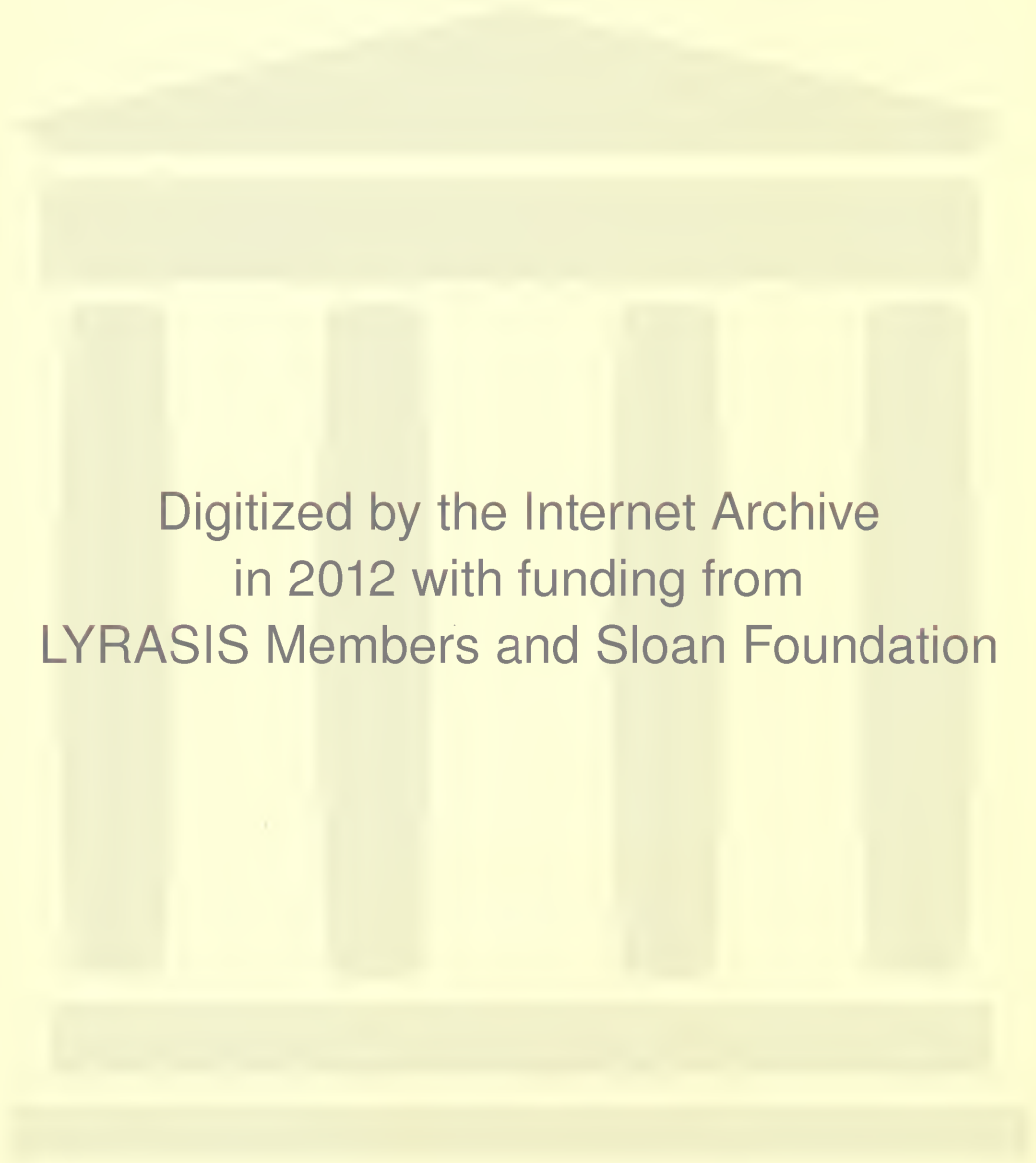

KANSAS STATE UNIVERSITY BULLETIN

GENERAL CATALOG

1968-1970

SEPTEMBER 1968

KANSAS STATE UNIVERSITY
OF AGRICULTURE AND APPLIED SCIENCE
MANHATTAN, KANSAS 66502

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Business Directions

General information about the University is obtainable from the President.

Prospective undergraduate students should communicate with the Dean of Admissions and Records.

Prospective graduate students should communicate with the Dean of the Graduate School.

The experiment stations and the various departments are always ready to respond to requests for information in their special fields. Those who need scientific and practical information should write to the head of the department concerned with the work under consideration.

Requests for publications of the Agricultural Experiment Station or the Engineering Experiment Station should be made to the director of the station.

CALENDAR

FIRST SEMESTER, 1968-69

Sept. 1, Sun. Beginning of pay period for 9-months staff.
Sept. 2, Mon. Holiday—Labor Day.
Sept. 8, 2:30 p.m., Sun. Convocation for new students and their parents.
Sept. 9-11, Mon.-Wed. Registration of all students including physical examinations, testing, and orientation for new students.
Sept. 12, Thurs. Classes begin. Late enrollment fee, $2.50.
Sept. 14, Noon, Sat. Regular registration closes for University staff, elementary and secondary school teachers.
End of first week. Late enrollment fee, $5.00 for subsequent enrollment.
Sept. 20, Fri. Last day to enroll without special permission *from student's Dean* (2nd week).
Oct. 2, Wed. Last day for all students except new undergraduate students to drop courses without a Wd or Failure being recorded (18th class day).
Oct. 18, Fri. Last day to withdraw and receive a fee refund (6th week).
Oct. 25, Fri. Mid-semester grade reports due in Office of Admissions and Records (7th week).
Nov. 8, Fri. Last day for new undergraduate students to drop courses without a Wd or Failure being recorded (9th week).
Nov. 26, 10:00 p.m., Tues. Thanksgiving student recess begins.
Nov. 28, Thurs. Holiday—Thanksgiving Day.
Dec. 2, Mon. Classes resume.
Dec. 21, Sat. Christmas student recess begins.
Dec. 25, Wed. Holiday—Christmas Day.
Jan. 1, Wed. Holiday—New Year's Day.
Jan. 6, Mon. Classes resume.
Jan. 10, Fri. Last day subject may be dropped before end of semester.
Jan. 20-24, Mon.-Fri. Semester examinations for *all* students.
Jan. 27, Noon, Mon. Deadline for grade reports to Office of Admissions and Records.

SECOND SEMESTER, 1968-69

Jan. 30, 31-Feb. 1, Thurs.-Sat. Registration of all students including physical examinations, testing, and orientation for new students.
Feb. 3, Mon. Classes begin. Late enrollment fee, $2.50.
Feb. 8, Noon, Sat. Regular registration closes for University staff, elementary and secondary teachers.
End of first week. Late enrollment fee, $5.00 for subsequent enrollment.
Feb. 14, Fri. Last day to enroll without special permission *from student's Dean* (2nd week).
Feb. 21, Fri. Last day for all students except new undergraduate students to drop courses without a Wd or Failure being recorded (18th class day).
Mar. 14, Fri. Last day to withdraw and receive a fee refund (6th week).
Mar. 21, Fri. Mid-semester grade reports due in Office of Admissions and Records (7th week).
Mar. 28, Fri. Last day for new undergraduate students to drop courses without a Wd or Failure being recorded (9th week).
Mar. 29, Sat. Spring student recess begins (Easter is April 6.)
Apr. 7, Mon. Classes resume.
May 16, Fri. Last day a subject may be dropped before end of semester.
May 26-30, Mon.-Fri. Semester examinations for all students *except candidates for degrees.*
May 26, Noon, Mon. Grades to Office of Admissions and Records for all candidates for degrees.
May 29, 11:00 a.m., Thurs. Senate meeting to approve candidates for degrees.
May 31-June 1, Sat.-Sun. Commencement weekend.
June 2, Noon, Mon. Deadline for grade reports to Office of Admissions and Records.

8-WEEK SUMMER SESSION, 1969

June 9, 8:00 a.m., Mon. Registration of all students including physical examinations, testing, and orientation for new students.
June 10, 7:30 a.m., Tues. Classes begin. Late enrollment fee, $2.50.
June 13, 4:30 p.m., Fri. Regular registration closes for University staff. End of first week. Late enrollment fee, $5.00 for subsequent enrollment.
Last day to enroll without special permission *from student's Dean.*
June 20, 4:30 p.m., Fri. Last day for all students except new undergraduate students to drop courses without a Wd or Failure being recorded (9th class day).
June 27, 4:30 p.m., Fri. Last day to withdraw from the 8-week session and receive a fee refund (3rd week).
July 4, Fri. Holiday—Independence Day.
July 11, 4:30 p.m., Fri. Last day for new undergraduate students to drop courses without a Wd or Failure being recorded (5th week).
July 29, 4:00 p.m., Tues. Last day subject may be dropped before end of session.
Aug. 1, Fri. Last day for examinations.
Aug. 4, 8:00 a.m., Mon. Deadline for grade reports to Office of Admissions and Records.

NOTE: Registration for short courses will be as announced in the Summer School Catalog for individual courses. Registration in each case will occur on the first day.

CALENDAR
(Continued)

FIRST SEMESTER, 1969-70

Sept. 1, Mon. Beginning of pay period for 9-months staff.
Holiday—Labor Day.
Sept. 7, 2:30 p.m., Sun. Convocation for new students and their parents.
Sept. 8-10, Mon.-Wed. Registration of all students including physical examinations, testing, and orientation for new students.
Sept. 11, Thurs. Classes begin. Late enrollment fee, $2.50.
Sept. 12, Fri. Regular registration closes for University staff, elementary and secondary school teachers.
End of first week. Late enrollment fee, $5.00 for subsequent enrollment.
Sept. 19, Fri. Last day to enroll without permission *from student's Dean* (2nd week).
Oct. 1, Wed. Last day for all students except new undergraduate students to drop courses without a Wd or Failure being recorded (18th class day).
Oct. 17, Fri. Last day to withdraw and receive a fee refund (6th week).
Oct. 24, Fri. Mid-semester grade reports due in Office of Admissions and Records (7th week).
Nov. 7, Fri. Last day for new undergraduate students to drop courses without a Wd or Failure being recorded (9th week).
Nov. 25, 10:00 p.m., Tues. Thanksgiving student recess begins.
Nov. 27, Thurs. Holiday—Thanksgiving Day.
Dec. 1, Mon. Classes resume.
Dec. 20, Sat. Christmas student recess begins.
Dec. 25, Thurs. Holiday—Christmas Day.
Jan. 1, Thurs. Holiday—New Year's Day.
Jan. 5, Mon. Classes resume.
Jan. 9, Fri. Last day subject may be dropped before end of semester.
Jan. 19-23, Mon.-Fri. Semester examinations for *all* students.
Jan. 26, Noon, Mon. Deadline for grade reports to Office of Admissions and Records.

SECOND SEMESTER, 1969-70

Jan. 29-31, Thurs.-Sat. Registration of all students including physical examinations, testing, and orientation for new students.
Feb. 2, Mon. Classes begin. Late enrollment fee, $2.50.
Feb. 7, Noon, Sat. Regular registration closes for University staff, elementary and secondary teachers.
End of first week. Late enrollment fee, $5.00 for subsequent enrollment.
Feb. 13, Fri. Last day to enroll without special permission *from student's Dean* (2nd week).
Feb. 20, Fri. Last day for all students except new undergraduate students to drop courses without a Wd or Failure being recorded (18th class day).
Mar. 13, Fri. Last day to withdraw and receive a fee refund (6th week).
Mar. 20, Fri. Mid-semester grade reports due in Office of Admissions and Records (7th week).
Mar. 27, Fri. Last day for new undergraduate students to drop courses without a Wd or Failure being recorded (9th week).
Spring student recess begins. (Easter is March 29.)
Apr. 6, Mon. Classes resume.
May 15, Fri. Last day a subject may be dropped before end of semester.
May 25-29, Noon, Mon.-Fri. Semester examinations for all students *except candidates for degrees.*
May 25, Noon, Mon. Grades to Office of Admissions and Records for all candidates for degrees.
May 28, 11:00 a.m., Thurs. Senate meeting to approve candidates for degrees.
May 30-31, Sat.-Sun. Commencement weekend.
June 1, Noon, Mon. Deadline for grade reports to Office of Admissions and Records.

8-WEEK SUMMER SESSION, 1970

June 8, 8:00 a.m., Mon. Registration of all students including physical examinations, testing, and orientation for new students.
June 9, 7:30 a.m., Tues. Classes begin. Late enrollment fee, $2.50.
June 12, 4:30 p.m., Fri. Regular registration closes for University staff.
End of first week. Late enrollment fee, $5.00 for subsequent enrollment.
Last day to enroll without special permission *from student's Dean.*
June 19, 4:30 p.m., Fri. Last day for all students except new undergraduate students to drop courses without a Wd or Failure being recorded (9th class day).
June 26, 4:30 p.m., Fri. Last day to withdraw from the 8-week session and receive a fee refund (3rd week).
July 4, Sat. Holiday—Independence Day.
July 10, 4:30 p.m., Fri. Last day for new undergraduate students to drop courses without a Wd or Failure being recorded (5th week).
July 28, 4:00 p.m., Tues. Last day subject may be dropped before end of session.
July 31, Fri. Last day for examinations.
Aug. 3, 8:00 a.m., Mon. Deadline for grade reports to Office of Admissions and Records.

NOTE: Registration for short courses will be as announced in the Summer School Catalog for individual courses. Registration in each case will occur on the first day.

THE UNIVERSITY

The University, founded on February 16, 1863, was established under the Morrill Act, under which land-grant colleges came into being. At first the University was located on the grounds of the old Bluemont Central College, chartered in 1858, but in 1875 most of the work of the University was moved to the present site. The campus is at the northwest corner of the city of Manhattan, convenient to both business and residential sections. The campus itself consists of 315 acres carefully landscaped, on which the main buildings, most of them constructed of native limestone, are located. Beyond the campus there are 4,036 acres of land belonging to the University which are used for experimental work in agriculture. In addition there are five branches of the Agricultural Experiment Station located at Hays, Colby, Garden City, Mound Valley, and Tribune, totaling 4,555 acres plus a number of outlying experimental fields.

Objectives of the Educational Program at Kansas State University

The objectives of the educational program at Kansas State University are to develop an individual capable of applying an enlightened judgment in his professional, his personal, and his social life. To that end the University program is designed:

I. To provide full and efficient counseling and guidance to the student while in the University. Specifically, this means to:
   1. Learn and make known to the student before he enrolls all that is possible and useful about his interests, aptitudes, and abilities.
   2. Apply that knowledge to the student's choice of courses and curriculums as fully as possible without encroaching harmfully on his initiative and feeling of self-responsibility.
   3. Provide continuing guidance for the student according to his needs.

II. To prepare the student adequately in a technical sense for an occupation or a profession which includes an organized body of information and theory so that he may realize his creative potentialities in the field of his choice. More specifically this means that the student should acquire:
   1. The ability to recognize and master fundamental principles in his field of specialization.
   2. The knowledge basic to his special field of study.
   3. The ability to reason critically from facts and recognized assumptions to useful technical conclusions.
   4. The basic skills associated with his field of study.
   5. A professional attitude in his chosen work.

III. To provide every student with an opportunity to gain the knowledge and abilities which members of a democratic society, relative to their capabilities, need to possess in common, whatever occupation or profession they expect to enter. Specifically, this means that through its total program the University undertakes to help the student to:
   1. Develop his communication skills.
   2. Develop the ability to apply critical and creative thinking to the solution of theoretical and practical problems.
   3. Understand the basic concepts of the natural sciences, the interrelations of the natural and social sciences, and the impact of science on society.
   4. Comprehend and evaluate the processes and institutions in society at home and abroad, and develop a dynamic sense of his personal responsibilities as an effective citizen in a democratic society.
   5. Develop habits of self-evaluation, responsibility, and enterprise which will increase the effectiveness of the educative process in college, and provide the basis for continued self-improvement.

6. Develop a well-adjusted personality, good character traits, and a sound philosophy of life.
7. Prepare for effective participation in family life.
8. Utilize actively and fully his capacity for esthetic appreciation and enjoyment.

IV. To stimulate the faculty and students to extend the boundaries of knowledge through critical and creative thinking and experimentation.

V. To provide the facilities for extending education outside the boundaries of the campus to the members of the community which the institution serves.

Undergraduate Degrees

To graduate, a student must complete a prescribed curriculum. Under special conditions such substitutions are allowed as the interests of the student demand. The total requirement for four-year undergraduate curriculums ranges from 120 to 136 semester hours, according to the curriculum taken. (A semester hour is one hour of recitation or lecture work, or two or three hours of laboratory a week, for one semester. When no ambiguity is involved, the term "hour" is used for "semester hour" in this catalog.) For each semester hour of work a student gets points, according to the grades he makes, as follows: A, 4; B, 3; C, 2; D, 1; F, 0. To be awarded an undergraduate degree, students who enter after September 1, 1964, and all who graduate after June, 1970, must have earned a grade-point average of at least 2.0 on all Kansas State University courses taken for resident credit and applied toward a degree. In addition, a 1.85 over-all average in all resident courses is required.*

To be considered for an undergraduate degree, a student must have completed in residence 20 of his last 30 undergraduate hours, with not fewer than 30 hours of resident undergraduate credit at this institution. To receive a degree in the College of Arts and Sciences, any student enrolling in the University after September 1, 1960, must have completed 30 hours of resident credit while registered in the College of Arts and Sciences.

Resident work includes all regularly scheduled class or laboratory instruction given by the regular University faculty but excluding extension courses and courses completed by special examination. In special cases, candidates will be considered who have completed three full years of work in this institution and who petition to take their last year of work in an institution approved by the faculty. A student's dean is empowered by the faculty to lift the residence requirements for a degree on the basis of credits transferred from an accredited school of medicine, dentistry, or law.

A candidate for spring graduation must attend commencement unless granted the degree *in absentia*. Application to graduate *in absentia* must be filed with the candidate's dean who, if convinced that hardship would result if the request were denied, will present the case to be acted upon at the Senate meeting shown in the academic calendar for passing on candidates for degrees. Summer and fall graduates are invited to participate in the following spring commencement exercises but attendance is not required.

