groups, group extension.
Offered in alternate years.
- 227. Theory of Sets.** (3) I. Mr. Stein
Fundamental concepts; cardinal numbers, order types, ordinal numbers. The axiom of choice and its role in the theory of sets.
- 228. Advanced Numerical Analysis of Differential Equations.** (3) I. Mr. Pope
Prerequisite: courses 128A-128B. Recommended: course 129.
Difference methods in systems of ordinary differential equations; error analysis and stability; two-point boundary value problems; numerical analysis of partial differential equations of first and second order; relaxation techniques; higher order equations; use of digital computers.
- 229. Approximation Theory and Applications to Computation.** (2) II. Mr. Pope
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.
- *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.

* Not to be given, 1961-1962.

250A-250B. Algebra. (3-3) Yr.

Mr. Tamura

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.

299. Research in Mathematics. (2-6) I and II.

The Staff (Mr. Hayes in charge)

PROFESSIONAL COURSE

300. The Teaching of Mathematics. (2) II.

The Staff

Prerequisite: senior or graduate standing; a mathematics teaching major or minor.

Accepted in partial satisfaction of the 22-unit requirement in education for the general secondary credential and the 24-unit requirement in education for the elementary credential.

MEDICINE, SURGERY, AND CLINICS

John W. Kendrick, D.V.M., M.S., *Chairman of the Department.*

(Department Office, 1315 Haring Hall)

John F. Christensen, D.V.M., Ph.D., *Professor of Veterinary Medicine.*
John D. Wheat, D.V.M., *Professor of Veterinary Medicine.*
Robert M. Cello, D.V.M., *Associate Professor of Veterinary Medicine.*
Theodore J. Hage, D.V.M., *Associate Professor of Veterinary Medicine.*
Jack A. Howarth, D.V.M., Ph.D., *Associate Professor of Veterinary Medicine.*
John W. Kendrick, D.V.M., M.S., *Associate Professor of Veterinary Medicine.*
Blaine McGowan, Jr., D.V.M., *Associate Professor of Veterinary Medicine.*
Edward A. Rhode, Jr., D.V.M., *Associate Professor of Veterinary Medicine.*
Atwood C. Asbury, D.V.M., *Assistant Professor of Veterinary Medicine.*
Murray E. Fowler, D.V.M., *Assistant Professor of Veterinary Medicine.*
John P. Hughes, D.V.M., *Assistant Professor of Veterinary Medicine.*
———, *Assistant Professor of Veterinary Medicine.*
———, *Assistant Professor of Veterinary Medicine.*
Alida P. Wind, D.V.M., *Assistant Professor of Veterinary Medicine.*



Joseph D. Bergevin, D.V.M., *Lecturer in Veterinary Medicine.*
Herman Bonasch, D.V.M., *Lecturer in Veterinary Medicine.*
David E. Brown, M.D., *Lecturer in Surgery.*
James S. Brown, D.V.M., *Lecturer in Veterinary Medicine.*
Ronald S. Downey, D.V.M., *Lecturer in Veterinary Medicine.*
Charles E. Grayson, M.D., *Lecturer in Radiology.*
Steven L. Johnson, D.V.M., *Lecturer in Veterinary Medicine.*
Richard U. Miles, D.V.M., *Lecturer in Veterinary Medicine.*
Virginia D. Perryman, D.V.M., *Lecturer in Veterinary Medicine.*
Troy G. Rollins, M.D., *Lecturer in Dermatology.*

VETERINARY MEDICINE

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.
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.
199. **Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Kendrick in charge)

GRADUATE COURSES

203. **Introductory Medicine.** (4) I. Mr. Cello, Mr. Rhode
Lectures and laboratory.
Prerequisite: Pathology 122A-122B; Physiological Sciences 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. Cello
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 diseases of the gastrointestinal system, liver and peritoneum, diseases of the respiratory and cardiovascular systems, and diseases of the blood-forming organs of horses, cattle, swine, sheep, and goats.
- 207. Large Animal Medicine.** (4) I. Mr. Asbury, Mr. Cello, Mr. Fowler
Prerequisite: courses 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.
- 210. Large Animal Medicine.** (2) I. Mr. McGowan
Prerequisite: course 203.
The diagnosis and control of internal parasitism, and diseases of the urinary systems of horses, cattle, swine, sheep, and goats.
- 220. Introductory Surgery.** (4) II. Miss Wind
Lectures and laboratory.
Prerequisite: Pathology 122A-122B, Physiological Sciences 123A-123B.
Principles and methods of surgical technique.
- 223. Large Animal Surgery.** (4) I. Mr. Wheat
Prerequisite: course 220, Anatomy 220.
Diseases of domestic animals that require surgical treatment.
- 224. Small Animal Surgery.** (2) I. Miss Wind
Prerequisite: course 220.
Surgical diseases of small animals.
- 225. Operative Surgery.** (1) I. ———, 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: Pathology 122A-122B; Physiological Sciences 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. Fowler
Prerequisite: course 203; Physiological Sciences 123A-123B, 140-140L.
Lectures and discussions of newer developments in the therapy of animal diseases.

- 245. Ecological Factors of Animal Disease.** (2) I. Mr. McGowan
Prerequisite: senior standing in the School of Veterinary Medicine or consent 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. Kendrick 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. 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. Kendrick 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. Grayson, Mr. Hage
Lectures and laboratory.
Prerequisite: Anatomy 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.
- 290. Seminar in Veterinary Medicine.** (1) I and II.
The Staff (Mr. Cello in charge)
- 299. Research in Veterinary Medicine.** (1-6) I and II.
The Staff (Mr. Kendrick in charge)

MICROBIOLOGY

James R. Douglas, Ph.D., *Chairman of the Department.*

(Department Office, 2004 Haring Hall)

Hugh S. Cameron, D.V.M., Ph.D., *Professor of Veterinary Microbiology.*
James R. Douglas, Ph.D., *Professor of Parasitology.*
Delbert G. McKercher, D.V.M., Ph.D., *Professor of Veterinary Virology.*
Clyde N. Stormont, Ph.D., *Professor of Immunogenetics.*
Jacob Traum, D.V.M., *Professor of Veterinary Medicine, Emeritus.*
Norman F. Baker, D.V.M., Ph.D., *Associate Professor of Parasitology.*
Ernst L. Biberstein, D.V.M., Ph.D., *Associate Professor of Microbiology.*
John W. Osebold, D.V.M., Ph.D., *Associate Professor of Immunology.*



Michel M.-J. Laviopierre, M.B., Ch.B., *Lecturer in Parasitology.*
Stewart H. Madin, D.V.M., Ph.D., *Professor of Public Health and Bacteriology (Berkeley Campus).*
Leslie A. Page, Ph.D., *Lecturer in Microbiology.*

UPPER DIVISION COURSES

111. Animal Hygiene. (3) II. Mr. Cameron
Prerequisite: Bacteriology I.

The causes, prevention, control, and eradication of animal diseases important in economic livestock production and public health.

121. Microbiology. (10) I. Mr. Biberstein, Mr. McKercher, Mr. Osebold
Lectures and laboratory.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The principles of immunity, and a study of the bacterial, mycotic, and viral disease-producing agents of importance in veterinary medicine.

124. Veterinary Parasitology. (6) II. Mr. Baker, Mr. Douglas
Lectures and laboratory.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The protozoan, helminth, and arthropod parasites of domesticated animals with emphasis on biology, life history, identification, and control.

125. Veterinary Medical Genetics. (2) II. Mr. Stormont
Lectures and laboratory.

Prerequisite: Genetics 100 or its equivalent. Recommended: general bacteriology or microbiology.

Inheritance of resistance to disease; breeding for resistance to disease; blood groups and their applications in clinical medicine and breeding programs; lethal and sublethal traits in farm animals.

***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 odd-numbered years.

* Not to be given, 1961-1962.

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.
The Staff (Mr. Douglas in charge)

GRADUATE COURSES

270. **Advanced Immunology.** (4) II. Mr. Osebold
Lectures and laboratory.
Prerequisite: course 121 or 127 or consent of the instructor.
Dynamics of infection and resistance: host responses to invasion of foreign substances, antibody production and manifestations of antigen-antibody reactions, immunochemistry. Immunological considerations of the groups of disease agents.
Offered in even-numbered years.
290. **Seminar in Microbiology.** (1) I and II. Mr. Biberstein
299. **Research in Microbiology.** (1-6) I and II. The Staff

MILITARY SCIENCE

Donn W. Yoder, Lieutenant Colonel, Infantry; *Chairman of the Department.*

(Department Office, 125 Gymnasium)

Donn W. Yoder, Lieutenant Colonel, Infantry; *Professor of Military Science.*
Harold V. Kays, Major, Infantry; *Associate Professor of Military Science.*
Douglas G. Marshall, Major, Infantry; *Associate Professor of Military Science.*

Carl L. Cunningham, Captain, Chemical Corps, *Assistant Professor of Military Science.*

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 enrolled in the 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 6 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 30.

LOWER DIVISION COURSES

1A. Basic General Military Science (First Year). (1) I. The Staff
Lectures and drill.

Required of all physically fit male students unless specific exemption is granted.

Organization of the Army and ROTC; individual weapons and marksmanship; leadership laboratory.

1B. Basic General Military Science (First Year). (1) II. The Staff
Lectures and drill.

Required of all physically fit male students unless specific exemption is granted.

United States Army and national security, 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; U.S. Army and national security; 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.

Introduction to operations and basic tactics, 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.

Leadership, military teaching principles, and leadership laboratory.

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 laboratory; 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.

Army administration; military law; service orientation; role of the U. S. in world affairs; leadership laboratory.

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

Jerome W. Rosen, M.A., *Chairman of the Department.*

(Department Office, 107 Music Building)

†George Perle, Ph.D., *Associate Professor of Music.*
Jerome W. Rosen, M.A., *Associate Professor of Music.*
Larry D. Austin, M.M., *Assistant Professor of Music.*
Robert C. Below, M.M., *Assistant Professor of Music.*
Richard G. Swift, M.A., *Assistant Professor of Music.*



Sidney R. Charles, Ph.D., *Lecturer in Music.*
The Griller Quartet of the University of California, Davis.
Sidney Griller, C.B.E., F.R.A.M., *Lecturer in Music.*
Willard Tressel, A.B., *Lecturer in Music.*
Milton Thomas, *Lecturer in Music.*
Colin Hampton, F.R.A.M., *Lecturer in Music.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

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 1A-1B, 1C-1D, 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. Swift
Fundamentals of music, with singing, ear-training, harmonization of melodies, and conducting.

† Absent on leave, 1961-1962.

27A. Introduction to Musical Literature. (3) I and II.

Two lectures and one section meeting per week. Mr. Below, Mr. Austin
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. Below

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
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. (1-2) I and II.**

Mr. Swift

Two to four class hours 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.

42. The Repertory Band. (1) I.

Mr. Austin

Prerequisite: consent of the instructor.

One two-hour rehearsal per week. Open to any student in the University
whose technical proficiency meets the requirements of concert performance.

Rehearsal and performance of selected music for wind ensemble. 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.

The Griller Quartet (Mr. Griller in charge)

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.**

Mrs. Charles

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. Mrs. Charles

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. (1-2) I and II. Mr. Swift

Prerequisite: 2 semesters in course 41.

May be repeated once for credit.

142. Advanced Repertory Band. (1) I. Mr. Austin

Prerequisite: Music 42 or consent of the instructor.

One two-hour rehearsal per week. Open to any student in the University whose technical proficiency meets the requirements of concert performance.

Rehearsal and performance of selected music for wind ensemble. 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

1A-1B. Masterworks of Musical Literature. (2-2) Yr. Mr. Swift

Prerequisite: ability to read music or consent of the instructor.

Guided listening to important works from the seventeenth century to the present and discussion of their style and form.

1C-1D. Masterworks of Musical Literature. (2-2) Yr. Mrs. Charles

Prerequisite: courses 1A-1B and 4A-4B or consent of the instructor.

Guided listening to important works from the seventeenth century to the present and discussion of their style and form. A continuation of course 1A-1B.

4A-4B. Elementary Theory. (5-5) Yr. Mr. Below

Exercises in notation, rhythm, ear-training, beginning counterpoint and harmony.

* Not to be given, 1961-1962.

- 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. Mr. Swift
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. Mr. Rosen
Prerequisite: course 5A-5B.
A study of the principles and techniques of conducting choral ensembles.
Offered in alternate years.
- 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. Mrs. Charles
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)

TEACHING METHODS COURSE

- 329A. Instrumental Methods.** (1) I and II.
The Griller Quartet (Mr. Griller in charge)
Prerequisite: courses 1A-1B, 4A-4B or consent of the instructor.
Methods of teaching orchestral instruments; repertory and program planning for secondary schools. Course may be repeated once for credit.

* Not to be given, 1961-1962.