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* Students who entered prior to June 1, 1964, are continued under old policy to June, 1970, under which students can graduate with a 2.0 grade-point average on courses applying towards the degree, and a 1.7 over-all average.

DEGREES

The degrees shown below are conferred on completion of the following four-year curriculums: The letter which precedes each curriculum indicates the prerequisite high school courses presented on page 11. It is recommended that entering freshmen complete the prerequisite mathematics courses. However, deficiencies in mathematics preparation can be removed at the University during the first year.

In the College of Agriculture

(E) Agriculture, B. S. in Agriculture, B. S. in Agricultural Journalism, page 52.
- (Agricultural Economics major), page 52.
- (Agricultural Journalism major), page 52.
- (Agricultural Mechanization major), page 53.
- (Agronomy major), page 53.
- (Animal Science and Industry major), page 53.
- (Dairy Production major), page 53.
- (Entomology major), page 53.
- (Horticulture major), page 54.
- (Plant Pathology major), page 54.
- (Poultry Science major), page 54.
- (Pre-Veterinary Medicine major), page 54.

(E) Agricultural Education (Teachers), B. S. in Agriculture, page 57.

(E) Bakery Science and Management, B. S. in Bakery Science and Management, page 58.
- (Administration option), page 58.
- (Science option), page 58.
- (Operations option), page 58.

(F) Biochemistry, B. S. in Biochemistry, page 61.

(E) Dairy Foods Processing, B. S. in Agriculture, page 62.

(E) Feed Science and Management, B. S. in Feed Science and Management, page 59.
- (Administration option), page 59.
- (Chemistry option), page 59.
- (Operations option), page 59.

(E) Milling Science and Management, B. S. in Milling Science and Management, page 60.
- (Administration option), page 60.
- (Chemistry option), page 60.
- (Operations option), page 60.

In the College of Architecture and Design

(F) Architecture (five years), Bachelor of Architecture, page 98.

(F) Architectural Structures Option (five years), Bachelor of Architecture, page 99.

(F) Interior Architectural Design Option (five years), Bachelor of Architecture, page 100.

(E) Landscape Architecture (five years), Bachelor of Landscape Architecture, page 101.

(F) Building Construction, B. S. in Building Construction, page 102.

In the College of Arts and Sciences*

A. B.	B. S.
Bachelor of Arts	**Bachelor of Science**
(B) Anthropology	(B) Anthropology
(A) Art	(E) Biology
(E) Biology	(E) Chemistry
(E) Chemistry	(E) Computer Science
(A) Computer Science	(B) Economics
(B) Economics	General Majors:
(A) English	(D) Biologicial Science
General Majors:	(A) Humanities
(D) Biological Sciences	(E) Physical Science
(A) Humanities	(A) Social Science
(E) Physical Science	(E) Geochemistry
(A) Social Science	(B) Geography
(E) Geochemistry	(E) Geology
(B) Geography	(E) Geophysics
(E) Geology	(B) History
(E) Geophysics	(F) Mathematics
(A) History	(E) Physics
(F) Mathematics	(B) Political Science
(A) Modern Language	(B) Psychology
(A) Philosophy	(B) Radio and TV
(B) Political Science	(B) Sociology
(B) Psychology	(B) Speech
(B) Radio and TV	(E) Statistics
(B) Sociology	(B) Technical Journalism
(A) Speech	
(A) Statistics	
(B) Technical Journalism	

Pre-Professional

A. B.	B. S.
(D) Physical Therapy	(E) Medical Technology
(E) Pre-Dentistry	(D) Physical Therapy
(B) Pre-Law	(E) Pre-Dentistry
(E) Pre-Medicine	(A) Pre-Elementary Education
	(B) Pre-Law
(A) Bachelor of Music	(E) Pre-Medicine
(A) Bachelor of Music Education	(B) Pre-Nursing
(A) Bachelor of Physical Education	(E) Pre-Pharmacy
	(A) Pre-Secondary Education
	(E) Pre-Veterinary

In the College of Commerce

(E) **Business Administration, B. S. in Business Administration, page 232.**

(E) **Accounting, B. S. in Business Administration, page 235.**

In the College of Education

(A) **Elementary Education, Bachelor of Science in Elementary Education, page 243.**

(A) **Secondary Education, Bachelor of Science, page 245.**

In the College of Engineering

(F) **Agricultural Engineering, B. S. in Agricultural Engineering, page 261.**

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(F) **Electrical Engineering, B. S. in Electrical Engineering, page 264.**

(F) **Industrial Engineering, B. S. in Industrial Engineering, page 265.**

* See page 9 for mathematics prerequisites.

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Dual degree in Engineering and Business Administration, page 269.

IN THE COLLEGE OF HOME ECONOMICS

(C) Home Economics with options. B. S. in Home Economics, page 311.
(Home Economics Education—Vocational Teaching), page 312.
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(Fashion Design), page 313.
(Interior Design), page 314.
(Community Services), page 315.
(Preschool Education), page 314.
(Consumer Interest), page 316.
(Housing and Equipment), page 317.
(Foods and Nutrition in Business), page 317.
(Foods and Nutrition Research), page 318.
(Dietetics and Institutional Management), page 318.
(C) Home Economics and Journalism, B. S. in Home Economics and Journalism, page 319.
(C) Home Economics with Liberal Arts, B. S. in Home Economics, page 320.
(C) Restaurant Management, B. S. in Restaurant Management, page 321.

IN THE COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine, Doctor of Veterinary Medicine, page 337.
(For completion of six-year combination of pre-veterinary curriculum and veterinary medicine curriculum)
(See Colleges of Agriculture and Arts and Sciences for B. S. degrees in connection with College of Veterinary Medicine.)

Admission of Undergraduates

Students interested in attending Kansas State University should write to the Admissions Office for the admission application form. The student should complete the form, indicate the curriculum in which he plans to enroll and return it to the Admissions Office. All correspondence about admission should be addressed to this office.

High School Graduates

Residents of Kansas who are graduated from an accredited Kansas high school are admitted to Kansas State University. Out-of-state students are expected to have a good academic rank in class and to have made good scores on the American College Test battery.

Specific admission procedures are given to each student at the time he inquires about admission to the University. Students are urged to apply early in their senior year of high school.

High School Prerequisites

Entering freshmen should have completed the high school mathematics courses which are a necessary prerequisite for their curriculum as listed below. The capital letters correspond to the previous section on undergraduate degrees. See pages 9 and 10.

(A) One unit of algebra, or one unit of geometry, or a unit involving the combination of these, or approved substitute.
(B) One unit of algebra.

(C) Two units of algebra, or one unit of algebra and one unit of geometry.

(D) One unit of algebra and one unit of geometry.

(E) One and one-half units of algebra and one unit of geometry.

(F) Two units of algebra, one unit of geometry, and one-half unit of trigonometry.

In addition, entering freshmen should have completed at least three units of high school English and one unit of high school science.

Transfer Students

All transfer students (those with previous college credit) are expected to have a 2.0 (C) overall average in their previous academic work in order to be considered for admission to the University. This standard applies to both Kansas and out-of-state transfer students.

Most credits from other accredited junior and senior colleges and universities are transferable to K-State. Transcripts of record should be sent to the Admissions Office directly from each institution previously attended. Unofficial transcripts and grade summaries should not be submitted by the student, since these are not acceptable by the University.

Transfer students should apply for admission approximately six months prior to the term they wish to enter.

American College Test (ACT)

Freshman applicants to KSU are required to take the ACT and have their test scores forwarded to the University. The test should be taken on one of the national test dates throughout the year, preferably in October. Numerous test centers are available throughout the state and nation. Further information about the ACT can be obtained from your high school counselor or high school principal.

Admissions Counseling

The Admissions Office is open weekdays for admissions counseling. It is suggested that campus visits be scheduled from 9 to 11 a.m. and 2 to 4 p.m. on weekdays, since University offices are closed all day Saturday and Sunday.

Several admissions counselors usually are available to consult concerning educational plans. The Admissions Office is located in the center of the main administration building, Anderson Hall.

Advanced Placement

A student who has completed one of the College Entrance Examination Board Advanced Placement Tests should have a report of his scores sent to the director of admissions at Kansas State University. College Board Advanced Placement Tests are given in American History, Biology, Chemistry, English, European History, French, German, Latin 4, Latin 5, Mathematics, Physics and Spanish. Credit is given for scores of 5, 4 or 3. Scores of 2 are referred to the appropriate department head for review. No credit is given for scores of 1.

Enrollment

Students who have been admitted to Kansas State University will be scheduled for enrollment. Enrollment for the fall semester normally takes place in July of each year. Students are scheduled in groups of approximately 200 in number for one of the two-day July enrollment sessions. Specific information and instructions are sent to each student at the time the acceptance letter is mailed.

New Student Advisement

Each new student is assigned a faculty adviser at the beginning of the school year. This faculty adviser is available to him any time during the year when he needs help. Faculty advisers assist students in defining goals to be reached in college, give information regarding appropriate

curriculums and courses, and discuss any personal problems that the students may have, especially those problems related to the student's progress and plans for subsequent work.

Late Admission

A student who seeks to enter the University later than 10 calendar days after the day classes begin for a semester is admitted only by special permission of his dean. Those who enroll after the regular registration period and prior to the end of the first week pay a late enrollment fee of $2.50. University staff members, including graduate assistants and graduate research assistants and teachers employed in elementary and secondary schools, do not pay this fee. However, anyone enrolling after the first week must pay a late enrollment fee of $5.00. (See University Calendar.)

Physical Examinations

All new students are required to take a physical examination prior to registration under the Board of Regents regulations.

It is recommended that all seniors take a physical examination and chest X ray prior to graduation.

Students who have been out of school one semester or longer are required to have a chest X ray upon return.

Special Students

A special student is one not regularly enrolled in work for a degree. Special students are expected to meet the same admission requirements as regular students. Students who will enroll for only a few courses may wish to apply under this category.

Under certain circumstances, outstanding students are admitted as special students to take several courses in the summer between their junior and senior year in high school. To be considered for such admission the student must have the recommendation of his high school principal and have an outstanding high school academic record.

Adults who are not high school graduates are sometimes admitted as special students if the high school work that they did complete was of good quality, or if they show promise of collegiate success as evidenced by scores on the American College Test battery.

Special students are subject to regulations for regular students, payment of all fees, regular attendance at classes and maintenance of satisfactory standing.

Extension and Correspondence Credit

College-level credit earned through accredited extension divisions may be applied toward credit requirements for a degree at this institution. The credit must be applicable to the curriculum chosen and the amount of such credit which can be used is limited. In the College of Arts and Sciences a total of 30 semester hours of acceptable correspondence and/or extension work may be applied toward a degree.

Credit by Special Examination

Credit may be granted to entering freshmen and other students in any subject if a satisfactory examination is passed.

In general, permission to take examinations is given by the student's dean after consultation with the head of the department in which the course is given. A small fee is charged. A special examination may be given only to a previously or currently enrolled student. (See page 17.)

However, a first-semester freshman at Kansas State University may take a test to receive credit in English Composition I, Chemistry, Modern Languages, College Algebra and/or Trigonometry without expense to himself. In only exceptional cases should a student without at least two units of high school credit in algebra attempt the test in algebra. A student attempting the test in trigonometry should have at least one-half unit of high school credit in trigonometry. Only first-semester freshmen who have met the standard set by the Department of English in the

English placement examination are eligible for the examination in English Composition I.

Failure in these free examinations will not be entered on the student's permanent record. Grades received on all other special examinations will be recorded on the student's permanent record.

Mathematics Proficiency Tests

In all curriculums in which college algebra is required, students will take a proficiency test in algebra within the first two weeks of their enrollment in any course in algebra. The results of this test will be used to determine whether a student shall be required to take the course in intermediate algebra to qualify for college algebra.

Scores on the College Entrance Examination Board College Level Examinations in College Algebra, Trigonometry, and Calculus will be referred by the Admissions Office to the Department of Mathematics for review.

Service School Credit for Veterans

In general the University follows the recommendation given in *A Guide to the Evaluation of Educational Experiences in the Armed Services*, published by the American Council on Education.

Fees

Fees Subject to Change. All fees are subject to change at any time without notice by the Board of Regents.

Payment of Fees. Each student must pay the total amount of his semester or summer session fees on the day he enrolls, either by cash or check. Students receiving scholarships or grants not processed through the Kansas State University Aids and Awards Office must present evidence of the award when enrolling unless this information has been furnished to the Comptroller's Office prior to registration.

Tuition. There is no tuition fee. Fees are charged for personal services such as private music lessons but not for class instruction.

Incidental Fee. The incidental fee is designed to assist in defraying costs of laboratory supplies, plant operation and maintenance, non-academic and administrative personnel, library books and personnel, equipment, and other non-teaching activities not particularized. The incidental fee is not tuition, nor a fee in lieu of tuition, but represents the student's contribution to the costs of non-teaching aspects of the total instructional program. This fee covers approximately 15 to 20 percent of the total costs.

Student Health Fee. For a description of the Department of Student Health and the services provided by this fee, see page 30.

Student Union Building Fee. This fee is used to retire the K-State Union building revenue bonds.

Student Union Annex Fee. This fee is used to retire the K-State Union annex building revenue bonds.

Student Union Annex II Fee. This fee is used to retire the K-State Union annex II building revenue bonds.

Stadium Bonds Fee. This fee is used to retire the Stadium revenue bonds.

Student Activities Fee. The Student Activities fee is used for student publications, Union operations, judging teams, musical groups, intramural sports, open houses, stage performances, Student Governing Association and other student activities. Those enrolling in six credit hours or less do not pay a full activities fee and thus are not entitled to the yearbook, student athletic ticket rates and certain other student events.

Swimming Pool. This fee will be used to construct a swimming pool.

Withholding Student Records. When necessary, the University withholds student records for non-payment of fees, loans and other appropriate charges.

FEES FOR REGULAR SEMESTERS
Subject to Change Without Notice

For students enrolled in more than six semester credit hours.

	Residents of Kansas and Staff Members	*Non-residents of Kansas*
Incidental Fee		
All except Veterinary Medicine students	$120.00	$350.00
Veterinary Medicine students	160.00	410.00
Student Health	13.00	13.00
Student Union Building	4.00	4.00
Student Union Annex I	3.50	3.50
Student Union Annex II	3.50	3.50
Student Activities (including Union operations)	14.25	14.25
Stadium Bonds	4.25	4.25
Swimming Pool	1.50	1.50
Totals—All except Veterinary Medicine students	164.00	394.00
Totals—Veterinary Medicine students	204.00	454.00

For students enrolled in six semester credit hours or less.

	Residents of Kansas and Staff Members	*Non-residents of Kansas*
Incidental Fee		
All except Veterinary Medicine students per credit hour	8.00	27.00
Veterinary Medicine students per credit hour	11.00	32.00
Student Health	Not Elig.*	Not Elig.*
Student Union Building	2.65	2.65
Student Union Annex I	2.35	2.35
Student Union Annex II	2.35	2.35
Student Activities (including Union operations)	2.50	2.50
Stadium Bonds	.50	.50
Swimming Pool	.65	.65

For staff members enrolled in Graduate School.

Incidental Fee per semester credit hour	8.00
Campus Privilege Fees:	
A. If enrolled in more than six semester credit hours:	
Student Health	13.00
Student Union Building	4.00
Student Union Annex I	3.50
Student Union Annex II	3.50
Student Activities (including Union operations)	14.25
Stadium Bonds	4.25
Swimming Pool	1.50
B. If enrolled in six semester credit hours or less:	
Student Health	Not Elig.*
Student Union Building	2.65
Student Union Annex I	2.35
Student Union Annex II	2.35
Student Activities (including Union operations)	2.50
Stadium Bonds	.50
Swimming Pool	.65

* Except for foreign students who must pay the full student health fee of $13.00 and also must subscribe to the student health insurance plan if such insurance is not provided by their sponsoring agency or government.

FEES FOR SUMMER SESSIONS

Subject to Change Without Notice

The following schedule of fees covers the Incidental, Student Health, Student Union Building and Annexes, Student Activities, Swimming Pool and parking fees.

	Residents of Kansas and Staff Members	*Non-residents of Kansas*
Per semester credit hour:		
Incidental Fee	8.00	27.00
Campus Privilege Fees*	4.00	4.00

* Not applicable to students enrolled in off-campus instruction and not to exceed $24.00 for each summer session enrollment on campus.

Definitions for the Purpose of Assessing Fees

Residents of Kansas. The residence of students entering Kansas State University is determined by an act of the legislature (K. S. A. 76-2701), which reads as follows: "Persons entering the state educational institutions who, if adults, have not been, or if minors, whose parents have not been residents of the state of Kansas for six months prior to matriculation in the state educational institutions, are non-residents for the purpose of the payment of matriculation and incidental fees: Provided further, that no person shall be deemed to have gained a residence in this state for the aforesaid purpose while or during the elapse of time attending such institution as a student, nor while a student of any seminary of learning, unless, in the case of a minor, his parents shall have become actual residents in good faith of the state of Kansas during such period, or unless, in the case of a minor, he has neither lived with nor been supported by his parents or either of them for three years or more prior to enrollment and during said years has been a resident in good faith of the state of Kansas."

Staff Members. For fee assessment purposes, staff members are those who work four tenths time or more and are paid on the unclassified or classified payrolls during at least a part of the following months:

For fall semesters—September, October and November
For spring semesters—February and March
For summer sessions—June or the preceding February and March

Also wives and dependent children, but not husbands, of full-time employees paid on the above payrolls and federal employees given courtesy appointments.

Private Music Lessons and Practice Facilities. University students enrolled in the Applied Music or Music Education curriculum or for the Bachelor of Arts degree with a major in music are exempt from fees for private music lessons and music practice facilities. Fees for all others, payable in advance, are as follows (Subject to refund policy outlined below):

	University Students	*Non-University Students*
Two 30-minute lessons a week, per semester	$42.00	$70.00
One 30-minute lesson a week, per semester	24.00	36.00
Two 30-minute lessons a week, summer session	21.00	35.00
One 30-minute lesson a week, summer session	12.00	18.00
Single lessons, each	4.00	4.00
Practice piano, 1 hour daily, per semester	5.00	5.00
Practice piano, 2 hours daily, summer session	5.00	5.00
Practice organ:		
Two-manual, 1 hour daily, per semester	10.00	10.00
Two-manual, 2 hours daily, summer session	10.00	10.00
Three-manual, 1 hour daily, per semester	20.00	20.00
Three-manual, 2 hours daily, summer session	20.00	20.00

Field Geology Fee. The fee for the summer geology field camp is $50.00, which is the additional amount required from all students en-

rolled in this course to pay for their transportation and lodging for the field camp.