NEMATOTOLOGY

Dewey J. Raski, Ph.D., *Chairman of the Department.*

(Department Office, 223 Soils and Plant Nutrition Building)

Merlin W. Allen, Ph.D., *Professor of Nematology.*
Dewey J. Raski, Ph.D., *Professor of Nematology.*



Bert Lear, Ph.D., *Lecturer in Nematology.*
Benjamin F. Lownsbery, Ph.D., *Lecturer in Nematology.*
Armand R. Maggenti, Ph.D., *Lecturer in Nematology.*
David R. Viglierchio, 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

- 220. Principles and Techniques of Nematode Taxonomy and Morphology.**
(3) I. 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.
- 221. Nematode Pathogenicity and Control.** (3) II.
Lectures and laboratory. Mr. Lear, Mr. Lownsbery
Prerequisite: course 100.
Advanced studies of the relation of nematodes to plants and control of plant parasitic nematodes.
- 225. Nematode Taxonomy and Comparative Morphology.** (4) II.
Lectures and laboratory. Mr. Allen, Mr. Maggenti
Prerequisite: course 220.
The taxonomy, morphology, and comparative anatomy of soil and fresh-water nematodes.
- 290. Seminar in Nematology.** (1) I and II. The Staff (Mr. Raski in charge)
Prerequisite: graduate standing.
- 299. Research in Nematology.** (1-6) I and II.
Prerequisite: graduate standing. The Staff (Mr. Raski in charge)

NUTRITION

———, *Chairman of the Executive Committee.*

(Committee Office, 207 Poultry Husbandry Building)

Committee in Charge:

Arthur L. Black, Ph.D., *Associate Professor of Biochemistry.*
Floyd D. Carroll, Ph.D., *Associate Professor of Animal Husbandry.*
Donald R. Cordy, D.V.M., Ph.D., *Professor of Veterinary Pathology.*
†Perry T. Cupps, Ph.D., *Professor of Animal Husbandry.*
Gladys J. Everson, Ph.D., *Professor of Home Economics.*
Richard A. Freedland, Ph.D., *Lecturer in Biochemistry.*
Charles R. Grau, Ph.D., *Professor of Poultry Husbandry.*
Hubert Heitman, Jr., Ph.D., *Professor of Animal Husbandry.*
Fredric W. Hill, Ph.D., *Professor of Poultry Husbandry.*
Lucille S. Hurley, Ph.D., *Associate Professor of Nutrition.*
Max Kleiber, Sc.D., *Professor of Animal Husbandry, Emeritus.*
Frank H. Kratzer, Ph.D., *Professor of Poultry Husbandry.*
Glen P. Lofgreen, Ph.D., *Professor of Animal Husbandry.*
James H. Meyer, Ph.D., *Associate Professor of Animal Husbandry.*
‡Leo C. Norris, Ph.D., *Lecturer of Poultry Husbandry.*
Daniel W. Peterson, Ph.D., *Associate Professor of Poultry Husbandry.*
Magnar Ronning, Ph.D., *Assistant Professor of Animal Husbandry.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*
Aloys L. Tappel, Ph.D., *Associate Professor of Food Science and Technology.*
William C. Weir, Ph.D., *Professor of Animal Husbandry.*

GRADUATE COURSES

- 250. Concepts of Animal Nutrition.** (2) II. Mr. Hill, Mr. Lepkovsky
Prerequisite: biochemistry or physiological chemistry; Chemistry 8; Physiology 1; Zoology 1B; or consent of the instructor.
Dynamic interrelationships between food, animal, and environment, including concepts in food intake, digestion, absorption, and utilization of nutrients.
- 290. Seminar in Nutrition.** (1) I and II. The Staff
Discussion and critical evaluation of advanced topics in nutrition research.

PALEONTOLOGY

For courses in paleontology see "Geological Sciences," page 218.

PARASITOLOGY

For courses in parasitology see "Entomology and Parasitology," page 200.

PARK ADMINISTRATION

For courses in park administration see "Landscape Horticulture," page 235.

† Absent on leave, 1961-1962.

‡ Absent on leave, fall semester 1961-1962.

PATHOLOGY

Donald R. Cordy, D.V.M., Ph.D., *Chairman of the Department.*

(Department Office, 1221 Haring Hall)

Donald R. Cordy, D.V.M., Ph.D., *Professor of Veterinary Pathology.*

Peter C. Kennedy, D.V.M., Ph.D., *Associate Professor of Veterinary Pathology.*

Jack E. Moulton, D.V.M., Ph.D., *Associate Professor of Veterinary Pathology.*



A. C. Anderson, V.M.D., Ph.D., *Lecturer in Radiopathology.*

William P. C. Richards, M.V.Sc., *Lecturer in Veterinary Pathology.*

UPPER DIVISION COURSES

122A-122B. Veterinary Pathology. (5-5) Yr.

Lectures and laboratory.

Mr. Cordy, Mr. Kennedy, Mr. Moulton

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor.

The fundamental degenerative, vascular and inflammatory processes; oncology; systemic pathology; and the pathology of communicable diseases and the toxicoses.

199. Special Study for Advanced Undergraduates. (1-5) I and II.

The Staff (Mr. Cordy in charge)

GRADUATE COURSES

251A-251B. Necropsy Laboratory ($\frac{1}{2}$ - $\frac{1}{2}$) Yr.

Mr. Cordy, Mr. Kennedy, Mr. Moulton

Prerequisite: fourth-year standing in the School of Veterinary Medicine.

Supervised experience in necropsy diagnosis, including techniques and interpretation.

280. Advanced Pathology. (3) II.

Mr. Cordy, Mr. Kennedy

Lectures and laboratory.

Prerequisite: course 122A-122B.

Selected topics in the pathology of non-neoplastic diseases. Mechanisms of disease and patterns of reaction are stressed.

Offered in even-numbered years.

281. Necropsy and Surgical Pathology. (1-4) I and II.

Laboratory.

Mr. Cordy, Mr. Kennedy, Mr. Moulton

Prerequisite: courses 122A-122B, 251A-251B.

Responsible diagnostic casework. Performance of necropsies, slide reading and case reporting. Participation in slide conference constitutes first unit of credit and is required of all students enrolled. Enrollment for additional units is limited. May be repeated for credit.