Refund Policy. (Acceptable only to refundable fees, viz., incidental, health, union, activities, field geology and private music lessons.) Refunds will not be made until sufficient time has elapsed to insure that student checks have been honored—usually 15 days after students enroll. If an enrollee withdraws and returns his identification card during a regular semester or eight-week summer session, the following schedule of refunds shall apply. However, the Student Activities Fee is not refunded if the student does not return his student identification and fee receipt cards.

	Amount of Refund	
	Regular semester	*8-week summer session*
During the first academic week	100%	100%
During the second academic week	90%	75%
During the third academic week	80%	50%
During the fourth academic week	70%	no refund
During the fifth academic week	60%	no refund
During the sixth academic week	50%	no refund
After sixth academic week	no refund	no refund

Late Enrollment, Including Re-enrollment After Withdrawal. A late enrollment fee of $2.50 shall be assessed and collected from each person enrolling after the regularly scheduled enrollment period. A larger late enrollment fee of $5.00 shall be assessed and collected from each person enrolling, re-enrolling or paying his fees after the first week of a semester or session; however, only one or the other of these fees shall be collected for each late enrollment or re-enrollment. Late enrollment fees shall not be subject to refund, and payment thereof shall be considered a part of the enrollment process.

Student Identification Card. A $2.00 fee for a permanent identification card is assessed each student once during his attendance. If an identification card is lost or destroyed, a $2.00 fee is also assessed for each replacement card. These fees are not subject to refund.

Special Examination. The fee for taking a special examination to obtain college credit (in lieu of attending classes) is $2.50 per semester credit hour in which examined for residents of Kansas and staff members; $7.50 per semester credit hour for non-residents of Kansas. Permission to take a special examination is issued by the student's dean after consultation with the head of the department in which the course is given. *This fee must be paid before taking the examination and is not subject to refund; this service is available only to students who are or have been regularly enrolled and is not applicable to Continuing Education courses.*

Graduate Research Work in Absentia. The fee for graduate research work *in absentia* is $8.00 per semester credit hour. Resident staff members may not enroll *in absentia* while regular college sessions are in progress. This fee is not subject to refund.

Auditing Fee. An auditor who is neither an enrollee paying full incidental fee nor a staff member shall be assessed $1.00 a semester credit hour for courses audited. Laboratory or Continuing Education courses may not be audited. This fee is not subject to refund.

Laboratory Fees and Course Charges or Deposits. No laboratory fee, course charge, or deposit may be assessed against or collected from persons enrolled in any regular semester or summer session at Kansas State University, except for geology field camps, and for excessive usage or breakage or losses due to personal negligence on the part of the student, and then only for the actual fair value of supplies so used or lost and subject to the approval of the appropriate dean or the President.

Correspondence Study. Information about correspondence study courses, including the fees charged, is available from the Extramural Independent Study Center, University of Kansas, Lawrence, Kansas 66044.

Charges to Government or Private Agencies. The fees collected under arrangements with governmental or other agencies follow in general the fees outlined above, and in all cases the charges are equal to or greater than the fees stated herein.

Military Uniforms. Every student who takes military training must have a uniform. For the basic courses the uniform is furnished by the government. The money value of any missing articles will be collected when the uniform is returned. Failure to return or pay for missing articles of the uniform may result in withholding of credit and in extreme cases may cause the University to refuse a transcript or to graduate the student concerned. The uniform which is purchased for each advanced course student under contract becomes his personal possession upon completion of the course. All or nearly all of the cost of this uniform is paid by the federal government.

Other Expenses

In addition to the previously mentioned fees, students are required to purchase textbooks, drawing instruments, slide rules, gym suits and other personal equipment and supplies when needed for courses in the curriculum chosen. The cost of these items will vary from semester to semester.

Classification of Students

A student who is a high school graduate, or offers 15 acceptable units of high school work, is classified as a freshman. A student is advanced to a higher classification when he has completed successfully all prerequisite high school courses and has credit hours to meet the requirements as listed below:

Sophomore	*Junior*	*Senior*	*Fifth-year student*
25	58	90	120

Classes

By order of the Board of Regents, courses of basic freshman subjects require a minimum enrollment of 15; other classes require a minimum enrollment of 10, except that certain advanced laboratory and advanced technical classes may have a minimum of seven. Courses involving individualized instruction and courses numbered 800 to 999 require a minimum of one student.

Course Description Key

Courses carrying no credit (pre- or non-collegiate in effect) are numbered 0-99; those carrying no prerequisites, generally aimed at nonmajors or introductory general educational ideals, 100-199; courses aimed at freshman-sophomore development in a major field, 200-399; courses aimed at junior-senior development in a major field and for graduate students in a minor field, 400-599; courses for advanced undergraduates and graduate students in a major field, 600-799; advanced research and high-level specialized courses for graduate students, 800-999.

Within the parentheses ( ) following each course title are shown the semester hours of the course, followed by the terms it is offered. Each unit usually represents one 50-minute period of lecture or recitation, or two or three 50-minute periods of laboratory each week of the semester. **I, II, S** indicate when the course is offered. **I** means first or fall semester; **II**, second semester; and **S**, summer session. **I, II** mean both semesters. **Pr.** indicates "Prerequisite." **Conc.** is the abbreviation for concurrent.

Assignments

A student is responsible for fulfilling all the requirements of the curriculum in which he is enrolled. He should consult with his adviser or his dean in planning his work. A student should be familiar with the catalog statements about assignments and curriculums, because the catalog is the official source of information.

Catalogs are maintained for student use in the Admissions Office, all deans' offices, the library, and all departmental offices. If a student wishes a personal copy this may be purchased for a small fee.

No student may be enrolled in classes or for private lessons in music or other subjects before getting an assignment. No assignment is complete until all fees and charges are paid.

Registration and assignment of courses take place as shown on the calendar. Later assignments to courses are made during regular office hours by the student's dean or assigner. A student may not enroll later than 10 days after the beginning of a semester or summer session except by permission of his dean.

Students should enroll during the regularly scheduled registration periods in order to avoid penalty fees. See the calendar and the section on Late Enrollment Fees, page 13.

A student who wants to take work at other than scheduled times must have the written consent of his dean, the head of the department in which the work is to be done, and the dean of the college in which department belongs.

A student may not enroll for more than 18 hours including correspondence and extension study unless granted permission by his dean. However, if the normal assignment in his curriculum is 18 hours, a student may enroll for one additional hour without special permission.

A student whose grades were B or better during the preceding semester, and who did not have a deficiency of any kind in that period, may apply to his dean for special permission to take additional hours. In no case may the total assignment including correspondence and extension work exceed 21 hours.

A regularly enrolled student must have the permission of his dean to do correspondence or extension study while enrolled, and this is counted as part of his semester load.

Changes in Assignments

Deans will not drop subjects from a student's assignment during the last two weeks of a period covered by final scholarship deficiency reports.

No student may drop a course or change an assignment except by a formal reassignment by his dean.

If an instructor recommends a reassignment, a student should confer with his dean.

A student who drops out of class without a reassignment is reported absent.

The last day for dropping a course without a Wd or F being recorded is the 18th day of classes; however, beginning undergraduate students have nine weeks for this purpose.

Students desiring to transfer from one college to another within the University should confer with both deans concerned.

Withdrawal from the University

A student who withdraws from the University must have an official withdrawal permit from his dean. If a student other than a beginning undergraduate student withdraws from the University not later than the 18th day of classes of the semester, no mark shall be reported to the Registrar. If he withdraws thereafter, a mark of Wd is reported in all courses in which he is passing, and F is reported for courses in which he is not doing satisfactory work. (See the University Calendar.) Beginning undergraduate students have nine weeks for this purpose.

Auditing Classes

The auditor is one who attends a class regularly without participating in class work and without receiving credit. Permission to audit a class is granted by the dean of the college in which the class is offered. A nonrefundable fee of $1 a semester hour is charged each auditor except that no auditing fee is charged students who have paid a full incidental fee or full-time University faculty members and employees of the University. Laboratory courses may not be audited.

Grades

The University uses the following grades:

A, for excellent work (94-100)
B, for good work (86-93)
C, for fair work (78-85)
D, for poor work (70-77)
F, for failure
Cr, for credit in courses for which no letter grade is given.
NCr, for no credit in courses for which no letter grade is given.

The report Inc (incomplete) is used at the discretion of the instructor when a student may have further time to complete the required work.

Hours taken on a pass-fail basis will be graded by Cr, if passed, or NCr if not passed. Courses in which a Cr grade is received will be used in fulfilling graduation requirements. Neither Cr nor NCr graded courses will be used in calculating resident grade averages.

Report of Grades

As shown on the academic calendar, mid-semester grade reports are sent to deans' offices at the close of the 7th week. The reports indicate whether a student is doing satisfactory level, D level, or F level work.

Students desiring reports of grades must supply instructors with properly self-addressed official cards, with postage affixed, after the seventh Saturday of the semester or with their final examination papers. Instructors send reports so requested to the students or to student organizations.

The instructor reports semester grades based on the examination and class work to the Director of Records for recording (see the University Calendar).

If a student other than a beginning freshman or a beginning transfer student drops a subject not later than the 18th day of classes, no mark is reported to the Director of Records. Beginning freshmen and beginning transfer students have nine weeks for this purpose. An official drop slip from the student's dean constitutes the record of performance.

If a student other than a beginning freshman or a beginning transfer student drops a subject after the 18th day of classes, either a mark of Wd or a full semester grade of failure is reported, depending on whether the student was passing or failing at the time of dropping the subject. No course may be dropped from a date marking the close of this privilege as shown on the academic calendar. Regardless of the time of withdrawal, however, a final grade is reported and designated as such, if all the required work of the course has been completed.

In case of absence from the final examination, no semester grade is reported until the reason for such absence has been learned; the instructor reports to the Director of Records a mark of Inc. If the student's absence is not excused by his dean, a semester grade is reported on the basis of zero for the final examination; but if the absence is excused, a reasonable time, usually not over one month, is allowed within which the examination may be taken.

Instructors leave all class books in the proper departments when semester grade cards have been made out. The head of the department keeps all grade books as a permanent file of the department.

Points

For each semester hour of work a student gets points, according to the grades he makes, as follows: A, 4; B, 3; C, 2; D, 1; F, 0. (See page 22.)

Scholarship Deficiencies

Probation, Dismissal and Reinstatement

A student's Kansas State University academic record of resident work is used to establish probation or dismissal status. An undergraduate student (excluding students in the College of Veterinary Medicine) is placed on probation if he has 60 or more resident hours at Kansas State Univer-

sity with less than a 2.0 (C) over-all or semester average. A student with less than 60 hours is placed on probation whenever he has more than five grade points less than a 2.0 (C) over-all or semester average.

A student on academic probation, who has completed 20 or more hours at Kansas State University, will be dismissed when the summation of his resident grade points is not within 18 points of a 2.0 (C) over-all average on his resident work. No student with a grade-point average of 1.85 or above will be dismissed.

A student who neglects his academic responsibilities may be dismissed at any time on the recommendation of his academic dean.

Students are notified by their academic deans of their status from information supplied to the deans by the Director of Records. The scholastic record of each undergraduate will be evaluated twice yearly, at the end of the fall semester and at the close of the spring semester.

A dismissed student may not be readmitted until approved for readmission by the Academic Standards Committee of the college from which he was dismissed or is about to enter. Normally a student must wait at least one semester before he will be considered for readmission. Applications for reinstatement must be directed to the Academic Standards Committee of the specific college of the University in which the student was last enrolled. If the student is seeking readmission to another college of the University, that application will be referred with whatever pertinent information is available to the Academic Standards Committee of the college of his choice for a decision relative to his readmission.

Absences

Each student is expected to attend all meetings of the classes to which he is assigned. Each instructor shall determine whether a student may or may not be excused from his class and he shall also establish with the student any make-up work required. In case of excessive absences instructors will report the absences to the student's dean. The Student Health Center supplies a weekly statement to the faculty showing the names of students hospitalized and the dates of hospitalization.

Absences for Activities Participation

Each student who will be absent to participate in out-of-town or other University-sponsored activity must submit to his coach or sponsor of the event a completed form for each of his classes (Excuse Absence Notification to Instructor, obtained at the University Postal Center). The coach or sponsor of a university activity will compile a list of participants who will miss classes because of the activity. This list will be submitted to the academic deans at least 24 hours in advance of the departure from the campus. The student is required to make up the work missed during excused absences.

Excessive Absences

A student may be withdrawn from a course by his dean for excessive absences. After due warning to both student and parents, the dean may report persistent absentees to the President with recommendation for suspension from the University.

Absence the Day Before or After a Holiday or Student Recess

Excuses will not be granted to students for absences the day before or the day after a student recess except in cases of extreme emergency. All classes must convene as usual.

Examinations

A final examination period is scheduled at the end of the fall and spring semester during which no regular classes meet. There is no specially scheduled period for final examinations in the summer session. Candidates for degrees may or may not be required to take examinations, at the option of the instructor and subject to the policies of the department. If required, the examinations are to be given during the scheduled examination period for the first semester, but outside class during the

week preceding the final examination week for the second semester. Such examinations may not be given during regular class periods, for candidates for degrees must attend regular class sessions up to the beginning of the scheduled final examination period for other students. Each instructor shall determine the manner in which his students who are candidates for degrees shall complete their work in his course in accordance with policies of the department.

A student whose semester grade in any subject is A may be excused from the final examination in that subject.

Permission for special examination in subjects not taken in class, or for advanced credit, or to make up failures must be obtained, on recommendation of the head of the department in which the course is given, from the dean of the college in which the student is assigned. Such permission is granted only if the student has prepared for the examination under an approved tutor. The examination must be taken under the immediate supervision of the head of the department in which the course is given. A special examination may be given *only* to an *enrolled* student. The charge for such examination is $2.50 a credit hour for residents, $7.50 for nonresidents.

Scholastic Honors

To be eligible for scholastic honors, awarded each semester, an undergraduate must receive a grade of A, B, C, D or F in a minimum of 12 semester hours of undergraduate work in residence and earn a grade-point average of 3.30 (A = 4, B = 3, C = 2, D = 1, F = 0) or better for that semester's work. Students in the Graduate School are not considered for this recognition.

Bachelor degree candidates who rank in the top 10 per cent of their class and who have completed a minimum of 60 hours of undergraduate work in residence are considered for commencement scholastic honors. Of these, the highest ranked, not to exceed three per cent of the class, may be selected by the Scholastic Honors Committee to receive diplomas inscribed "Magna Cum Laude" or "Summa Cum Laude." Only students with a 3.950 or above academic average are eligible for "Summa Cum Laude." The committee will also designate those who are to receive diplomas inscribed "Cum Laude." Candidates for the degrees Doctor of Veterinary Medicine, Master of Science, and Doctor of Philosophy are not considered for this recognition.

Credits for Extracurricular Work

Students may earn credit toward graduation by satisfactory participation in certain extracurricular activities. These activities, and the maximum of semester hours of credit allowed, are as follows:

Subject	*Semester*	*Total*
Orchestra	1	4
Band	1	4
University Choir	1	4
University Chorus	1	4
Kansas State Singers	1	4
Varsity Men's Glee Club	1	4
Women's Glee Club	1	4
Madrigal Ensemble	1	4
Instrumental Ensemble	1	4
Debate	2	4
Oratorical Contest	2	4
Kansas State Collegian journalism	1	4
Ag Student News journalism	1	4
Kansas State Engineer journalism	1	4
Royal Purple journalism	1	4

Credits may be counted as electives in the student's curriculum. A student may use not more than eight semester hours in these subjects toward graduation and enroll for not more than two in a semester.

A student is regularly assigned to these activities, but only on the written recommendation of the instructor in charge of the work. A student enrolling in one or more of these activities must be enrolled for credit even though the credits exceed the maximum usable for graduation.

The Speech Clinic

Those students who have speech problems may receive attention and aid through the University Speech Clinic, maintained under the direction of the Department of Speech. Trained speech specialists make an examination, give a diagnosis, plan a remedial program, and carry out the retraining. The clinic has the active cooperation of the Student Health Center and the Counseling Center in giving fullest possible aid. Students are urged to make use of this service.

The University's System of Libraries

The Francis David Farrell Library, named for Kansas State University's eighth President, is the main library of the University. It provides seating for 780 students and faculty members at individual carrels, in listening rooms, around seminar tables, in browsing alcoves, and in the Library's film-projection rooms. Branch libraries include the Architecture Library, located in the new addition to Seaton Hall; the Veterinary Medicine Library, housed in Veterinary Hall; the Chemistry Library in Willard Hall; and the Physics Library, located on the main floor of the Physical Science Building. A collection of printed matter, pictures, and three-dimensional models relating to elementary, secondary, and college teaching is contained in the Teaching Materials Center.

The Audio-Visual Department of the Library consists of collections of slides, records, magnetic tapes, film, film strips and mounted art work for the use of students in the Library and faculty members for classroom use. Five listening and projection rooms are equipped with modern listening and viewing equipment. A central audio console allows records and tapes to be played in rooms and over earphones throughout the Library gallery. Extensive collections of materials and equipment catalogs and advice concerning the selection of new materials and equipment are also provided.

The University libraries contain more than 500,000 volumes, and approximately 40,000 carefully selected items are added to this number each year. The Library Courier Service, a cooperative arrangement with other public, private and special libraries within close proximity to Manhattan, affords K. S. U. students ready access to the several million volumes included in collections of the Linda Hall, University of Kansas, Kansas State Historical Society, University of Kansas Medical School, Harry S. Truman, Dwight D. Eisenhower, and the Command and General Staff School Libraries. Scheduled passenger service is available to these facilities.