282. Tumor Pathology. (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.

290. Seminar in Veterinary Pathology. (1) I and II.

The Staff (Mr. Cordy in charge)

299. Research in Veterinary Pathology. (1-6) I and II.

The Staff

PHILOSOPHY

Arthur Child, Ph.D., *Chairman of the Department.*

(Department Office, 311 Academic Office Building)

Arthur Child, Ph.D., *Professor of Philosophy.*

‡William H. Bossart, Ph.D., *Assistant Professor of Philosophy.*



Stanley N. Weissman, A.B., *Lecturer in 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 108).

Departmental Major Adviser.—Mr. Child.

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, 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. Child, Mr. Weissman
Course 6A is not prerequisite to 6B.

12A. Introduction to Modern Logic. (3) I. Mr. Weissman

Principles of inference and definition for symbolic deductive systems; sentential connectives, quantifiers, classes and relations. Applications of such systems in mathematics, science, and ordinary language.

‡ Absent on leave, fall semester 1961–1962.

20A-20B. History of Philosophy. (3-3) Yr.

I. Mr. Child; II. Mr. Weissman

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) I. 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.

*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. Mr. Weissman

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. Weissman

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.

* Not to be given, 1961-1962.

***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.

* Not to be given, 1961-1962.

PHYSICAL EDUCATION

Charles R. Kovacic, Ed.D., *Chairman of the Department.*

(Department Office, 204 Gymnasium)

- Charles R. Kovacic, Ed.D., *Professor of Physical Education.*
Marya Welch, Ed.D., *Associate Professor of Physical Education.*
Willard S. Lotter, Ed.D., *Associate Professor of Physical Education.*
Barbara J. Heller, Ed.D., *Assistant Professor of Physical Education.*
William L. Lakie, Ed.D., *Assistant Professor of Physical Education.*
Everett D. Ryan, Ed.D., *Assistant Professor of Physical Education.*
James L. Sells, Ed.D., *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.*
_____, *Supervisor of Physical Education.*
Herbert A. Schmalenberger, M.A., *Associate Supervisor of Physical Education.*
_____, *Associate Supervisor of Physical Education.*
Ruth J. Rose, M.A., *Lecturer and 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 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.—Miss Heller, Mr. Kovacic, Mr. Lakie, Mr. Lotter, Mr. Ryan, 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. (½) 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, tumbling, handball, 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.

Fundamental knowledges and skills in swimming, basketball, football, track, baseball, tennis, golf, combative sports, developmental activities, court sports, tumbling. The Staff

LOWER DIVISION COURSES FOR WOMEN

22. Professional Physical Education Activities (Women). (1) I and II.

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. The Staff

26. Physical Education for Women. (½) I and II.

Sections meet twice weekly at hours to be arranged. The Staff
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.

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. Miss Rose

LOWER DIVISION COURSES FOR MEN AND WOMEN

5A. First Aid. (1) I and II.

Standard course. Upon successful completion of the course, the Red Cross Certificate is awarded. Mr. Stromgren

20. Introduction to Physical Education. (1) I.

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. Mr. Schmalenberger

24. The Theory of Swimming and Diving. (1) I and II.

Lectures and laboratory. Mr. Hickey
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.

Lectures and laboratory. Mr. Hickey
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.

Lectures and laboratory. Miss Rose
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.

* Not to be given, 1961-1962.

***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.

110. Psychosocial Factors in Athletic Performance. (3) II. Mr. Ryan

Prerequisite: Psychology 1A.

Analysis of various psychological and social factors affecting the development and use of motor skills.

130. Principles and Theory and Physical Education. (3) II. Miss Welch

Prerequisite: course 20.

A critical analysis of the assumptions underlying the physical education program.

131. Organization and Administration of Physical Education. (3) I.

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) I. 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.

Mr. Lotter

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,

* Not to be given, 1961-1962.

health service, healthful school living and the contributing community health agencies.

180A-180B. Physical Education in the Secondary School. (2-2) Yr.

Miss Heller, Mr. Lakie

Prerequisite: course 130 and individual proficiency in activities.

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.

Miss Heller, Mr. Lakie

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

Charles G. Patten, Ph.D., *Chairman of the Department.*

(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.*
David B. Beard, Ph.D., *Associate Professor of Physics.*
William J. Knox, Ph.D., *Associate Professor of Physics.*
James A. McCray, Ph.D., *Acting Assistant Professor of Physics.*
William W. True, Ph.D., *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 108).

Major Subject Adviser.—Mr. Gardner.

Bachelor of Arts Major Program

(A) Lower Division Courses.—Required: Physics 4A, 4B, 4C, Chemistry 1A, Mathematics 3A–3B, and 14 or their equivalent. Recommended: Mathematics 7 and a reading knowledge of French and German.

(B) Upper Division Courses.—Required: Physics 105A–105B, 108B, 110A–110B, 115, 121, 110L or 121L, and Mathematics 106, 107. Recommended: Physics 104, 129A–129B and Mathematics 185.

Bachelor of Science 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.—Required: Physics 104, 105A–105B, 108B, 110A–110B, 115, 121, 129A–129B, 110L or 121L, and Mathematics 106, 107. Recommended: Physics 112, Mathematics 119, and 185.

Honors and Honors Program. (See page 109.)—The honors program in physics consists of three units of course 194H open to seniors who qualify for the honors program. Students may be graduated with honors in physics upon the completion of the required major and this program.

Graduate Study.—The Department of Physics offers programs of study and research leading to the M.A. and Ph.D. degrees.

LOWER DIVISION COURSES

Physics 4A, 4B, 4C 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. Knox, Mr. McCray, 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. McCray
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. Knox, Mr. McCray, 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. McCray, Mr. True

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 (Mathematics 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. Patten

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.

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.

* Not to be given, 1961-1962.

- 104. Vector Analysis.** (3) I. Mr. True
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. Gardner
Lectures and laboratory.
The phenomena of diffraction, interference, and polarization of light, and their applications.
Offered in alternate years.
- 110A-110B. Electricity and Magnetism.** (3-3) Yr. Mr. Beard
Prerequisite: Mathematics 106, 107.
Elementary and mathematical theory of electrostatics, magnetostatics, magnetism, steady and varying currents, electron theory, and electromagnetic waves.
Offered in alternate years.
- *110L. Advanced Electrical Laboratory.** (1) II. _____
Laboratory.
Prerequisite: course 110A-110B (110B may be taken concurrently), or the equivalent, or consent of the instructor.
The use and calibration of precision electrical instruments and electronic devices.
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. Knox
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.
- *121L. Atomic and Nuclear Physics Laboratory.** (1) I. _____
Laboratory.
Prerequisite: course 121.
Experimental foundation for the theory of atomic structure.
Offered in alternate years.
- 129A-129B. Nuclear Physics.** (3-3) Yr. Mr. McCray
Prerequisite: course 121.
Natural and artificial radioactivity, nuclear radiations and their inter-

action with matter, general properties of nuclei and the theory of nuclear structure, high energy physics, mesons.

Offered in alternate years.

194H. Special Study of Honors Students. (3) I and II. The Staff

Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff

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.

210A-210B. Theory of Electricity and Magnetism. (3-3) Yr.

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.

219. Statistical Mechanics and Kinetic Theory. (3) II.

Mr. True

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.

Mr. Jungerman

Advanced study in various fields of modern physics. Topics will vary from year to year.

299. Research. (1-6) I and II.

The Staff

* Not to be given, 1961-1962.

PHYSIOLOGICAL SCIENCES

Stuart A. Peoples, M.D., *Chairman of the Department.*

(Department Office, 2163 Haring Hall)

Louis W. Holm, Ph.D., *Professor of Physiology.*
Stuart A. Peoples, M.D., *Professor of Comparative Pharmacology.*
Arthur L. Black, Ph.D., *Associate Professor of Biochemistry.*
Harold R. Parker, D.V.M., Ph.D., *Assistant Professor of Physiology.*



R. J. Della Rosa, Ph.D., *Lecturer in Radiobiology.*
Richard A. Freedland, Ph.D., *Lecturer in Biochemistry.*
Marvin Goldman, Ph.D., *Lecturer in Radiobiology.*

UPPER DIVISION COURSES

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. Mr. Black, Mr. Freedland
Laboratory. 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.

123A-123B. Comparative Pharmacology. (4-4) Yr. Mr. Peoples
Lectures and laboratory.

Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the 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.

140. Mammalian Physiology. (6) II. Mr. Holm, Mr. Parker
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. Mr. Holm, Mr. Parker
Laboratory. Prerequisite: course 140 or equivalent (may be taken concurrently).

199. Special Study for Advanced Undergraduates. (1-5) I and II.
The Staff (Mr. Peoples in charge)

GRADUATE COURSES

205. Intermediary Metabolism of Animals. (3) II. Mr. Black, Mr. Freedland
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.

265. Experimental Physiology. (3) I.

Mr. Holm

Lectures and laboratory.

Prerequisite: course 140-140L or Animal Husbandry 110; Animal Husbandry 101, 102; and consent of the 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.

290. Seminar in Physiological Sciences. (1) I and II.

The Staff

299. Research in Physiological Sciences. (1-6) I and II.

The Staff

PHYSIOLOGY

For courses in physiology see "Animal Physiology," page 145, and "Zoology," page 304.

PLANT NUTRITION

For courses in plant nutrition see "Soils and Plant Nutrition," page 295.

PLANT PATHOLOGY

Lysle D. Leach, Ph.D., *Chairman of the Department.*

(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.*
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.*
Edward E. Butler, Ph.D., *Assistant 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.*
Robert J. Shepherd, Ph.D., *Assistant Professor of Plant Pathology.*



Joseph M. Ogawa, Ph.D., *Lecturer in Plant Pathology.*

Departmental Major Adviser.—Mr. English.

The Major.—See pages 74–78.

UPPER DIVISION COURSES

120. Plant Diseases. (4) I and II.

Lectures and laboratory. I. Mr. English, Mr. Shepherd; II. Mr. Campbell, 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. Ogawa

Lectures and laboratory.

Prerequisite: course 120.

The laboratory methods and techniques used in the study of plant diseases.

125A. Diseases of Crop Plants. (3) I.

Mr. Grogan, Mr. Houston

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. Ogawa, Mr. Wilson

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.

199. Special Study for Advanced Undergraduates. (1–5) I and II.

The Staff (Mr. DeVay in charge)

† Absent on leave, 1961–1962.

GRADUATE COURSES

- 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; Biochemistry 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. Hewitt, Mr. Leach
Prerequisite: courses 122, 224.
A study of the factors influencing pathogenicity and of the reaction of host plants to disease.
- 224. Pathogenic Fungi.** (3) II. Mr. Butler
Lectures and laboratory.
Prerequisite: Botany 119.
Morphology and taxonomy of fungi, with special emphasis on plant pathogens.
- 226. Plant Virology.** (3) II. Mr. Shalla
Lectures and laboratory.
Prerequisite: course 120.
Viruses as causal agents of plant diseases; the nature, morphology, chemical, physical and serological properties of plant viruses; methods of transmission including insect vector relationships; application of techniques and equipment used in research.
- 291. Seminar in Plant Pathology.** (1) I and II. Mr. DeVay
- 299. Research in Plant Pathology.** (1-6) I and II.
The Staff (Mr. Leach in charge)

POLITICAL SCIENCE

Clyde E. Jacobs, Ph.D., *Chairman of the Department*

(Department Office, 257 Academic Office Building)

Vernon J. Puryear, Ph.D., *Professor of Political Science.*

Clyde E. Jacobs, Ph.D., *Associate Professor of Political Science.*

Paul E. Zinner, Ph.D., *Associate Professor of Political Science.*

Ernest G. Miller, Ph.D., *Assistant Professor of Political Science.*

John R. Owens, Ph.D., *Assistant Professor of Political Science.*

Marvin Zetterbaum, 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 108.)

Departmental Major Advisers.—Mr. Jacobs, Mr. Miller, Mr. Puryear, Mr. Zetterbaum.

Graduate Advisers.—Mr. Owens, 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, 163, 166. See also the section entitled "General Regulations" on page 40.

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.
- (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 109).—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.

The Master of Arts Degree in Political Science.—The Department offers graduate study leading to the Master of Arts Degree in Political Science. Information concerning admission to candidacy for this degree and requirements for completion may be obtained at the department office.

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 and II.

Mr. Puryear, Mr. Zinner

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

Prerequisite: not open to students who have credit for course 104.

State constitutions, institutions, political patterns, and public programs; the challenge of contemporary problems; state-national conflict and cooperation 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.

***104. California State and Local Government.** (3) II.

Mr. Miller

Prerequisite: not open to students who have credit for course 102.

California's constitution, party system, legislature, executive agencies, administration, courts, major public programs and problems, state-local relations, county, city, school and special district governments.

Offered in alternate years.

105. The Legislative Process. (3) II.

Mr. Owens

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) I.

Mr. Zetterbaum

Underlying theories and principles of United States government and politics.

114. Polity and Economy: Political Foundations of Economic Thought.

(3) 1.