Computing Center

Kansas State University maintains a well-equipped Computing Center to meet a wide variety of research and instructional needs. Installed in June, 1967, the main unit is an I. B. M. 360/50 equipped with a 128 K main core and a 1,000 K extended core. Supporting equipment includes disc and tape drives, a card reader/punch, a high-speed printer, as well as card-processing equipment.

The Computing Center is located on the ground floor of Cardwell Hall. The Center has a professional staff which provides assistance in programming and project design. Programming languages in current use are FORTRAN, COBOL, ALGOL, RPG, PL/I, and basic assembler language. From time to time informal non-credit classes are held for current and prospective users.

For further information about the Computing Center, write to the Director, Computing Center, Cardwell Hall.

The University Press of Kansas

Kansas State University, together with the University of Kansas and Wichita State University, is a sponsor of the University Press of Kansas, an organization dedicated to the advancement of scholarship through publication of scholarly books, as well as material on Kansas and mid-America. Stemming from the former University of Kansas Press, the current organization was established July 1, 1967, through an enabling

resolution passed the previous October by the Kansas Board of Regents. It is the first university press in the United States to be operated on a statewide level under the specific sponsorship of all the state's universities.

Administrative control of the Press rests with a board of trustees composed of the academic vice-president of the sponsoring institutions. The Press's chief executive officer is the director, who is assisted in editorial decisions by a nine-member editorial committee, of which he is chairman. Three faculty members from each of the universities, or their alternates, serve on the committee, with each delegation headed by a vice chairman. The Press offices are located at 358 Watson Library, The University of Kansas, Lawrence 66044.

Publications

General Catalog
Student Catalog
Summer Catalog
Biennial Report
Financial Report
Extension Bulletins
Agricultural Experiment Station Bulletins
Engineering Experiment Station Bulletins

Student publications include:

The Kansas State Collegian—newspaper published five days a week during regular semesters and weekly in summer.

The Royal Purple—yearbook.

The University Directory—published annually.

Ag Student News—published six times during academic year.

The Kansas State Engineer—published monthly during academic year.

Other publications include *The Trumpet* and *The K-Stater*. *The K-Stater* is published quarterly by the University and the Alumni Association. *The Trumpet* is published quarterly by the University and the Endowment Association.

Postal Center

The University operates a Postal Center in Anderson Hall which sells stamps, money orders and other postal supplies; weighs, insures and registers mail; and receives outgoing mail. U. S. mail is delivered directly to University buildings by Manhattan Post Office personnel who also pick up outgoing U. S. mail from the Postal Center.

All mail for students must be addressed to their Manhattan residence.

Student Personnel Services

Kansas State University has developed a program of student personnel services in the belief that education involves experiences which supplement classroom training. This philosophy considers the importance of providing the student with a variety of opportunities and services aimed at improving his intellectual development; his vocational interest, aptitudes, and skills; his emotional balance; his social relationships; his moral and religious values; his physical health; and his aesthetic appreciations. Student needs for adequate medical care, housing, food, financial assistance, employment, counseling, recreation, and spiritual inspiration have been anticipated in this program.

The Vice President for Student Affairs is responsible for maintaining a close relationship with the academic and administrative staffs in helping to interpret student needs. He has the general responsibility for the administration and coordination of the following divisions of the student personnel program: Aids and Awards, Housing and Food Service, K-State Union, Counseling Center, Placement Center, Student Health, Foreign Student Advising, Student Religious Activities, and Student Organizations.

The Office of the Associate Dean of Students (Dean of Women) has as its primary responsibility the welfare of women students. Its major goal is to foster on the part of each student a better understanding of

herself and others. This is accomplished through varied experiences within the student's living group and through out-of-class activities and associations.

Staff members serve as advisers to such organizations as Social Coordinating Council, Associated Women Students, Panhellenic Council, and Off-Campus Women. They work closely with the University pre-enrollment and orientation programs; assist students in developing effective programs in halls, sororities, and off-campus living units; coordinate workshops for housemothers; and are available for individual and group conferences.

The Associate Dean of Students (Men) serves as adviser to the Interfraternity Council; is responsible for the orientation services for new students; works with the Student Senate; counsels with students concerning disciplinary matters; and helps to coordinate graduate study in guidance and student personnel services.

The Assistant Dean of Students for Residence Halls Programs is responsible for the selection and training of hall personnel staff. He also directs the educational and cultural programs in the residence halls.

Orientation for New Students

An orientation program is provided for all new undergraduate students during the registration period. This program is designed to ease the change from high school to university or from university to university. All new students are required to participate. New students who pre-enrolled are given a different program of orientation. All students are given the opportunity to become acquainted with the University, to meet faculty members and classmates, to get help from advisers, and to attend social functions. Each entering student receives a program during the summer containing a complete schedule of Orientation Week activities. It is important that all arrive on time, follow the schedule closely and attend all functions.

No one may register as an undergraduate unless he has completed the required physical examination and required aptitude tests.

The opening convocation for freshmen and new students will be held on Sunday afternoon immediately preceding the enrollment period. This convocation is designed especially for all new students and their parents.

UNIVERSITY HOUSING POLICY

Office of Director of Housing and Food Service

Kansas State University considers the housing of students as part of the total educational plan. All unmarried undergraduate minor students attending the University and not living at home must live in University-approved housing such as residence halls, scholarship houses, fraternities, sororities, rooming houses, and apartments.

All single, minor freshman women not living at home are housed in University-operated residences. Sophomore women may live in residence halls or one of the sororities.

Single, minor freshman men not living at home or classified as veterans may either live in a fraternity house or a University-operated residence.

Any exceptions to the above policies must be cleared in advance in the Office of Student Affairs.

Available Housing Facilities

Kansas State University provides residence hall living for 4,100 students; scholarship housing for approximately 90 men; cooperative housing for 64 women; 576 apartments and 52 mobile home lots for married couples. Sororities provide 600 places for women, and fraternities have accommodations for 1,200 men. Others find privately owned rooms and apartments from University-approved listings.

Self-Government on Campus

Learning to manage one's own affairs is certainly a part of university life. This takes maturity and self-discipline. K-Staters start as freshmen

with self-government within the framework of general University regulations. In all University residences, elected hall councils assume responsibility for many activities. Married students on campus use the mayor-council form of government to regulate their community life.

Residence Halls

Each residence hall is staffed with a professionally trained director and staff. The total residence hall personnel program is coordinated by the Residence Halls Program Director.

The following service and facilities are furnished in residence halls: sheets and pillowcases—laundered weekly; free laundry facilities—washers and driers and areas for hand laundry; pleasant rooms with beds, mattresses, mattress covers, chests of drawers, closet facilities, study tables, and lamps. The resident furnishes pillow, towels, bedspreads, etc.

On the lighter side, each hall has lounges and recreation rooms for relaxation and social activities—TV sets, hi-fi equipment, ping-pong tables and the like providing for any occasion from a game-watching party to a Christmas ball.

With the exception of a Sunday evening meal, three meals are served daily. Most meals are served cafeteria style, but special dinners and faculty buffets add to the variety of the food service program.

Contracts are issued on receipt of a $25.00 non-refundable application fee for fall enrollees and $12.50 for those entering in the spring.

K. S. U. has a nine-month contract. Fees are $387.50 a semester if the entire amount is paid by August 25 and February 1.

Students may elect to be billed monthly. Because of additional expenses, $10.00 a semester is charged for the service. Payments are $75.00 with the contract and $80.00 a month from August 1 through April 1. Students enrolling in the spring pay $77.50 with contract and the first $80.00 payment is due January 1. Rates are subject to change without notice.

Applications and further detailed information are available through the Office of the Director of Housing and Food Service, Kansas State University, Manhattan, Kansas.

University Scholarship Housing

There are many students who would profit greatly from a university education, but do not feel they can afford four college years. Kansas State University offers, in addition to scholarships, two scholarship houses for men.

These are cooperative units, in the sense that the students do their own housekeeping—cooking, cleaning, and dishwashing. In this way living costs, a big item in the budget, are lowered considerably. The men in Straube and Smith spend about six hours a week at their house duties. Forty-five men live in each house.

Smurthwaite House for women provides cooperative living for 64 freshmen and upperclass women at low cost. This is a new and contemporary house which has, in part, been supported by donations from Home Demonstration Units of Kansas.

At Smurthwaite, house duties are rotated so that each student has a chance to learn all aspects of house management. The duties take about an hour daily. Everyone lends a hand on special occasions.

Applications for these houses are considered on the basis of academic ability and financial need. Write to the Director of Aids, Awards, and Veterans Services, Holtz Hall, Kansas State University, Manhattan, Kansas, for applications and information.

Married Student Housing

The married students have not been overlooked in the housing expansion at Kansas State University. Pride can be taken in the one- and two-bedroom apartments at Jardine Terrace. These completely furnished, low-cost apartments are close to the campus. Each group of buildings has a central laundry.

In addition, there are mobile home lots in North Campus Courts for the "home-owning" couples.

The apartment rates are $67.50 for a one-bedroom apartment and $75.00 for a two-bedroom apartment. The trailer parking lot rental is $20.00 a month. For the apartments the rental includes utilities such as gas, water, and 140 KWH of electricity. The rental for the trailer parking lot includes sewer, water, and 140 KWH of electricity.

Applications are available at the Office of the Director of Housing and Food Service, Pittman Building, Kansas State University, Manhattan, Kansas.

Graduate Student Housing on Campus

Single graduate students are welcome to live in the residence halls. When possible, these students are assigned to a graduate area of a hall.

Since graduate assistants are classified under faculty, single graduate assistants qualify for the Evans Apartments. There are 20 apartments in this building which rent for $65.00 a month for a one-bedroom and $70.00 a month for a two-bedroom. These are furnished and all bills are paid up to 140 KWH of electricity. (See source of applications under Married Student Housing.)

There is no problem for the married graduate student, since either Jardine Terrace Apartments or North Campus Trailer Courts are available.

Organized Houses

Fraternal organizations provide excellent living accommodations and social programs for over 1,700 K-Staters. Rush Week immediately precedes the opening of the University in the fall. Men and upperclass women may move directly into their houses, but all freshman women live in residence halls for a year. Membership in all of these organizations is by invitation.

Fraternities. Any students accepted by the University may attend fraternity Rush Week. House bills average $100.00 a month, including room, board, and dues. For further information, write to the Faculty Adviser to Fraternities, Office of Student Affairs, Kansas State University, Manhattan, Kansas. The following national fraternities are established at Kansas State:

Acacia, Alpha Gamma Rho, Alpha Kappa Lambda, Alpha Tau Omega, Beta Sigma Psi, Beta Theta Pi, Delta Chi, Delta Sigma Phi, Delta Tau Delta, Delta Upsilon, FarmHouse, Kappa Sigma, Lambda Chi Alpha, Phi Delta Theta, Phi Gamma Delta, Phi Kappa Tau, Phi Kappa Theta, Pi Kappa Alpha, Sigma Alpha Epsilon, Sigma Chi, Sigma Nu, Sigma Phi Epsilon, Tau Kappa Epsilon (Colony), Triangle.

Sororities. Booklets describing social sororities and setting forth the provisions regulating selection of new members are provided to all prospective students by Panhellenic Council. These may be obtained by writing to the Faculty Adviser to Sororities, Office of Student Affairs, Kansas State University, Manhattan, Kansas. House bills in sororities range from $100.00 to $110.00 a month including room, board, and sorority dues. The following national sororities are established at Kansas State:

Alpha Chi Omega, Alpha Delta Pi, Alpha Xi Delta, Chi Omega, Delta Delta Delta, Delta Zeta, Gamma Phi Beta, Kappa Alpha Theta, Kappa Delta, Kappa Kappa Gamma, Pi Beta Phi.

Clovia. Clovia 4-H House provides accommodations for 62 upperclass women 4-H members. Freshman women are required to live in a residence hall their first year. Since Clovia 4-H House provides opportunities for cooperative living, monthly house bills are approximately $75.00, including social fees. Applications are made through the County extension offices or the State 4-H Department at Kansas State University.

Off-Campus Housing

The Department of Housing and Food Service, Pittman Building, has a card file of rooms and apartments that are available in Manhattan. It

is necessary that students who wish to live off campus visit Manhattan and personally select their own rooms and apartments. Listings change too rapidly to be of use by mail. Rent ranges from $25.00 to $30.00 a month for one person to a room and $20.00 to $25.00 a month per person when two or more reside in a room. Meals at the K-State Union Cafeteria and local cafes will cost $50.00 to $60.00 a month. Rates in board-and-room houses usually run $360.00 a semester. This includes 17 meals per week. Apartments rent from $50.00 to $165.00 per month, depending upon the size of the family and the facilities required.

All Manhattan householders who rent to students are expected to follow the University policy of making accommodations available to all students regardless of race, color, or national origin.

AIDS, AWARDS, AND VETERANS SERVICES

Loan Programs

Many Kansas State University students are assisted with student loans through the National Defense Education Act Loan Program, the Alumni Association Loan Program, and various loan units of the Endowment Association. Many other student loans will be provided through the Guaranteed Loan Program under Title IV of the Higher Education Act of 1965.

To qualify for most long-term loans, a student, undergraduate or graduate, must show reasonable financial need as well as the ability to meet the scholastic minimums established by the University Loan Committee.

Short-term, interest-free loans are available to assist qualified students in an emergency.

While no absolute deadline has been established for submitting loan applications, it is advisable to plan early and apply for loan assistance prior to June 1 of each academic year.

Students interested in applying for student loan assistance or information should write or visit the Aids, Awards, and Veterans Services Office, Holtz Hall, Kansas State University.

Scholarship Programs

More than 700 Kansas State University undergraduate students receive some scholarship assistance each year. Some scholarships are awarded for a single year, others are renewable for additional years of undergraduate study.

Students desiring scholarship applications or information relative to scholarships should write to the Aids, Awards, and Veterans Services Office, Holtz Hall, Kansas State University, Manhattan, Kansas. The deadline for submitting completed applications is February 15 prior to the fall semester in which the student intends to enroll.

Part-Time Work

Kansas State University employs more than 3,000 students each year. Many other part-time job opportunities are available in the Manhattan community. Any student enrolled in seven or more semester credit hours who wants assistance in securing a part-time job should visit the Aids, Awards, and Veterans Services Office, Holtz Hall, immediately after he arrives in Manhattan.

Work-Study Program

This program is part of the Economic Opportunity Act of 1964 to assist students from low-income families by providing jobs on campus or with affiliated organizations. Additional information and applications may be obtained from the Aids, Awards, and Veterans Services Office, Holtz Hall, Kansas State University.

Services for Veterans

The University maintains a Veterans Service Office for the purpose of aiding veterans and children of deceased or disabled veterans in securing educational benefits.

Those veterans who have more than 181 days of service after January 31, 1955, may be eligible for educational benefits.

Children of a deceased or disabled veteran may be entitled to educational benefits, providing the veteran's death or disability was due to active service in World War I, World War II, or the Korean Campaign.

Information may be obtained from your nearest Veterans Administration Office or the Aids, Awards, and Veterans Services Office, Holtz Hall, Kansas State University.

State Vocational Rehabilitation Training

The University cooperates with the State Board for Vocational Education in providing rehabilitation training for physically handicapped persons who need financial assistance. Correspondence should be addressed to the Vocational Rehabilitation Division of the State Board for Vocational Education, Topeka, Kansas.

FOREIGN STUDENT ADVISER

The Assistant Dean of Students serves as Foreign Student Adviser and is responsible for the reception, orientation and personal counseling of over 400 foreign students who attend K. S. U. These students come from all continents of the world and represent some 50 nations. He assists them in passport and visa renewals and obtaining work permits.

He is responsible for persons coming to K. S. U. under the Exchange Visitor Program. His office helps promote contacts between foreign students and the American student groups, faculty and community; he also serves as adviser to various foreign student organizations.

COUNSELING CENTER

Most students find the services of the Counseling Center to be useful to them. Counselors are available to discuss with students a wide variety of concerns. Often these have to do with decision making or planning, as in the case of vocationally uncertain students, or those having difficulty in choosing a major. Sometimes students attempt to develop new habits and attitudes through counseling as in the case of those with poor study habits or with attitudes and pressures interfering with successful performance. Other students use the counseling service to try to learn more about themselves and to gain a firmer understanding of themselves in terms of their goals, values, interests, and abilities.

Regardless of the reason for calling upon the Center, the student will find a friendly and interested counselor willing to contribute his professional training and experience to the student's efforts at coming to terms with his situation. Counselors contribute to the student's efforts in several ways—by providing a warm and accepting environment, a completely confidential setting, an understanding view of the situation, or perhaps some relevant objective information. This information may include the result of psychological tests, occupational opportunities, University requirements, effective study techniques, or a variety of other types of information which the student may not have available to him.

Students do find themselves in a better position to handle their situation in a mature and responsible fashion by coming to know and accept more about themselves. This they can do through a counseling experience, primarily by thoroughly exploring their own attitudes, feelings, and motivations, but also by gaining relevant information.

Orientation tests are administered by the Counseling Center to all entering students. New students are encouraged to make an appointment with a counselor to obtain the results of these tests in order to learn more about themselves and to fit this information in with present and future planning. These tests do not accurately describe the "right job" or "right curriculum" for anyone, but do often provide useful information to the student as he studies the decisions he must make.

High school seniors are encouraged to consult with their high school counselor, but are eligible to make use of the Counseling Center's services before they enter college if they so desire. Appointments may be made by writing to the Counseling Center.

University students who want to talk with a counselor can make arrangements to do so by seeing the Center's receptionist in 226 Anderson Hall.

STUDENT HEALTH CENTER

The University has a modern Student Health Center supported by student health fees.

The Student Health Center is located directly west of the Library in the center of the campus. The Center is staffed by full-time physicians with adequate medical supporting personnel to care for the students. Treatment may include visits with the physicians, laboratory and X-ray studies as necessary, immunizations, minor surgery, care of injuries, and continuation of treatment such as allergy injections prescribed by home physicians. When necessary, the student is referred to specialists for treatment.

After regular clinic hours an ill or injured student may receive medical care in the Emergency Room. Home calls are not covered by the Student Health program.