Mr. Zetterbaum

Interpretation of human nature and institutions underlying the relationship of economic doctrines to political science in classical and modern writers, notably Aristotle, Locke, Mandeville, Montesquieu, Rousseau, Adam Smith, and Marx.

118A. History of Political Theory. (3) I.

Mr. Zetterbaum

Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas.

118B. History of Political Theory. (3) II.

Mr. Zetterbaum

Prerequisite: course 118A is not prerequisite to 118B.

Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke, Nietzsche.

119. Recent Political Theory: Democracy, Fascism, and Communism. (3) II.

Mr. Zetterbaum

Examination of representative works of the principal competing modern ideologies, including those of Mill, Dewey, Nietzsche, Marx, Engels and Lenin.

* Not to be given, 1961-1962.

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.

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.

131. Soviet Foreign Policy. (3) I. Mr. Zinner

The conduct of Soviet foreign relations in contemporary world affairs; ideology and power as mainsprings of policy; foreign policy as an instrument of revolution; the role of diplomacy, economic aid and nuclear armaments.

141A-141B. Soviet and East European Governments. (3-3) Yr. Mr. Zinner

The governmental systems of the Soviet Union and the East European satellites; background, seizure of power, techniques of totalitarian control.

***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.

149. International Communism. (3) II. Mr. Zinner

The international communist movement; Leninist organizational precepts; relations among Communist parties (the Comintern and Cominform); centralized direction vs. local autonomy; problems of leadership and social composition; the Communist parties as adjuncts of Soviet foreign policy.

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.

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

218. Seminar in Political Theory. (2) II. Mr. Zetterbaum

230. Seminar in American Foreign Policy. (2) I and II. Mr. Puryear

241. Seminar in Soviet and East European Governments. (2) I. Mr. Zinner

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

PROFESSIONAL COURSES

400A-400B. Field Work in Political Science. (1-4) Yr. The Staff
Prerequisite: consent of the instructor.

Directed study and internship in a governmental agency, office, or political party.

POMOLOGY

Claron O. Hesse, Ph.D., *Chairman of the Department.*

(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.*
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. Bradley, 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.*

The Major.—See pages 74–78.

Departmental Major Advisers.—Mr. Brown, Mr. Crane.

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. Hartmann
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) I and II. 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, Mr. Maxie
Lectures and laboratory.
Prerequisite: course 2; Botany 111.
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 111; 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

Fredric W. Hill, Ph.D., *Chairman of the Department.*

(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.*
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).*
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.*
‡Leo C. Norris, Ph.D., *Lecturer in Poultry Husbandry.*
George F. Stewart, Ph.D., *Professor of Food Science and Technology.*

Departmental Major Adviser.—Mr. Ogasawara.

The Major.—See pages 61–64.

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 (Mrs. Abbott and Mr. Peterson 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.

‡ Absent on leave, fall semester 1961–1962.

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. Grau, Mr. Hill, Mr. Kratzer
Lectures and laboratory.
Prerequisite: Biochemistry 101 or equivalent.
A study of the fundamentals of nutrition specifically related to avian organisms. Introduction to methods used in nutritional evaluations.
106. **Poultry Feeds and Feeding.** (2) II. Mr. Grau, 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 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: 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. Brant, Mr. Peterson, 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 effect of environmental factors on physiological processes related to animal production.
Offered in odd-numbered years.
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)**Poultry Pathology Laboratory (Avian Medicine 112)****Animal Hygiene (Microbiology Science 111)****Concepts of Animal Nutrition (Nutrition 250)**

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

Paul Dempsey, Ph.D., *Chairman of the Department.*

(Department Office, 356 Academic Office Building)

William F. Dukes, Ph.D., *Associate Professor of Psychology.*

Paul Dempsey, Ph.D., *Assistant Professor of Psychology.*

Andrew K. Solarz, Ph.D., *Assistant Professor of Psychology.*



Jay S. Caldwell, Ph.D., *Lecturer in 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 108).

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 109).—The honors program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

LOWER DIVISION COURSES

1A. General Psychology. (3) I and II.

I. Mr. Dukes; II. Mr. Caldwell

Not open to entering freshmen.

An introduction to the facts and principles of psychology.

1B. General Psychology. (3) I and II. I. Mr. Caldwell; II. Mr. Solarz

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.

3. Quantitative Description of Behavior. (3) II.

Mr. Dempsey

Prerequisite: course 1A (may be taken concurrently); Mathematics D or equivalent; Mathematics 13.

Principles and problems of measurement in psychology; methods of order-

ing and comparing measurements; inference and prediction from psychological data.

33. Personal and Social Adjustment. (3) I and II.

Prerequisite: course 1A.

I. Mr. Solarz; II. Mr. Morris

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 1.

A study of the relationships between behavioral adjustments and receptor-, connector-, effector-systems.

Offered in alternate years.

130. Learning. (3) I.

Mr. Caldwell

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.

150. Comparative Psychology. (3) II.

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.

Lectures and laboratory.

Mr. Dempsey

Prerequisite: courses 1B, 145 or 168; 3 units of statistics.

* Not to be given, 1961-1962.

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. Duker

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.

Investigation of special problems.

The Staff (Mr. Dempsey in charge)

PUBLIC HEALTH

Donald E. Jasper, D.V.M., Ph.D., *Acting Chairman of the Department*

(Department Office, 1018 Haring Hall)

Donald E. Jasper, D.V.M., Ph.D., *Professor of Clinical Pathology.*

John B. Enright, Ph.D., *Associate Professor of Veterinary Public Health.*

Walter W. Sadler, D.V.M., M.P.H., *Associate Professor of Veterinary Public Health.*



Frederick N. Cooper, B.S., *Lecturer in Public Health.*

John H. Jones, M.D., *Lecturer in Public Health.*

UPPER DIVISION COURSES

199. **Special Study for Advanced Undergraduates.** (1-5) I and II.

The Staff (Mr. Jasper in charge)

GRADUATE COURSES

240. **Public Health for Veterinarians.** (5) II.

Lectures and laboratory.

Mr. Cooper, Mr. Enright, Mr. Sadler

Prerequisite: third-year standing in the School of Veterinary Medicine.

A study of those aspects of public health that are of concern to the veterinarian with particular reference to the zoonoses and the control of diseases spread through meat, milk, and other foods.

290. **Seminar in Public Health.** (1) I and II.

The Staff (Mr. Jasper in charge)

299. **Research in Public Health.** (1-6) I and II.

The Staff (Mr. Jasper in charge)

RANGE MANAGEMENT

Henry J. Vaux, Ph.D., *Chairman of the Committee. (Berkeley Campus)*

(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 (Berkeley campus).*

William C. Weir, Ph.D., *Professor of Animal Husbandry.*



Beecher Crampton, M.A., *Lecturer in Agronomy.*

William A. Williams, Ph.D., *Associate Professor of Agronomy.*

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 Advisers.—Mr. Love, Mr. Williams.

The Major.—See pages 80–82.

LOWER DIVISION COURSES

1. Introduction to Range Management. (3) I. Mr. Biswell

Basic principles of range management and their relationships to the management of wildlands for livestock production, wildlife, water, recreation and timber.

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 COURSES

100. Range Plants. (3) I. Mr. Crampton

Lectures and laboratory.

Prerequisite: Botany 1.

Systematic relationships and identification of range grasses, legumes, forbs and shrubs; their distribution, environmental requirements and use.

133. Grassland Ecology. (3) II. Mr. Heady

Prerequisite: course in plant ecology or consent of the instructor.

Composition, structure, development and habitat factors of native North American grasslands. Principles of grassland management for forage production.

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)
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 117)

GRADUATE COURSES

- 290. Seminar in Range Management.** (2) I and II.
Prerequisite: course 133. The Staff (Mr. Love in charge)
- 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 208.

SOCIOLOGY

Edwin M. Lemert, Ph.D., *Chairman of the Department.*

(Department Office, 314 Academic Office Building)

Edwin M. Lemert, Ph.D., *Professor of Sociology.*

Charles D. Bolton, Ph.D., *Assistant Professor of Sociology.*

Kenneth C. W. Kammeyer, Ph.D., *Assistant Professor of Sociology.*



Carlos E. Kruytbosch, M.A., *Lecturer in Sociology.*

Winslow Rouse, Ph.D., *Lecturer in Sociology.*

Letters and Science List.—All undergraduate courses are included in the Letters and Science List of Courses (see page 108).

Major Advisers.—Mr. Bolton, Mr. Kammeyer, Mr. Lemert.

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 either Sociology 165 or Sociology 185 depending upon the needs and interests of the student.

LOWER DIVISION COURSES

1. **Introduction to Sociology.** (3) I and II. 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. Bolton
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.
- 130. Race Relations and Minority Groups.** (3) I. Mr. Kruytbosch
Prerequisite: 6 units of social science or consent of the instructor.
A study of contacts and interaction between racial and ethnic groups; sources and effects of prejudice and discrimination; programs for reducing intergroup tensions.
- 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.
- 152. Juvenile Delinquency.** (3) II. Mr. Lemert
Prerequisite: 6 units of social science or consent of the instructor.
Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control, with special attention given to the juvenile court.
- 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.
- 170. Population.** (3) I. Mr. Kammeyer
Prerequisite: 6 units of social science or consent of the instructor.
Introduction to the study of human population including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution; migration; sociopsychological factors affecting fertility.
- 185. The Field of Social Welfare.** (3) II. Mr. Rouse
Prerequisite: courses 1 and 2; upper division standing or consent of the instructor.
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.

* Not to be given, 1961-1962.

SOILS AND PLANT NUTRITION

Perry R. Stout, Ph.D., *Chairman of the Department.*

(Department Office, 125 Dennis Robert Hoagland Hall)

Daniel G. Aldrich, Ph.D., *Professor of Soils (Berkeley campus).*
Francis E. Broadbent, Ph.D., *Professor of Soil Microbiology.*
Lannes E. Davis, Ph.D., *Professor of Soils.*
Frank F. Harradine, Ph.D., *Professor of Soil Morphology.*
Perry R. Stout, Ph.D., *Professor of Soil Science.*
Victor V. Rendig, Ph.D., *Associate Professor of Soils and Plant Nutrition.*
John L. McMurdie, Ph.D., *Assistant Professor of Soil Physics.*
James A. Vomocil, Ph.D., *Assistant Professor of Soil Physics.*
Lynn D. Whittig, Ph.D., *Assistant Professor of Soil Science.*



Eugene L. Begg, B.S., *Lecturer in Soil Morphology.*
Arthur L. Brown, Ph.D., *Lecturer in Soils and Plant Nutrition.*
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., *Professor of Irrigation.*
William E. Martin, Ph.D., *Lecturer in Soils and Plant Nutrition.*
Duane S. Mikkelsen, Ph.D., *Associate Professor of Agronomy.*

Departmental Major Adviser.—Mr. McMurdie.

The Major.—See pages 82–84.

PLANT NUTRITION

UPPER DIVISION COURSE

116. Principles of Plant Nutrition. (3) II.

Mr. Epstein

Lectures and laboratory.

Prerequisite: Botany 111; 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.

† Absent on leave, 1961–1962.

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) II.** Mr. Vomocil
Lectures and laboratory.
Prerequisite: course 1; Physics 2A-2B.
Introduction to physical properties and behavior of mineral and organic soil particles and structural units; effect of environmental factors and cultural treatments on structure; soil-water relations; laboratory evaluation of effect of treatments on aggregation, permeability and strength.
- 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 1A.
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. Martin
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. Mr. Davis

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. Mr. Broadbent, Mr. Epstein, Mr. Rendig

Prerequisite: courses 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.

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 208.

* Not to be given, 1961-1962.

SPEECH

For courses in speech see "Dramatic Art and Speech" on page 177.

SUBJECT A

(Department Office, 176 Academic Office Building)

Leonard G. Homann, A.B., *Instruction Supervisor in Subject A.*

Merrill D. Grohman, A.B., *Associate in Subject A.*

Doris J. Humphrey, A.B., *Associate 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 and pass a special examination with a grade of A, half of the fee will be refunded; they may discontinue attending the course.

TEXTILE SCIENCE

For courses in textile science, see "Home Economics" on page 227.

VEGETABLE CROPS

James E. Knott, Ph.D., Sc.D., (hon.c.), *Chairman of the Department.*

(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.*
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 74–78.

LOWER DIVISION COURSES

- 1. Vegetable Production.** (2) II. Mr. Flocker
Principles involved in vegetable production; survey of the vegetable industry.
- 1L. Vegetable Crops Production Laboratory.** (1) II. Mr. Flocker
(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.
One or more field trips.