The 40-bed hospital is equipped to provide medical care for most illnesses, but major surgery must be done at one of the two local hospitals. If surgery is necessary, the patient has a choice of several very able Manhattan surgeons. Such surgical treatment is at the student's expense. Convalescent care following surgery may be carried out at the student hospital.

Medication, laboratory tests, and X rays are available at the Student Health Center at reduced rates and many services are provided at no cost. Hospitalization for the first 21 days is provided at special rates and thereafter the charge is reasonable and comparable to that of the other Kansas hospitals.

Hospital insurance plans may be used at the Student Health Center. There is a Blue Cross policy available to students only, at a special rate. The plan supplements the coverage provided by the Health Center and has many attractive features. The student may purchase this insurance at the time of enrollment for the regular semester. It is recommended that students carry insurance.

By ruling of the State Board of Regents, a complete medical examination is required of each new student. This examination should be done by the family medical doctor and the completed examination form should be sent to the Student Health Center prior to enrolling. The student must visit the Health Center for an evaluation of his health prior to enrolling or at the time he enrolls.

The purpose of the examination is to evaluate the student's state of health, determine remediable defects, detect infectious or contagious conditions, discuss preventive measures such as immunizations, and to classify the student for Physical Education.

PLACEMENT CENTER

The Placement Center, located in Anderson Hall, assists K-State prospective freshmen, undergraduates, graduating seniors, graduate students, and alumni with career planning and employment. Functioning in the areas of business and industrial placement, educational placement, alumni placement, and summer employment, the Center is particularly effective in attracting employers from throughout the state and nation; in recent years more than 1,200 recruiters representing over 700 organizations have each year conducted on campus more than 8,000 interviews. All students are urged to register with this office. However, part-time employment applicants should register with the Office of Aids, Awards, and Veterans Services in Holtz Hall.

As its name implies, the Placement Center provides a centralized placement system for all colleges and departments of the University, bringing together students, faculty members, and employer representatives seeking college-educated manpower. Employment trends and opportunities in business, industry, agriculture, education, and government are recorded and made available to interested K-Staters. In the field of edu-

cation, current information is filed on positions open and the qualifications required in elementary, secondary, and college-level work, including administration. Extension information on employment opportunities is available, and qualified staff members are always eager to help students and alumni with employment considerations.

Regarded by many as one of the leading offices of its kind in the Midwest, the Placement Center is designed to promote wise and responsible career planning, resulting in optimal matching of educated talent in challenging positions, to the ultimate benefit of applicants, employers, and society.

K-STATE UNION

The K-State Union is the "campus community center." Here are found extensive facilities for the social, recreational, and cultural life of the campus. The five-level structure includes a cafeteria, a snackbar, a beautiful ballroom, 25 meeting areas, banquet and party rooms, recreation facilities (bowling, billiards, table tennis, etc.), a little theater, and the Activities Center. In addition, there are lounges, a master campus calendar, a browsing library, an information desk, and paperback book and school supplies stores. A $900,000 addition completed in 1963 provides for the extension of these facilities, and a second major addition is currently being planned.

The 150 student organizations have here comfortable headquarters and qualified staff assistance for carrying on their activities, everything from typing minutes to planning a major all-University event.

The Union Governing Board is responsible for the Union policies and program. There are over 300 students working on Union Committees, which provide an extensive program of interesting activities designed for the cultural and personal growth of students. These activities are coordinated by the Union Program Council. The Union Committees are: Dance, Movies, Sports and Recreation, Hospitality, Art, Campus Entertainment, News and Views, Personnel and Research, Trips and Tours, and Harlequinade. All students are invited to apply for membership on one of these committees.

RELIGIOUS LIFE AT THE UNIVERSITY

Religion at Kansas State University finds expression in the many church-sponsored student religious organizations related to the campus, and within the administrative and academic structure of the University itself.

Adjacent to the campus there are six student religious centers, representing a $2,000,000 investment and an annual budget of $115,000. These facilities are owned and operated by various faith groups. In them, and in the churches of the city, the usual sectarian activities of religious life are conducted.

On campus there are two memorial chapels—Danforth and All-Faith—which are available for student religious services and private meditation. Also, within the framework of the University is the office of the Director of Student Religious Activities. The functions of the Director are to coordinate religious activities on campus, and to promote religious knowledge by securing scholarly speakers for convocations and lectures and by teaching courses in religion in the Department of Philosophy. Credit courses in religion are offered in the departments of English, History and Philosophy.

Religious Council

The Religious Council is a student organization concerned with the coordination and promotion of religious activities and religious knowledge at Kansas State University. It is composed of elected officers, appointed committee chairmen and representatives from the Islamic Association, the Jewish Hillel Foundation, and each of the Christian foundations. The council is responsible for initiating, directing, coordinating, and evaluating all campus-wide religious programs.

Religious Advisers Council

There are 10 clergymen who work as campus ministers. These men plus the faculty advisers for student religious organizations and the Director of Student Religious Affairs constitute the Religious Advisers Council. This council advises on religious policy on campus, and operates closely with the Student Personnel Services of the University to satisfy the religious demands of students in the multi-faith university community.

Student Religious Organizations

The following are religious groups recognized by the University as campus organizations:

American Baptist (Roger Williams Fellowship)
Baptist Student Union (Southern Baptist)
Campus Crusade for Christ
Chi Alpha (Church of God)
Chinese Christian Fellowship
Christian Science Organization
Episcopal (Canterbury Association)
Friends (Quaker)
Grace Baptist Student Fellowship
Islamic Association
Jewish (B'nai B'rith Hillel Foundation)
Kansas State Christian Fellowship (Inter-Varsity Christian Fellowship)
Lutheran, Missouri Synod (Gamma Delta)
Lutheran, National Lutheran Council (Lutheran Student Association)
Mennonite Fellowship
Methodist (Wesley Foundation)
Mormon (Latter Day Saints Student Group)
Mormon (Reorganized Latter Day Saints; Liahona Fellowship)
Navigators
Newman Club (Catholic)
Religious Council
United Campus Christian Fellowship
Affiliating Denominations:
Christian
Evangelical United Brethren
Presbyterian
The United Church of Christ (Congregational and Evangelical and Reformed)
University Christian Movement
Wesleyan Campus Fellowship
YWCA

Besides these religious foundations, there are over 30 fine church congregations in the City of Manhattan. Kansas State students are urged to avail themselves of the services of these important institutions.

Operation of Motor Vehicles

All motor vehicles operated on the campus by staff and students must be registered and identified with decals. Possession of cars by students is discouraged. Freshmen and students living in residence halls may not secure parking permits. By authority of Kansas Statutes, Chapter 484, Laws of Kansas, 1957, the University has established a Traffic and Security Office which operates under rules established by a student-faculty Traffic Control Board. Driving and parking of motor vehicles are governed by these regulations.

University Organizations

The University, as any community, has many organizations which complement the academic, cultural, social, and religious lives of the students; provide the means for student government in a number of areas; and provide constructive recreation opportunities.

The All-University governing body is the Student Governing Association. All students enrolled in more than six hours are members of this association. The three branches of government are as follows:

Executive	**Legislative**	**Judicial**
President	Senate	Tribunal
Cabinet	College Councils	Chancellor
Appointed Officers	Committees	Justices

Departmental and professional clubs and societies afford many opportunities for students to strengthen their academic work. In these organizations, students may meet with faculty members and other professional persons informally and practice the theories learned in class.

Other groups, though often representing academic fields, are open to students in any curriculum and provide for extracurricular activity that is consonant with the objectives of the University.

The Student Governing Association constitution and all student organizations, their presidents and faculty advisers, are in the Kansas State University Directory. Students should read through these pages. Judicious participation in these activities can add an important dimension to their university lives.

The following professional and honorary organizations recognize superior achievement in specific fields, leadership, and service.

Professional

Alpha Chi Sigma (Chem., Chem. Engg., Biochem.)
Alpha Kappa Psi (Business Administration)
Alpha Tau Alpha (Agricultural Education)
American Chemical Society
American Guild of Organists
American Home Economics Association
American Institute of Aeronautics and Astronautics
American Institute of Architects
American Institute of Chemical Engineers
American Institute of Industrial Engineers
American Institute of Interior Designers
American Institute of Physics
American Institute of Planners
American Nuclear Society
American Society of Agricultural Engineers
American Society of Civil Engineers
American Society of Landscape Architects
American Society of Mechanical Engineers
American Veterinary Medical Association
Bakery Management Club
Institute of Aerospace Sciences
Institute of Electrical and Electronics Engineers
Kappa Alpha Mu (Photo Journalism)
Music Educators National Conference (MENC)
Phi Delta Kappa (Men's Education)
Phi Mu Alpha (Men's Music)
Phi Upsilon Omicron (Home Economics)
Sigma Delta Chi (Men's Journalism)
Society of American Military Engineers
Soil Conservation Society of America
Steel Ring (Engineering)
Theta Sigma Phi (Women Journalists)
Wildlife Society

Honorary

Alpha Mu (Milling)
Arnold Air Society (Air Force ROTC Cadets)
Blue Key (Senior Men)
Chi Epsilon (Civil Engineering Honors Committee)
Chimes (Junior Women)
Delta Phi Delta (Art)
Delta Sigma Rho (Debate)
Gamma Sigma Delta (Agriculture)
Kappa Delta Pi (Education)
K-Fraternity (Varsity Letter Winners)
Mortar Board (Senior Women)
Mu Phi Epsilon (Women, Music)
National Collegiate Players
Omicron Delta Epsilon (Economics)
Pi Epsilon Delta (Dramatics)
Scabbard and Blade (Cadet ROTC Officers)
Sigma Alpha Eta (Speech Therapy)
Sparks (Sophomore Women)

Scholastic Honorary

Alpha Delta Theta (Medical Technology)
Alpha Epsilon Rho (Radio-TV)
Alpha Lambda Delta (Freshman Women)
Alpha Zeta (Agriculture)
Delta Mu Delta (Business Administration)
Eta Kappa Nu (Electrical Engineering)
Gamma Theta Upsilon (Geography)
Omicron Nu (Home Economics)
Phi Alpha Mu (Arts and Sciences)
Phi Alpha Theta (History)
Phi Epsilon Kappa (Men's Physical Education)
Phi Eta Sigma (Freshman Men)
Phi Kappa Phi (All-University)
Phi Lambda Upsilon (Chemistry and Chemical Engineering)
Pi Mu Epsilon (Mathematics)
Pi Tau Sigma (Mechanical Engineering)
Putnam Scholarship Association
Sigma Delta Pi (Spanish)
Sigma Gamma Epsilon (Geology)
Sigma Tau (Engineering)
Sigma Xi (Faculty, Graduate Student, Science)
Tau Sigma Delta (Architecture)

All-University Honor Societies

Phi Kappa Phi. A national fraternity. Membership is open to honor students in all departments, on the basis of scholarship. The Kansas State chapter was installed in 1915.

Sigma Xi. A national fraternity. Members of the faculty and graduate students are eligible for election to active membership on the basis of achievement in original scientific investigation; seniors who have shown excellence in two departments of science are eligible for election to associate membership. The Kansas State chapter was installed in 1928.

The Summer School

The Summer School is an integral part of the educational program of Kansas State University. It is designed to meet the needs of the following groups:

1. Undergraduate students who wish to accelerate their programs of study toward an early graduation, and those who wish to make up courses missed during fall or spring semesters.
2. Graduate students for whom the Summer School offers an opportunity to make more rapid progress towards a degree, and teachers who are unable to attend the University during the two semesters.
3. Special interest, non-degree groups, including public school, business and industrial personnel.

High school graduates expecting to enter the University for the first time are urged to attend the Summer School. These students will find it valuable in establishing study habits, becoming acquainted with the campus and faculty, and adjusting to university life.

The Summer School has available all the facilities and services of the University which are available in the regular semesters, including housing, food service, counseling and testing services, Student Health Center, and Student Union recreational programs. A large number of the classrooms and library study rooms are air conditioned.

A special recreation program is planned for each summer session. It includes dancing, parties, movies, lectures, concerts, plays, tennis, boating, water skiing, swimming, fishing, bowling and other sports.

The teaching staff of the Summer School is formed from the regular instructional staff of the University, supplemented by visiting professors and lecturers.

The courses offered in the Summer School are chosen from among those offered in the regular session with the addition of conferences and workshops planned to meet special needs. The particular courses chosen for Summer School are determined by student demand.

The Summer School consists of an eight-week session in which a student may earn as many as nine semester hours of credit on a regular assignment. A student may, if he wishes, take a part-time assignment.

Workshops, short courses, and conferences are offered to accommodate those students who find it inconvenient to attend the full eight-week session. The length of these special sessions varies from a single week to four-week lengths.

The Summer School Bulletin gives complete and detailed information on all aspects of the Summer School. It is available in February each year. A copy may be obtained free of charge by requesting it from the Dean of Admissions and Records.

The Graduate School

R. F. Kruh, *Dean*
John P. Noonan, *Associate Dean*

GRADUATE STUDY AT KANSAS STATE UNIVERSITY: ITS BEGINNINGS AND DEVELOPMENT

Although the first graduate student enrolled in 1868, the year 1886 is the significant date for graduate study at Kansas State University. In that year a standing committee on graduate work was created, and it was established then that a Master of Science degree would be granted to candidates who demonstrated a proficiency in one of the industrial arts or sciences and who presented a thesis reporting original research. Industrial arts included agriculture, horticulture, engineering, architecture and design, and domestic economy. The sciences were botany, chemistry, zoology, entomology, and physics.

Requirements for the master's degree evolved through the years and by 1912 definite procedures had been worked out whereby all applications for graduate study were passed upon by the Council of Deans, with student programs determined by the dean of the division (now college) in which the student did his major work. In October, 1919, a Graduate Council of seven members was created to administer graduate courses. It represented the divisions of Agriculture, Engineering, General Science (now Arts and Sciences), Home Economics, and Veterinary Medicine. The Council members and its chairman were appointed by the president. At that time members of the Graduate Faculty were selected by department heads and approved by the Council. In November, 1931, a separate Division of Graduate Study was established under a dean, and in 1932 the Board of Regents authorized doctoral programs in chemistry, milling industry, bacteriology, and entomology. The Graduate School acquired its present name in 1942, and its policy-forming group is an elected Graduate Council representative of each college or school and the major areas of graduate study.

The Graduate School Today

The Graduate School's continued development is demonstrated by enlarged enrollments, improved quality of its programs, and the diversity of the offerings. More and more students are being attracted to graduate study because they have developed interests in advanced scholarly work and because their career opportunities are improved as result of advanced training. The quality of the programs has been recognized by awards for increased research and training support from outside agencies and for the acquisition of sophisticated research apparatus and new library facilities. Faculty members from various departments have pooled their talents and resources in cooperative research and training activities with the result that students' programs of study may readily cross traditional departmental lines.

Graduate study is based on the proposition that students work individually or in small groups with a major professor. Most advanced graduate courses are, therefore, taught in small seminars which provide for the exchange of ideas among the students and instructor. The ultimate objective is to create the desire and capacity for independent study and research.

In keeping with today's trends in higher education, the Graduate School is concerned with a program designed to aid the student to achieve the maximum possible liberality in education while pursuing the specialized professional courses of study. Graduate students are encouraged, therefore, to aspire to a well-rounded self-development, and with it an outlook of a more adequate world view, through participation in those chosen university courses and activities which may enable them individually to gain such ends.

Wide support of research programs is provided through the Agricultural Experiment Station, the Engineering Experiment Station, and the Bureau of General Research. Each of the experiment stations offers backing for relevant research in many quarters of the campus beyond those traditionally identified with such stations, and the Bureau of General Research specifically serves the Colleges of Arts and Sciences, Commerce, and Education.

GENERAL INFORMATION

Admission

Admission to graduate study does not imply admission to candidacy for an advanced degree. For a doctoral degree such candidacy is confirmed upon successful completion of preliminary examinations.

Correspondence regarding admission to the Graduate School should be addressed to the department, which will supply application blanks and supplementary information about its program. The applicant should see that each undergraduate or graduate institution he has previously attended sends two copies of official transcripts directly to the appropriate department head. The application and transcripts should be received by the department at least three months before the time the student expects to enroll. All transcripts become part of the student's official file and may not be returned.

All new graduate students enrolling for seven or more credit hours are required to take a physical examination. For students applying from within the United States this examination may be given by a family physician prior to enrollment and recorded on forms furnished by the University. International students report to the Student Health Center during enrollment for a physical examination.

Entrance Requirements. Admission to the Graduate School ordinarily implies the student's intention to work toward an advanced degree. To be considered for admission with full standing the applicant must have:

(1) A bachelor's degree from an approved institution,

(2) Adequate undergraduate preparation in the proposed major field or equivalent evidence of an appropriate background for undertaking an advanced degree program, and

(3) An undergraduate average of B or better in the junior and senior years.

Admission to the Graduate School with provisional standing will be considered for the student who does not meet the foregoing requirements provided that there is other evidence that he has the ability to do satisfactory graduate work. Such evidence might include an excellent record of postgraduate work at another institution, or high scores on the Graduate Record Examination or the Miller Analogies Test. Those who wish to take the Graduate Record Examination should apply to Educational Testing Service, 20 Nassau Street, Princeton, New Jersey. The fee for either test must be paid by the applicant. Once admitted, students with provisional standing will be advised of deficiencies or of other conditions to be met to attain full standing. Full standing is attained automatically upon completion of at least nine hours of work for graduate credit with a grade of B or better, and upon the removal of any course or deficiency which was specified at the time of admission to provisional standing.

Students who do not plan to work for an advanced degree may be admitted to the Graduate School as special students. Applications from such students should be sent to the department in which they plan to take courses or directly to the Graduate School together with two copies of the official transcript from the institution which granted the undergraduate degree. A special student who later wishes to enter a degree program must obtain the permission of the department concerned. No more than 16 semester hours earned as a special student may be transferred into a regular degree program.

International Students. The Graduate School requires each foreign applicant to demonstrate his facility in the English language by making a satisfactory score on the Test of English as a Foreign Language (TOEFL). This test is required in the interest of assuring that the student's progress toward his degree is not jeopardized by language difficulties. The TOEFL is offered through the Educational Testing Service, Princeton, New Jersey, and tests are given several times a year in the student's home country. Further information about the TOEFL is available from the Graduate Office. Foreign students are advised to take the TOEFL as early as possible to avoid delays in processing their applications for admission.