UPPER DIVISION COURSES

- 101. Major California Vegetable Corps.** (3) I. Mr. Knott
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.** (2) I. Mr. Smith
Laboratory.
Prerequisite: course 1; Botany 1.
Origin, history, types, classification, nomenclature, and adaptation of the more important American vegetable varieties; minor vegetable crops; trends in development of new varieties. One or more field trips.
- 112. Handling, Storage, and Transit of Vegetables.** (3) I. Mr. Morris
Lectures and laboratory.
Prerequisite: course 1; Botany 111; or consent of the instructor.

† Absent on leave, 1961–1962.

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 111. 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 111.

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. Spurr 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 Pomology 291.

299. Research in Vegetable Crops. (1-6) I and II. The Staff

VETERINARY MEDICINE

For courses in veterinary medicine, see "Medicine, Surgery, and Clinics," page 246.

VITICULTURE AND ENOLOGY

Maynard A. Amerine, Ph.D., *Chairman of the Department.*

(Department Office, 1027 Horticultural Sciences Building)

Maynard A. Amerine, Ph.D., *Professor of Enology.*
Harold W. Berg, M.S., *Professor of Enology.*
James F. Guymon, Ph.D., *Professor of Enology.*
Harold P. Olmo, Ph.D., *Professor of Viticulture.*
Robert J. Weaver, Ph.D., *Professor of Viticulture.*
A. Dinsmoor Webb, Ph.D., *Professor of Enology.*
Albert J. Winkler, Ph.D., *Professor of Viticulture, Emeritus.*
‡James A. Cook, Ph.D., *Associate Professor of Viticulture.*
Lloyd A. Lider, Ph.D., *Associate Professor of Viticulture.*
Klayton E. Nelson, Ph.D., *Associate Professor of Viticulture.*
John L. Ingraham, Ph.D., *Assistant Professor of Enology.*



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.*

Departmental Major Advisers.—Viticulture, Mr. Olmo; Enology, Mr. Ingraham.

The Majors.—See pages 75–78 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. Amerine, Mr. Singleton
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. Lider, Mr. Nelson
Prerequisite: course 1 or Pomology 2.
Botanical classification of the grape—the principal varieties, rootstocks,

‡ Absent on leave, fall semester 1961–1962.

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 111; 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. Amerine, Mr. Berg

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.

198. Directed Group Study. (1-5) I and II.

The Staff

Prerequisite: consent of the instructor.

Directed group study of selected topics in viticulture and enology for advanced undergraduates.

199. Special Study for Advanced Undergraduates in Viticulture. (1-5) I and II.

The Staff

RELATED COURSE

Fruit Breeding (Pomology 114)

GRADUATE COURSES

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.

290. **Seminar.** (1) II.

Mr. Webb

Prerequisite: consent of the instructor.

299. **Research in Viticulture and Enology.** (1-6) I and II.

The Staff

ZOOLOGY

Milton A. Miller, Ph.D., *Chairman of the Department.*

(Department Office, 249 Animal Science Building)

Milton A. Miller, Ph.D., *Professor of Zoology.*
Lauren E. Rosenberg, Ph.D., *Professor of Zoology.*
Loye H. Miller, Ph.D., LL.D., *Professor of Biology, Emeritus.*
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.*
Ernest J. DuPraw, Ph.D., *Assistant Professor of Zoology.*
Charles R. Goldman, Ph.D., *Assistant Professor of Zoology.*
Jurgen H. H. Jacobs, 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.*
Glen W. Clark, M.A., *Associate in Zoology.*
James R. Douglas, Ph.D., *Professor of Parasitology.*
Wilfred J. Wilson, M.A., *Associate in Zoology.*

PHYSIOLOGY

Letters and Science List.—Physiology 1, 1L.

LOWER DIVISION COURSES

- 1. Introductory Physiology Lecture.** (3) I. Mr. Jacobs
Prerequisite: high school chemistry.
The physiology of muscle, nerve, central nervous system, sensation, circulation, respiration, excretion, and digestion.
- 1L. Introductory Physiology Laboratory.** (2) I. Mr. Jacobs
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 108).

Departmental Major Advisers.—Mr. Goldman, Mr. Hildebrand, Mr. Jameson.

Bachelor of Arts 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.

Bachelor of Science Major Program

The B.S. program is specifically designed as an interdisciplinary major with an area emphasis in wildlife for students with professional orientation in that field. All other zoology majors should take the A.B. program.

(A) Lower Division Courses.—Required: course 1A, 1B; Botany 1; Chemistry 1A, 8; Entomology 1; Mathematics 13. Recommended: Agronomy 1; Bacteriology 1; Geography 1, 3; Geology 1A; Physics 2A, 2B; Soil Science 1.

(B) Upper Division Courses.—Thirty-six units of upper division courses including 21 units of required courses and the remaining 15 to be selected from four groups of electives listed below (at least one course must be taken from each elective group). At least 24 units must be in upper division zoology courses (but with 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).

Required: Agronomy 115; Botany 108; Geography 161; Zoology 116, 125, and 6 units of upper division electives in zoology.

Elective groups (at least one course from each group is required).

Group 1. Ecology and Limnology.—Botany 117; Entomology 127; Zoology 140–140L.

Group 2. Physiology and Nutrition.—Animal Husbandry 105, 110; Poultry Husbandry 105.

Group 3. Parasitology and Pathology.—Veterinary Science 111, 122A–122B, 124.

Group 4. Vertebrate Zoology.—Zoology 133, 134.

Honors and Honors Program (see page 109).—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.

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. _____
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.
- 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) II. 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) II. 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. Salt
- 290. Seminar on Systematic Zoology and Evolution.** (1) II. Mr. Rudd
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. DuPraw, Mr. Hildebrand
Prerequisite: consent of the instructor.
Reports and discussion on embryology, morphogenesis, and developmental mechanisms.
- *293. Seminar in Invertebrate Zoology.** (1) I. Mr. Jacobs, Mr. Miller
Prerequisite: course 112 or consent of the instructor.
Reports and discussion on selected topics in invertebrate zoology with emphasis on recent advances.

* Not to be given, 1961-1962.

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.
296. **Seminar in Parasitology.** (1) I and II. Mr. Baker, Mr. Douglas
Prerequisite: consent of the instructor.
Reports and discussion of fundamental principles and selected topics in parasitology.
299. **Research in Zoology.** (1-6) I and II. The Staff

* Not to be given, 1961-1962.

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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:

Registrar, University of California, Berkeley, Berkeley 4.

Registrar, University of California, Davis, Davis.

Registrar, University of California, Los Angeles, Los Angeles 24.

Registrar, University of California, Riverside, Riverside.

Registrar, University of California, Santa Barbara, University.

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