A special orientation and advising program is conducted for new international students one week before the date of enrollment.

Registration. Students who have been admitted to the Graduate School register and pay their fees during the regular registration period.

A student enrolled in a short course or workshop during the summer session may take regularly scheduled courses as long as he is able to attend all sessions of both. His enrollment should not exceed the maximum number of hours allowed in the summer session.

Any change in a student's enrollment should be carried out through the regular procedures and must be accompanied by the approval of the student's adviser and the Dean of the Graduate School.

Every student using University facilities must be enrolled.

Fees. See page 15.

Graduate Study by Seniors. A senior who is within two semesters of receiving his bachelor's degree may enroll for one or more courses for graduate credit. His total enrollment in such case may not exceed 17 hours per semester or nine hours per summer session, and not more than 12 semester hours of graduate work may be accumulated in this way.

Requirements for Degrees

Graduate Credit. The course and research requirements for graduate degrees are expressed in terms of graduate credit. Graduate credit may not be earned by examination or by correspondence. Graduate students may enroll for a limited amount of research or problem work in absentia when it is appropriate to their program of study and when prior approval of the department and the Dean of the Graduate School has been obtained. No more than four semester hours of graduate credit may be earned for each month of such work in absentia, and the fee is $8.00 a semester hour. Resident faculty and students may not register for work in absentia.

Grades. The following grades are used in the Graduate School: A, B, C, D, Incomplete, F, and Withdrawn. A candidate for an advanced degree must make a grade of B or better in three-fourths of the credit hours attempted (excluding research). To count for graduate credit the grade in a course must be C or better and no course may be counted more than once. A graduate student's record will be reviewed after he has completed 10 hours of graduate work. To be in good standing a graduate student must make at least a 2.65 grade-point average in all graduate course work. Those failing to meet this requirement will be placed on probation. Continued unsatisfactory work will result in dismissal.

Validation of Credits. All credits, whether from Kansas State University or transferred and which have been acquired more than six years prior to receiving a master's degree or nine years prior to receiving a Ph. D., require validation either by repeating the course or by passing an advanced course in the subject area, or by a validation examination. The method of validation is determined by the department concerned, and validation is to be completed at least two weeks before the student's final oral examination. A grade of B or better is required for validation of lapsed credits.

English and Speech Proficiency. The following requirements for graduate students relative to oral and written English usage have been adopted by the Graduate Faculty and the Faculty Senate: (1) All entering graduate students are required to take an examination to demon-

strate proficiency in written English. Students who fail to pass this examination will be required to enroll in an appropriate review course. No student shall be permitted to begin writing the master's thesis or report until he has passed the proficiency examination in English. No student will be admitted to candidacy for the Ph. D. until he has passed this examination; (2) All international students entering Graduate School will be required to take an examination to establish his level of proficiency in oral English. Students who fail to pass this examination will be required to enroll in English 075 or Speech 070.

Master's Degree. Candidates for the master's degree are normally required to spend one academic year in residence. Subject to the approval of the major department, the candidate may choose either of the following options: (1) a minimum of 30 semester hours of graduate credit including a master's thesis of six to eight semester hours; (2) a minimum of 32 semester hours of graduate credit without a master's thesis but including a written master's report upon research or problem work in the major field. An acceptable report counts for two semester hours of graduate credit. Candidates for the Master of Regional and Community Planning degree must satisfactorily complete 60 hours of graduate work, but substantial experience or training may be substituted for 15 hours of this requirement if approved by the faculty in Regional and Community Planning and the Dean of the Graduate School.

The student's program of study is prepared with the assistance of an advisory committee consisting of the major adviser and two other graduate faculty members. The program is subject to the approval of the Dean of the Graduate School upon recommendation of the advisory committee and should be submitted to the Graduate School prior to the end of the candidate's second term. The program may be modified on further recommendation of the advisory committee and the approval of the Dean.

Three copies of theses and reports are required. All such reports and theses will be bound in cloth in accordance with specifications for Class A binding of the Library Binding Institute. To cover the cost of binding the student must deposit with his report or thesis a money order made out to an approved bindery. The University Library will forward manuscripts to the bindery for the candidate. If the student desires to publish all or part of his thesis before the degree is conferred the major professor should notify the Graduate School in advance by letter.

All master's degree candidates must pass a final examination administered by the advisory committee.

Doctor of Philosophy. At least three years of two semesters each of graduate study beyond the bachelor's degree equivalent to about 90 semester hours, including 50 or more hours of course work and a dissertation, are required of candidates for the degree of Doctor of Philosophy (Ph. D.). At least a year of this time must be spent in residence at the University. The candidate must demonstrate a reading proficiency in at least one foreign language appropriate to his special field. The choice of the language or languages must be approved by the candidate's supervisory committee and by the Dean of the Graduate School. The language requirement must be satisfied before preliminary examinations are taken.

For each doctoral student a supervisory committee is selected by the student and the major instructor with the approval of the head of the department and the Dean of the Graduate School. This committee, consisting of at least four members representing the student's field of study, aids the student in the preparation of his program of study (which must be approved by the Dean of the Graduate School) and has charge of the preliminary examination. Before the preliminary examination is arranged the student must have on file in the Graduate School a program of study approved by the supervisory committee.

Ordinarily, at the close of the second year of graduate study and at least seven months before the effective date of the degree he must have successfully completed the written preliminary examination. The foreign language requirement must be completed at least seven months prior to

the final oral examination. When these requirements are met the student is recommended by the supervisory committee to the Graduate Council for admission to candidacy for the degree Doctor of Philosophy. On completion of three years of graduate study as prescribed in the program of study and on submission of a dissertation to the Dean of the Graduate School the candidate is given a final examination.

Early in the graduate work a dissertation subject is chosen in the major field and approved by the supervisory committee. The dissertation must represent original investigation, contributing new knowledge or understanding to the candidate's field. All dissertations will be bound in cloth in accordance with specifications for Class A binding of the Library Binding Institute. To cover the cost of binding the student must deposit with his dissertation a money order made out to an approved bindery. The University Library will forward manuscripts to the bindery for the candidate.

Each dissertation is microfilmed and an abstract is published in Dissertation Abstracts. The current fee is $20.00.

If publication of the dissertation, in whole or in part, is to be made before the degree is conferred, the major professor should notify the Dean of the Graduate School by letter in advance of such publication. Publication of any part of a dissertation should show, through footnote or otherwise, that the material is from a dissertation presented in partial fulfillment of the requirements for the degree Doctor of Philosophy in the subject department at Kansas State University.

Student Organizations

See pages 32-33.

Graduate Student Housing

See page 27.

Graduate Loans

See page 28.

Assistantships and Fellowships

In order to support research, scholarship, and the acquisition of advanced degrees, the University offers several different kinds of financial aid for graduate students. These include fellowships, traineeships, teaching assistantships, and research assistantships. Applications for graduate teaching assistantships and graduate research assistantships should be made directly to the department concerned before March 15 for the following academic year. Inquiries about other types of support may be directed either to the Graduate School or to the department.

Graduate Teaching Assistantships and Graduate Research Assistantships. Award of assistantships is based on the student's ability and promise and is usually made for either nine months or 12 months. The usual, and maximum, appointment is for half-time, but appointments for lesser fractions may also be made. A student is eligible for resident fees during each term in which he holds an appointment for at least two-fifths time. In addition, students who have been on appointments for at least two-fifths time during the academic year are eligible for resident fees during the following summer term even though they do not hold assistantships. The maximum enrollment for assistants is 10 hours for half-time and 12 hours for two-fifths time appointments; the minimum is six hours in the regular terms and three in the summer. The corresponding maxima for a summer term are five and six hours respectively. Students desiring such appointments may obtain application blanks from the head of the department concerned.

In addition to assistanships the University has a number of fellowships and traineeships available. These include University Fellowships, which are intended primarily for students in the latter part of dissertation research, NDEA Title IV Fellowships, and NSF Graduate Traineeships. NDEA Title IV Fellowships are available in many departments, while NSF Traineeships are restricted to the sciences. Several departments

also have federally supported traineeships available under the programs of the National Institutes of Health.

OFFERINGS OF THE GRADUATE SCHOOL

Major Fields for Master of Science

Major work leading to the degree Master of Science is offered in the following fields:

Accounting
Agricultural Economics
Agricultural Education
Agricultural Engineering
Agronomy
Anatomy
Animal Science and Industry
Applied Mechanics
Bacteriology
Biochemistry
Botany
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Clothing and Textiles
Computer Science
Dairy Manufacturing
Dairy Production
Education
Electrical Engineering
Entomology
Extension Education
Family and Child Development
Family Economics
Farm Mechanics
Food Science
Foods and Nutrition
General Home Economics
Genetics
Geochemistry
Geology
Grain Science
Home Economics Education
Horticulture
Industrial Education
Industrial Engineering
Institutional Management
Mathematics
Mechanical Engineering
Music
Nuclear Engineering
Parasitology
Pathology
Physical Education
Physical Science Teaching
Physics
Physiology
Plant Pathology
Poultry Science
Psychology
Statistics
Surgery and Medicine
Technical Journalism
Zoology

Major Fields for Master of Arts

Major work leading to the degree Master of Arts is offered in the following fields:

Art
Economics
English
Geography
History
Mathematics
Modern Languages
Music
Philosophy
Political Science
Radio and Television
Sociology
Speech

Major Fields for Master of Architecture

Major work leading to the degree Master of Architecture is offered in the following fields:

Architectural Design
Architectural Structures
Interior Architectural Design

Master of Landscape Architecture

Major work leading to the degree Master of Landscape Architecture is offered in the College of Architecture and Design.

Master of Regional and Community Planning

Major work leading to the degree Master of Regional and Community Planning is offered on an interdepartmental basis, with the program centering administratively in the College of Architecture and Design.

Major Fields for Doctor of Philosophy

Major work leading to the degree Doctor of Philosophy is offered in the following fields:

Agronomy
Animal Breeding
Animal Nutrition
Applied Mechanics
Bacteriology
Biochemistry
Botany
Chemical Engineering
Chemistry
Economics (Agricultural)
Economics (Arts and Sciences)
Education
Electronics (Electrical Engineering or Physics)
English
Entomology
Food Science
Foods and Nutrition
Genetics
Geochemistry
Grain Science
History
Horticulture
Industrial Engineering
Mathematics
Mechanical Engineering
Nuclear Engineering
Parasitology
Pathology
Physics
Physiology
Plant Pathology
Psychology
Statistics
Zoology

Interdepartmental Degree Programs

The Graduate School recognizes the importance of programs involving interrelationships between fields and has established graduate faculty groups to plan programs and supervise research in interdisciplinary fields. These programs are described in the following paragraphs. For information regarding these programs write to the chairman of the appropriate program in care of the Graduate School.

Animal Breeding

G. B. Marion, *Chairman*

Professors Craig, Gier, Huston and Marion; Associate Professors Farmer, Smith and Wheat; Assistant Professors Kiracofe and Schalles

Major work leading to the degree Doctor of Philosophy in Animal Breeding is offered in the Departments of Animal Science and Industry and Dairy and Poultry Science.

The training for the Ph. D. is planned to equip the candidate for both research and teaching careers, with major emphasis on either reproductive physiology or animal genetics.

Facilities for advanced work in animal breeding include large and small experimental animals and modern laboratories. Faculty members serving as major advisers to degree candidates are conducting active research programs in many phases of animal breeding.

To enter graduate study in animal breeding, the student should have preparation in (1) elementary genetics, (2) college algebra, (3) physics, (4) general and organic chemistry, (5) general botany, (6) general zoology, and (7) at least six additional credit hours of advanced biological sciences. In addition, a student must have at least six credit hours of undergraduate livestock production or management courses. When necessary background courses are lacking, the student will be required to take such undergraduate courses.

Degree candidates are expected to acquire training in genetics, animal breeding, statistics, biochemistry, physiology, and zoology. Additional courses may be selected from other fields of biological and physical sciences.

A typical program of study for a Ph. D. candidate with major interests in reproductive physiology or animal genetics might include the following graduate-level courses:

REPRODUCTIVE PHYSIOLOGY

Anatomy
Embryology
Cytology
Histology
Endocrinology
General Physiology
Reproductive Physiology
Biochemistry
Statistics
Research Techniques
Genetics

ANIMAL GENETICS

Statistical and Population Genetics
Poultry and Dairy Genetics
Population Genetics
Animal Breeding
Statistics and Experimental Design
Physiology and Anatomy

In additon to these basic courses the candidate would take specific courses in his area of particular interests such as embryogenesis, biochemistry, population genetics, immunology and pathology, anatomy or endocrinology. Each semester the candidate will participate in at least one graduate seminar which will include visits by guest scholars representing various disciplines associated with animal breeding.

Animal Nutrition

Draytford Richardson, *Chairman*

Professors Bartley, Parrish, Richardson and Sanford; Instructor Frey

Major work leading to the degree Doctor of Philosophy in Animal Nutrition is offered in the Departments of Animal Science and Industry, Dairy and Poultry Science, Biochemistry, and Physiology. For courses, see departmental sections in this catalog.

To enter upon graduate study in Animal Nutrition, the student should have preparation in (1) biological sciences, including bacteriology, histology and zoology, (2) chemistry, including qualitative, quantitative and organic, (3) mathematics, (4) physics, and (5) livestock or poultry science. Where necessary background courses are lacking, the student will be required to take additional undergraduate courses.

In the course of preparation for the advanced degree, candidates are expected to acquire training in nutrition, biochemistry, physiology, anatomy and statistics. Additional courses may be selected from other fields of biological and physical sciences. Students desiring such a program should consult the Dean of the Graduate School and the representatives of the appropriate departments.

Facilities for advanced work in Animal Nutrition include large and small experimental animals, well-equipped laboratories and adequate library facilities.

Extension Education

CURTIS TRENT, *Chairman*

Professors McComas, Ringler and Trent

The College of Education in cooperation with other parts of the University and the Cooperative Extension Service offers graduate work leading to the degree Master of Science in Extension Education. The program is designed primarily for extension workers who are or expect to be engaged in supervisory, administrative or county extension agent positions and who wish to receive a broad training in the fields of education, communication and social science.

An essential difference from other programs is that the major field of study consists of courses selected in the fields of adult and extension education. For a major in extension education, the student should take Educ. 605, 752, 802 and 816. The remaining work may be selected from the offerings of the various academic departments in which the worker feels the greatest need for subject-matter training.

It is desirable for the student to have had two years of experience in extension work before enrolling in this program. The case of a student who lacks experience will be considered on its merits. The thesis or report must be written in the field of extension education, the major field.

Food Science

ROSS MICKELSEN,* *Chairman*

Professors Caul, Claydon, Clegg, Fan, Farrell, Finkelstein, Foltz, Harrison, Hoover, Johnson,* MacMasters, H. L. Mitchell,* Parrish, Pomeranz, Shugart, Tinklin, Wakefield and Ward; Associate Professors Bassette, Deyoe, Fryer, Greig, Kropf and Tuma;* Assistant Professors Allen, Bowers, Brent, Erickson, Hemphill, Hurley,* Iandolo,* Mickelsen,* Middleton, Miller and J. D. Mitchell;* Instructor Hayes*

Graduate work leading to the degrees Master of Science and Doctor of Philosophy in Food Science is offered in the Departments of Animal Science and Industry, Bacteriology, Biochemistry, Chemical Engineering, Dairy and Poultry Science, Grain Science and Industry, Foods and Nutrition, Horticulture, Institutional Management and the Division of Biology.

Requirements for entering graduate study in Food Science are: (1) mathematics including college algebra, (2) analytical and organic chemistry, (3) a course in physics, (4) an introductory course in microbiology, (5) a course in botany, zoology or biology. When the student's committee believes that it is necessary, the student will be required to take additional undergraduate courses to prepare him more completely for his own program.

Candidates for degrees are expected to select courses so as to give adequate coverage in several food areas, with primary emphasis in one or more areas. The student will be expected to include in the program of study general biochemistry, statistics, microbiology of foods or dairy bacteriology if these courses are not included in previous preparation. Course requirements will be evaluated by the student's advisory com-

* Members of Food Science Coordinating Committee.

mittee. At least one member of the Food Science Coordinating Committee should serve on the student's advisory committee.

Facilities are available for a comprehensive range of teaching and research activities including pilot plants for milling, baking, dairy products, poultry products, meats and quantity food production. Laboratories are equipped for research involving biochemistry, heat transfer, fluid flow, filtration, evaporation, microbiology, rheology, freeze drying and nutrition.

Courses in Food Science

ANIMAL SCIENCE AND INDUSTRY

Institutional Meats
Meat Technology
Meat Packing Plant Operation
Advanced Meat Science
Analytical Techniques in Animal Science and Industry

CHEMICAL ENGINEERING

Transport Phenomena
Process Analysis and Design

DAIRY AND POULTRY SCIENCE

Market Milk and Dairy Inspection
Dairy Products Evaluation II
Dairy Technology
Poultry Products Technology
Chemistry of Foods
Dairy Foods Processing
Dairy Plant Management
Dairy Fermentations
Processing and Chemical Analysis of Fats and Oils

DIVISION OF BIOLOGY

Dairy Bacteriology
Microbiology of Foods

FOODS AND NUTRITION

Food Science
Principles of Nutrition
Advances in Foods
Food Research Techniques
Nutrition in Developing Countries
Fundamentals of Food Flavor Analysis
Bionutrition
Advanced Nutrition
Food Systems
Advanced Foods
Research Methods in Foods and Nutrition
Food Science Colloquium

GRAIN SCIENCE AND INDUSTRY

Milling Technology I
Flour and Feed Analysis
Advanced Wheat and Flour Testing
Experimental Baking I
Experimental Baking II
Bakery Design and Flow
Bakery Technology
Advanced Flow Sheets
The Qualities of Wheat and Flour
Food and Feed Plant Sanitation
Milling Technology II
Fundamentals of Grain Storage
Principles of Food Analysis
Advanced Flour and Feed Technology
Flour and Feed Mill Construction
Enzyme Applications

INSTITUTIONAL MANAGEMENT

Quantity Foods
Food Production Management
Quantity Food Purchasing and Control
Food Service Equipment and Layout

Genetics

THAD PITTENGER,* *Chairman*

Professors Craig, Eisenstark,* Heyne, Huston,* K. G. Lark and Pittenger;* Associate Professors Barnett, Fisher, Hall,* McCracken,* Smith, Wassom and Wheat;* Assistant Professors Bode, Casady, Friesen, Cynthia A. Lark, Liang, Nassar,* Reiter and Schalles*

Graduate work leading to the M. S. and Ph. D. degrees in genetics is administered through an interdepartmental program. The program is supervised by a Genetics Coordinating Committee made up of faculty from participating departments which not only sets the academic requirements for degrees but assigns two of its members to the supervisory committee of each student. Graduate students are associated with the department to which their major professor belongs, but the graduate degrees are awarded in genetics.

In addition to the general entrance requirement set up by the Graduate School, students desiring to do graduate work in genetics should have at least an introductory course in genetics and six hours of biological sciences. Students who do not meet these requirements will be expected to make up these deficiencies either by examination by the appropriate departments or by enrolling in the necessary courses during the first year of graduate study. Although the program of study for each student is determined by his supervisory committee, the Genetics Coordinating Committee has outlined certain specific requirements. These requirements, outlined below, are kept at a minimum to allow specialization in a wide variety of areas of genetics ranging from plant and

* Members of the Genetics Coordinating Committee.

animal breeding, plant and animal genetics, population and statistical genetics, to microbial as well as cellular and molecular genetics. At present the minimum academic requirements are as follows:

An introductory course in either cytology or cell biology strongly oriented toward chromosome behavior.

An introductory course in biochemistry or statistics for the M. S. degree.

An introductory course in *both* biochemistry and statistics for the Ph. D. degree.

COURSES IN GENETICS

Three of the following courses will be required for the M. S. degree and five will be required for the Ph. D. degree.

AGRONOMY
Plant Genetics
Developmental Genetics
Plant Breeding

ANIMAL SCIENCE AND INDUSTRY
Population Genetics

BACTERIOLOGY
Microbial Genetics
Methods in Microbial Genetics

BOTANY
Cytogenetics

DAIRY AND POULTRY SCIENCE
Poultry and Dairy Genetics I
Poultry and Dairy Genetics II

PHYSICS
Biophysics II

STATISTICS
Statistical Population and Quantitative Genetics I
Statistical Population and Quantitative Genetics II

A more complete description of the above courses can be found in the respective departmental sections.

Participating in the interdepartmental program are the Departments of Animal Science and Industry, Agronomy, Horticulture, Dairy and Poultry Science, Statistics, Computer Science, and the Division of Biology.

Parasitology

M. F. Hansen, *Chairman*

Professors Ameel, Hansen, Knutson, Leland and Pady; Associate Professors Dickerson, Elzinga, Harvey and Kramer; Assistant Professor Pitts

Graduate study leading to the degrees Master of Science and Doctor of Philosophy in Parasitology is offered in the Division of Biology and the Departments of Entomology, Infectious Diseases, Pathology, and Plant Pathology (Nematology). Graduate courses related to parasitology will be found listed under the above division and departments in this catalog. Supporting courses may be taken in any of the scientific disciplines or in other academic areas with approval of the Parasitology Coordinating Committee and the student's advisory committee.

Facilities for research work in parasitology include rearing rooms, small and large parasite-free domestic animals, environmental control chambers, animal rooms, in vitro culturing, laboratories (toxicology, physiology, behavior) and field study areas.

Pathology

E. H. Coles, *Co-chairman*

Stanley M. Dennis, *Co-chairman*

Professors Coles, Dennis, Leasure, Leland and West; Associate Professors Anthony, Burroughs, Kelley, McGavin and Osbaldiston; Assistant Professors Gray and Hibbs

Graduate work leading to the degrees Master of Science and Doctor of Philosophy is offered in the Departments of Pathology and Infectious Diseases in the College of Veterinary Medicine. For available courses see the departmental sections in this catalog.

Facilities of the departments for advanced work include a well-

equipped clinical pathology laboratory, animal isolation units, virus research laboratories, parasitology research laboratories, a histopathology preparation laboratory, a diagnostic laboratory, a perinatal research laboratory, a wide variety of research equipment, and an extensive file of tissue slides. There is also an opportunity for experimental work with animals in studying diseases and related pathology.

Graduate training is available in the fields of clinical pathology, general pathology, systemic pathology and in the study of infectious diseases as related to pathology.

Requirements for entering graduate study in pathology are completion of a four-year curriculum in veterinary medicine, equivalent training in basic sciences or by approval of the interdepartmental graduate faculty.

Regional and Community Planning

VERNON P. DEINES,* *Chairman*

Professors Blackburn, Boyer,* Chadwick, Douglas, Ealy,* Fischer,* Friedmann,* Hill, Montgomery, Pine, Smith and Wright; Associate Professors Deines,* Emerson* and Siddall;* Assistant Professors Bussing, Day, Di Santo, Edmonds, Erickson, Ernst, Funk, Kromm, McGraw, Schultze and Weisenburger; Instructor Barnes*

Graduate study leading to the two-year professional degree Master of Regional and Community Planning is offered on an interdepartmental basis by the Graduate Curriculum in Regional and Community Planning which is staffed by faculty from Architecture, Civil Enginering, Economics, Geography and Geology, Landscape Architecture, Political Science and Sociology. The program is directed towards providing broad interdisciplinary training in the social sciences and the professions for directors of planning and development in cities, regions and states, schools, colleges and universities; business firms, industrial plants, and military installations; and other relevant organizational frameworks.

Students with undergraduate degrees in administration, architecture, economics, engineering, geology and geography, government, landscape architecture, law, planning, political science and sociology, who meet the requirements of the Graduate School for admission, are fully acceptable. Students with other academic backgrounds may be accepted upon approval of the interdepartmental committee and subject to such conditions as they may impose. Graduate students may also work toward the traditional one-year Master of Arts or Master of Science degree in their undergraduate discipline or profession with a minor in planning.

Operational sub-committees for graduate applications and financial assistance, curriculum development, public service, and research and thesis supervision include other faculty members from the University.

Typical courses in the program are the following:

AGRICULTURAL ECONOMICS
Land and Resource Conservation

ARCHITECTURE
Advanced Environmental Seminar

CIVIL ENGINEERING
Economics of Design and Construction
Planning Engineering
Urban Transportation Analysis I
Air Photo Interpretation
Traffic Engineering I

COMMERCE
Administration

COMPUTER SCIENCE
Computer Organization and Planning
Programming Systems

ECONOMICS
Intermediate Economic Analysis
Location of Economic Activities
Regional Economic Analysis
Strategy of Economic Development
Introduction to Econometrics

EDUCATION
The School Plant

GEOGRAPHY
Urban Geography
Geography of Transportation
Resource Utilization and Economic Development

GEOLOGY
Applied Geology

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* Members of the Interdepartmental Committee.

HOME ECONOMICS
Housing Requirements of Families

INDUSTRIAL ENGINEERING
Introduction to Operations Research I
Linear Programming

LANDSCAPE ARCHITECTURE
Site Planning and Analysis

MATHEMATICS
Set Theory and Logic
Determinants and Matrices

PLANNING
Planning Principles
City Planning I
Regional Planning I
Housing and Renewal
Planning Legislation and Regulations
Internship in Planning
Research in Planning
Advanced Planning Theory
Regional Planning II
City Planning II
Planning Theory
Urban Design I
Urban Visual Analysis
Urban Design II

POLITICAL SCIENCE
The Administrative Process
Urban Politics
Rural Politics
Administrative Policy Making
The Politics of Developing Nations
Administration in Developing Nations
Seminar in Public Policy and Decision Making

SOCIOLOGY
Methods in Social Research
Urban Sociology
Population and Human Ecology
Community Organization and Leadership
Advanced Rural Sociology
Methods of Demographic Analysis
Seminar in Community Analysis
Seminar in Societal and Institutional Dynamics
Seminar in Demographic Analysis

STATISTICS
Statistical Methods I
Statistical Methods II
Introductory Probability and Statistics I

Physical Science Teaching

HENRY V. BECK, *Chairman*

Professors Beck, Curnutte, Marr, Moore and Schrenk

The Departments of Chemistry, Geology, Mathematics, and Physics, and the College of Education jointly offer graduate work leading to the degree Master of Science in the field of physical science teaching. The program is specifically directed towards the needs and interests of present and prospective teachers of physical science in the high schools and junior colleges.

Prerequisite to graduate work in this field is the completion of a four-year undergraduate curriculum including one semester of course work in geology, or acceptable substitute, one year of course work in chemistry, one year of course work in physics, and an adequate background in mathematics. The student must have completed the course work required for a high school teaching certificate.

The purpose of this program is to enable the science teacher to broaden and strengthen his knowledge of his teaching field and his profession rather than to specialize in a single discipline. Programs will be designed to fit the students' needs, and will include 30 hours course work and a two-hour report. Each program must be approved by the coordinating committee.

Physiology

M. R. FEDDE,* *Chairman*

Professors Bartley, Brown, Cornelius, Gier, Koch, Marion and Wakefield; Associate Professors Besch, Clarenburg, Farmer, Hopkins, Kropf, Menzies and Mitchell; Assistant Professors Cardinet, Fedde,* Gronwall,* Kiracofe,* Morrill and Wilson**

Graduate work leading to the degree Doctor of Philosophy in Physiology is supervised by members of the Graduate Group in Physiology. The program is designed to provide in-depth training in the various areas of physiology to students located in many departments of the University. Departments cooperating in the program are Animal Science and Industry, Biology, Dairy and Poultry Science, Entomology, Foods and Nutrition, Physiological Sciences, and Psychology.

* Members of the Steering Committee.

Fundamental subjects required of students for entrance into the program are: inorganic chemistry including qualitative analysis; quantitative analysis; organic chemistry; general physics (two semesters); general zoology; introductory statistics; and analytical geometry and calculus (two semesters).

Core courses include: biochemistry (Biochem. 655, 656, 665, and 666); physical chemistry; gross and microscopic anatomy (Anat. 700 and Zool. 415); systemic physiology (Physi. 635 and 645); cellular physiology (Zool. 796) and graduate seminar. Elective courses may be selected from graduate courses in related areas (see selected list below). The student is also encouraged to obtain experience in the teaching laboratory in one or more of the areas of physiology. Following is a selected list of elective courses:

ANATOMY

Special Anatomy
Avian Anatomy
Bovine Anatomy
Canine Anatomy
Anatomy of Laboratory Animals
Reproductive Organ Anatomy
Anatomical Techniques
Special Microscopic Anatomy
Research in Anatomy

ANIMAL SCIENCE AND INDUSTRY

Research Techniques in Reproduction
Analytical Techniques in Animal Science and Industry

BIOCHEMISTRY

Biochemistry of Toxic Materials
Lipids
Vitamins
Intermediary Metabolism
Nucleic Acids
Hormones
Proteins
Chemistry of Carbohydrates
Enzyme Chemistry
Enzyme Laboratory

BIOLOGY

Comparative Anatomy of Vertebrates
Embryology
Human Physiology
Zoological Microtechnique
Principles of Zoophysiology
Comparative Embryology
Cytology

Physiology of the Sense Organs
Endocrinology
Experimental Endocrinology
Comparative Physiology of Animals
Advanced Endocrinology

DAIRY AND POULTRY SCIENCE

Milk Secretion
Avian Metabolism
Rumen Metabolism
Mammalian Reproduction

ENTOMOLOGY

Insect Physiology
Advanced Physiology of Insects
Insect Behavior

PATHOLOGY, PARASITOLOGY AND PUBLIC HEALTH

Principles and Techniques of Research in Medical Investigations

PHYSIOLOGY

Physiologic Constituents of Body Fluids
Pharmacology
Physiology and Pharmacology of Hormones
Histophysiology of Nutritional Deficiencies
Physiology of Reproduction
Advanced Physiology

PSYCHOLOGY

Introduction to Physiological Psychology
Vision
Seminar in Physiological Psychology

Members of the faculty participating in this program have well-equipped laboratories and active research programs in the various areas of physiology.

Agriculture

GLENN H. BECK, *Vice President for Agriculture*

Agriculture at Kansas State University includes instruction, research, extension, and international agricultural programs with county agents, branch experimental stations, experimental fields located at strategic locations in the state, and programs of education and development in foreign countries. Under the vice president for agriculture are four administrators in charge of those four phases of work: the dean of the College of Agriculture, the director of the experiment station, the director of cooperative extension, and the director of international agricultural programs.

The College of Agriculture

CARROLL V. HESS, *Dean*

FRANK R. CARPENTER, *Assistant Dean*

The College of Agriculture has two objectives. The first is to help the student develop the qualities of an educated person—a philosophy for constructive living, an understanding of people, and a capacity for leadership. The second is to provide professional education in agriculture so the student is equipped to enter and advance in the professional and scientific area of his choice. Curriculums in the College are designed to provide liberal, professional and scientific education.

The Profession

Professional agriculture is the application of the physical, biological and social sciences and/or the principles of management to food production, food preservation and processing, crop and livestock marketing, culture of flowers and ornamentals, life processes of plants and animals, natural resources management, economic development and related fields. This broad profession includes, therefore, disciplines that range from soil physics, to animal nutrition, to cereal chemistry, to land economics. Practitioners in the profession range from industrial researchers, to farmers, to technical salesmen, to soil conservationists.

The profession (and academic programs in the College of Agriculture) might be grouped into five areas: (1) Agricultural Production, (2) Agricultural Business, (3) Agricultural Science, (4) Agricultural Services, and (5) Agricultural Education.

Examples of positions held by recent graduates are:

1. Superintendent, flour mill
2. District Sales Manager, feed company
3. Research Director, fertilizer manufacturer
4. County Extension Agricultural Agent
5. Produce Manager, retail food chain
6. Beef Editor, farm magazine
7. Vocational Agriculture Instructor
8. Farm Appraiser and Loan Officer
9. Graduate Student, for Ph. D.
10. Fieldman, farm management company
11. Technical Representative, pesticide company
12. Work Unit Conservationist, SCS, U. S. D. A.
13. Commission Salesman, livestock market
14. Editor, flower and garden magazine
15. Assistant Manager, pork department of meat
16. Economist, Foreign Agricultural Service, U. S. D. A.
17. Farm or Ranch Manager
18. Owner, city flower shop
19. Medical Entomologist
20. Meat Inspector

The Faculty

Students who enter professional colleges are concerned primarily with quality of the faculty. More than 85 per cent of the instructional faculty of the College of Agriculture have Ph. D. degrees. All are actively involved in research and publish their findings regularly in scientific journals. They are housed and work closely with extension specialists in their fields. Such integration of teaching, research, and extension activities helps to insure that professional courses are current, factual, and relevant.

Facilities

Effective instruction in the application of basic sciences to "going industries" requires expensive and varied equipment. A feed mill, flour mill, and bakery, completed in 1961, include modern equipment from eight countries. Well-equipped drafting rooms are used by milling students. Greenhouses, hotbeds, and field plots provide ample stock for horticulture courses.

Over 4,000 acres of land are used for experimental work and for support of the teaching program—for work with poultry and livestock of many breeds and of various ages, and with various soil types, field crops, fruits, vegetables, ornamentals, etc.

A Dairy and Poultry building completed in the fall of 1963 and an Animal Industries building finished in 1957 contain the latest equipment for teaching and research in nutrition, genetics, and food processing (meat, milk, eggs). New entomology and biochemistry laboratories are now in use.

Nearly all classrooms and laboratories are in close proximity within the College, near faculty offices. Many students work part time in these facilities, on specific research projects, adding greatly to their understanding of the disciplines and to their familiarity with the equipment.

Curriculums and Majors in Agriculture

Majors in the Curriculum in Agriculture	*Options*
Agricultural Economics	Bus. and Industries Science Production Services
Agricultural Journalism	
Agricultural Mechanization	Bus. and Industries Science Production Services
Agronomy (crops and soils)	Bus. and Industries Science Production Services
Animal Science and Industry	Bus. and Industries Science Production Services
Dairy Production	Bus. and Industries Science Production Services
Entomology	Bus. and Industries Science Services
General Agriculture	
Pre-Forestry (2-year program)	
Pre-Veterinary* Medicine	
Horticulture	Bus. and Industries Science Production Services
Plant Pathology	Science
Poultry Science	Bus. and Industries Science Production Services

Other Curriculums in the College of Agriculture	*Options*
Agricultural Education	
Bakery Science and Management	Administration Chemistry Operations
Biochemistry	
Dairy Foods Processing	Administration Science Food Processing
Feed Science and Management	Administration Chemistry Operations
Milling Science and Management	Administration Chemistry Operations
Natural Resources Conservation and Use	Soil and Water Conservation Economics of Conservation Conservation of Recreation Areas

* Pre-veterinary requirements may also be completed in the College of Arts and Sciences (see page 121).

Note that most curriculums and majors primarily are aligned with commodities: Agronomy with crops and soils, animal husbandry with livestock and livestock products, milling technology with flour, etc. Electives permit adaptation of the program to the student's goals.

A student planning to farm, for example, might enroll in any one of several majors, and work with his adviser in developing an academic program *most* effective and valuable for him. One who wants to write for a flower and garden magazine might major in agricultural journalism and minor in horticulture, or vice versa, depending on the primary interest. Other examples of flexibility and adaptability could be given.

The "Agriculture" curriculum includes those majors which have a relatively large number of courses in common. Note that a student may enroll in Agriculture—General, if he wants to enter some part of professional agriculture but is not yet ready to identify a particular curriculum. Separate curriculums are available for students whose professional interests dictate a unique program of course work. These curriculums are Agricultural Education, Bakery Science and Management, Biochemistry, Dairy Foods Processing, Feed Science and Management, Milling Science and Management, and Natural Resources Conservation and Use. He can take basic courses during his freshman year that will be useful in *any* curriculum or major, and/or he may take courses in several branches of agriculture to determine which best fits his interests and abilities.

A majority of students identify a curriculum (or specific major in the Agriculture curriculum) at the time they enter. They are provided an academic adviser in their major field. Those who enter in Agriculture—General are provided an academic adviser who is a representative of the dean's office. These students are urged to choose a specific major before the close of the freshman year.

A student may change his curriculum or major at almost any time and with relative ease, though a change after the sophomore year may delay graduation.

Academic Programs

The curriculum structure in the College of Agriculture permits sufficient flexibility for the student and his adviser to take maximum advantage of courses available on the campus in designing the most effective program.

Requirements on the following pages have been established by the faculty of the College. Each student, during the freshman year or early in the sophomore year, will, with his adviser, develop an *individual* program within the guidelines of the stated requirements. This individual program, when signed by the *student*, his *adviser*, his *department head*, and the dean, becomes the student's degree requirement. For all students entering after September 1, 1966, the minimum credits for the B. S. degree will be 132. Those entering earlier must complete 136.

Preparing for Agricultural Business

About 25 per cent of the 1960-64 graduates of the College of Agriculture (excluding those in military service) are now employed in industry as salesmen, plant superintendents, buyers, writers, etc. This implies that many students should plan strong "minors" or groups of supporting courses to prepare themselves to compete in industry. Likely courses are accounting, labor relations, corporation law, sales psychology, journalism, and others.

Preparation for Agricultural Science—Research and Graduate Study

Nearly 30 per cent of recent graduates are now in graduate school, aiming for Master of Science or Doctor of Philosophy degrees in their respective majors. The proportion is increasing. Students aiming for graduate school will do best if their undergraduate programs are sufficiently strong in the basic sciences—mathematics, botany, zoology, physics, chemistry, statistics, computer science, economics, and in communications.

Preparation for Agricultural Production

Those who plan to farm or ranch in the Midwest (another 20 per cent of recent graduates) should consider their future community responsibilities and the changing characteristics of farming as they develop their individual academic programs. They will want to understand state and local government, principles of taxation, corporation law as applied to farms, etc., in addition to the technology of crop and livestock production.

Preparation for Agricultural Services

This option is designed to meet the need for personnel to administer programs of varying combinations of administration, education and service which are rapidly increasing in our society. These programs require that individuals have a broad understanding of agriculture, including production, assembly, processing and distribution. In addition they must develop a working knowledge of selected concepts in the social sciences and the humanities. Fields of employment which majors in this proposed option may consider include: cooperative extension work, international agriculture, community or area economic planning and development, recreation administration, and positions in many other public and quasi-public agencies and private businesses.

Preparation for Agricultural Education

Most students who plan to teach vocational agriculture major in the Agricultural Education curriculum. Those who plan to enter county extension work may prepare in this curriculum or in other majors within the Curriculum in Agriculture.

Preparation for Veterinary Medicine

Students planning to apply for admission to the College of Veterinary Medicine should enroll in the Pre-Veterinary major in the Curriculum in Agriculture, see page 54 (or optionally the Pre-Veterinary program in the College of Arts and Sciences). Upon completion of the Pre-Veterinary major in Agriculture and the first two years of the Curriculum in Veterinary Medicine, the student will be eligible for a Bachelor of Science degree in the College of Agriculture.

Other Agriculturally Related Professions

In some cases college-bound students want to prepare for specific professions that are considered a part of agriculture or are closely related to agriculture, but are not identified here as curriculums or majors. Range management, food technology, pest control, and wildlife management are examples. Careful study of majors and curriculums that do exist in the College of Agriculture and other Colleges of the University, and review of course offerings in the General Catalog, usually reveal that the desired program exists or can be developed.

The Freshman Year

Because entering students vary considerably in their academic backgrounds and their capacity to pursue college work rapidly, academic advisers work individually with new students in planning credit loads and lists of courses to be taken the first year.

Courses that *might be taken* by freshmen in the Agriculture curriculum follow. These are only *examples;* other combinations may be developed by the student and his adviser. The principle also applies to other curriculums in the College of Agriculture.

Example I:

FALL SEMESTER		SPRING SEMESTER	
English Composition I	3	English Composition II	3
Agriculture in Our Society	2	Plant Science	4
Animal Sciences	4	Chemistry I	5
College Algebra	3	Plane Trigonometry	3
Economics I	3	Physical Education	0
Physical Education	0		
Total	15	Total	15

Example II:

FALL SEMESTER		SPRING SEMESTER	
English Composition I	3	English Composition II	3
Agriculture in Our Society	2	Plant Science	4
Chemistry I and II[1]	8	Elements of Organic Chemistry	3
College Algebra	3	Elements of Statistics	3
General Botany	4	Soils	4
Physical Education	0	Physical Education	0
Total	20	Total	17

Example III:

FALL SEMESTER		SPRING SEMESTER	
General Psychology	3	General Botany	4
Agriculture in Our Society	2	English Composition I	3
Animal Sciences	4	College Algebra	3
General Geology	3	Dairy Science	1
Intermediate Algebra	3	Poultry Science	1
Physical Education	0	Physical Education	0
Total	15	Total	12

1. Planned for students with one year of good high school chemistry. Requires class time equivalent to about 5 credits, though 8 credits are earned.

Following are "suggested" or "typical" programs for each of the majors within the Agriculture curriculum.

Curriculum in Agriculture

B. S. in Agriculture

Courses that are common for students in the majors within this curriculum are listed below:

FRESHMAN YEAR COURSES

English Composition I	3	Humanities (See list, page 56)	6
English Composition II	3	Communications (See list, page 56)	2 or 3
Oral Communication	2	Chemistry II or Behavioral Science or a Physical Science	3
Agriculture in Our Society	2		
College Algebra	3		
Economics I	3		
Chemistry I	5		
Physical Education I	0		
Physical Education II	0		

In addition, each student will complete courses prescribed by his major department, some of which are listed on the following pages. The remainder of his planned program will strengthen his training toward the sciences, business and industries, agricultural services, or production, and will be guided by requirements listed on page 55.

Agricultural Economics

MAJOR COURSES

Principles of Agricultural Economics	3
Agricultural Economics Summary	2
Agricultural economics courses selected by the student with the consent of his adviser to fulfill his interests and objectives	15 to 25 hours

GENERAL ELECTIVES

General electives may be selected by the student with the consent of his adviser to fulfill the student's personal educational interests and objectives ..... 12 to 15 hours

NON-MAJOR COURSES

Depending upon the student's professional interests and objectives, he may select, with the consent of his adviser, courses from the following areas: 9 to 12 hours

- Professional Agriculture
- Business Administration
- Extension Education
- Economics, Political Science, Sociology and Psychology

Agricultural Journalism

TECHNICAL JOURNALISM COURSES

Graphic Arts Survey	1
Typography Lab	1
Reporting II	3
Editing	2
News Photography	2
Principles of Advertising	3
Magazine Article Writing	2
Public Relations	3
Radio & TV News	2
Ag Student Journalism	4
Journalism Electives	4

PROFESSIONAL AGRICULTURE COURSES

A minimum of 12 hours must be taken in one of the following areas:

1. Agricultural Economics
2. Agronomy
3. Animal Science and Industry
4. Dairy and Poultry Science
5. Entomology
6. Flour & Feed Milling Industries
7. Horticulture
8. Poultry Science
9. Agricultural Mechanization

Agricultural Mechanization

MAJOR COURSES

Farm Power	3
Agricultural Machinery	3
Planning and Management of Agricultural Buildings	2
Conservation Surveying and Planning	3
Farmstead Utilities	3
One or more of the following courses in Ag. E. 352, 452, 603, 651, 652, 653, 654	

NON-MAJOR COURSES

Engineering Graphics	2
General Physics	8
Plane Trigonometry	3

PROFESSIONAL AGRICULTURE COURSES

A minimum of 12 hours in one of the following:

1. Agricultural Economics and Journalism
2. Agronomy, Entomology, Horticulture, and Plant Pathology
3. Animal, Dairy, and Poultry Science

Agronomy

MAJOR COURSES

Plant Science	4
Soils	4
Crop Production	4
Soil Fertility	3
Weed Science	3
Range Management	3
Soil Management and Moisture Conservation	3
Crop Improvement	3
Soil Development and Classification	3

NON-MAJOR COURSES

Dependent on option chosen. See additional requirements on following pages.

Students may specialize in agricultural chemical sales, soil science, crop science, range management, soil conservation, or irrigation.

Animal Science and Industry

MAJOR COURSES

Basic Animal Science and Industry or	2
Principles of Animal Sciences	3
Animal Science and Industry	1
Principles of Feeding	3
Animal Nutrition	3
Principles of Livestock Selection	3
Elements of Meat Processing	3
Beef Cattle Production	3
Swine Production	3
Sheep Production	3
Animal Breeding	3
Animal Science and Industry Seminar	1

NON-MAJOR COURSES

To be chosen in consultation with adviser.

Students may specialize in animal nutrition, animal breeding and genetics, meat science, or livestock management.

Dairy Production

MAJOR COURSES

Principles of Animal Sciences	3
Dairy Science	1
Fundamentals of Nutrition	3
Genetics	3
Dairy Cattle Nutrition	3
Dairy Cattle Management	3
Genetics Dairy Cattle and Poultry	4
Dairy Cattle Judging	2
Milk Secretion	3
Artificial Breeding of Farm Animals	3
Market Milk & Dairy Inspection	4
Dairy Seminar	1

NON-MAJOR COURSES

To be chosen in consultation with adviser.

Entomology

MAJOR COURSES

General or Economic Entomology	3
External Insect Morphology	3
Taxonomy of Insects I	2
Advanced Applied Entomology I	3
Advanced Applied Entomology II	3
Properties of Insecticides	2

NON-MAJOR COURSES

Biology	8
Chemistry II and Lab.	5
Elementary or General Organic Chemistry	5
Plant Pathology	2
Genetics	3
General Microbiology	4
Trigonometry	3

Students who plan to continue work on the M. S. or Ph. D. in entomology should secure information from the Department on further undergraduate recommendations and requirements.

Pre-Forestry
(2-year)

MAJOR COURSES		NON-MAJOR COURSES	
Forestry Practices	3	General Botany	4
Horticulture Seminar	0	General Zoology	4
Forest Conservation	3	Chemistry II	3
Dendrology	4	Plane Trigonometry	3
		General Physics I	4
		General Geology	3
		Taxonomic Botany	3
		Plane Surveying	3
		Economic Entomology	3
		Soils	4
		Organic Chemistry	3
		Plant Physiology	3

Satisfactory completion of this two-year program, administered by the Department of Horticulture and Forestry, qualifies a student to enter a university offering a professional forestry degree.

Horticulture

MAJOR COURSES		NON-MAJOR COURSES	
Home Horticulture	2	Soils	4
Horticulture Seminar	0	Chemistry II	3
Plant Science	4		
Landscape Horticulture	3		
Principles of Fruit and Nut Growing I	3		
Vegetable Crops I	3		
Principles of Floriculture	3		

Students may specialize in floriculture, fruits, ornamental horticulture, turf management, or vegetables. Additional departmental requirements vary with the option selected.

Plant Pathology

MAJOR COURSES		NON-MAJOR COURSES	
General Botany	4	Soils	4
Plant Science	4	General Zoology	4
Plant Pathology	2	Genetics	3
Botanical Science	3	Chemistry II and Lab.	5
Introductory Mycology	4	General Organic Chemistry	5
		Economic Entomology	3
		Bacteriology	5
		General Physics I	4
		General Plant Biochemistry	4
		Descriptive Meteorology	3

Poultry Science

MAJOR COURSES		NON-MAJOR COURSES
Principles of Animal Science	3	To be developed in consultation with adviser.
Poultry Science	1	
Nutrition of the Fowl	3	
Poultry and Dairy Cattle Genetics	4	
Avian Metabolism	3	
Poultry Products Technology	3	
Poultry Management	3	

Each student in majors listed on the preceding pages will include in his program a group of courses selected to strengthen his abilities for agricultural science, agricultural businesses and industries, or agricultural production. Minimal requirements for each purpose are listed below. Some of these minimal requirements may have been met by courses listed as major or non-major courses on preceding pages.

Pre-Veterinary Medicine*
FRESHMAN

Ag. in Our Society	2	Chemistry II	5
Chemistry I	5	English Comp. II	3
English Comp. I	3	Oral Communication I	2
College Algebra	3	Trig. or El. Stat.	3
Prin. Animal Science	3	A. S. I., Dy. or Poult. Sci.	1
A. S. I., Dy. or Poult. Sci.	1	Economics	3
Physical Education	0	Physical Education	0
	17		17

*These requirements are subject to change as the College of Veterinary Medicine changes its minimum requirements for admission to that College. Pre-veterinary requirements may also be completed in the College of Arts and Sciences (see page 121).

SOPHOMORE

Gen. Org. Chem.	5	Physics	4
Economics I	3	Genetics	3
General Zoology	4	Humanities Elective	3
Humanities Elective	3	Electives	4
A. S. I., Dy. or Poult. Sci.	1	Ag. Journ. or Sci. Rep. Writing	3-2
	16		16-17

Students who satisfactorily complete the Pre-Veterinary Medicine requirements as outlined above and the first two years of the Curriculum in Veterinary Medicine, page 337, will be eligible for a Bachelor of Science degree in the College of Agriculture.

Additional Requirements for Majors Listed on Pages 52-54.*

	Science	*Business and Industries*	*Production*	*Services*
AGRICULTURE Soils 4 Plant Science 4 Animal Sciences 4 Prin. of Agr. Econ. 3 Engg. in Agr. 4	Two of the courses listed (Pl. Path. majors exempt)	Prin. of Agr. Econ. plus second course in Agr. Econ. plus 8 credits in other departments	Two of the courses listed plus 6 credits in animal sciences (except for Hort. majors) and 6 credits in plant sciences	(12 credits) Prin. of Agr. Econ. plus 2 additional courses listed
BIOLOGICAL SCIENCES General Botany 4 General Zoology 4 Genetics 3 General Microbiology 4 Economic Entomology 3 Plant Pathology 2 Ani. Anat., Physiol., or Path. 3	Four of the courses listed (only 2 for Agr. Econ. majors)	6 credits	Four of the courses listed	(8-12 credits) Three of the courses listed
MATHEMATICS AND STATISTICS Elements of Statistics 3 Plane Trigonometry 3 El. Digital Computing Technology 2	3 credits (courses not specified)	3 credits (courses not specified)	6 credits	(3-5 credits)
PHYSICAL SCIENCES Organic Chemistry 3 or 5 General Physics 4 Descriptive Physics 4 General Geology 3 Biochemistry 3 or 5 Quantitative Analysis 4 Chem. Equilibria and Qual. Anal. 4	6 credits (Agr. Econ. may sub. human behavioral sciences)	(3 credits can replace 3 of the 12 credits listed under social sciences)		One of the courses listed
Social Sciences (or human behavioral sciences)	3 credits	9 credits	9 credits	
Acctg. and Bus. Admin.		12 credits		

Gen. Psych.	3
Social Psych.	3
Intro. to Soc.	3
Comm. Org. & Lead.	3
Adm. Process or Adm. Policy	3
Public Finance	3
Agr. Econ. Stat.[1]	3
Ethics or Prof. Ethics	3
Elem. Logic	3
Prin. of Acctg.	3
Methods of Ext. Teaching	3
Persuasion	3
Group Discussion	3

* Except these requirements do not apply to Pre-Forestry nor to Pre-Veterinary Medicine.

1. Elements of Statistics may be substituted.

Approved Humanities Electives for Students Enrolled in the College of Agriculture

HUMANITIES ELECTIVES**

Department of Art	Only courses in appreciation and theory
Department of English	Any, except courses in composition
Department of Philosophy	Any course
Department of Modern Languages	Any course
Department of Music	Any course in theory or appreciation of music
Department of Speech	Any course in theater and interpretation
College of Architecture and Design	Any course in history or appreciation of architecture
Department of History	Only History of Western Civilization, Asian Civilization, History of Christianity, History of Science I or History of Science II

Suggested Communications Courses (beyond English Composition I and II) for Students Enrolled in the College of Agriculture

1. English 200	English Composition III	3 cr.
2. English 406	Advanced Composition	3 cr.
3. English 416	Scientific Report Writing	2 cr.
4. Technical Journalism 350	Agricultural Journalism	3 cr.
5. Courses in Speech and Speech Education, nos. 120 through 677		

** Any course can be used to satisfy the requirement in only one requirement area (humanities, social science, or other area).

Suggested Social Sciences or Human Behavioral Science Courses for Students Enrolled in the College of Agriculture

Economics (above Economics I), sociology, anthropology, history (other than those used above under Humanities), political science, psychology, philosophy, social geography.

Curriculum in Agricultural Education

B. S. in Agriculture

The Curriculum in Agricultural Education is for those who are interested in becoming teachers of vocational agriculture in high schools of Kansas and other states, teachers of agriculture in area vocational schools, or entering other educational work in some branch of the agricultural profession, such as county extension work. Students who complete the curriculum as outlined qualify for a state certificate to teach vocational agriculture in Kansas public schools.

FRESHMAN

First Semester					Second Semester			
		Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Gn. Ag.	035 100	Agr. in Our Society	2	Engl.	229 120	Engl. Comp. II	3
Engl.	229 100	Engl. Comp. I	3	Psych.	273 110	Gen. Psychology	3
Math.	245 100	College Algebra	3	Chem.	217 110	Gen. Chemistry	5
Agron. Hort.	015 040 200	Plant Science	4	Bot.	217 200	Gen. Botany	4
		Elective Agr. Sci.	3	Ph. Ed.	261 011	Physical Education	0
Ph. Ed.	261 011	Physical Education	0			Elective	1
		Elective	1				
Total		.....	16	Total		.....	16

SOPHOMORE

Biochem.	020 120	In. Bi. & Or. Chem.	5	Agron.	015 270	Soils	4
Zool.	293 205	Gen. Zool.	4	Ag. Ec.	010 200	Prin. Agr. Econ.	3
Ag. E.	506 151	Agr. Mech. Prac.	2	Spch.	281 105	Oral Comm. I	2
Educ.	405 202	Educ. Psych. I	3			Elective Agr. Science ..	3
Ec. So.	221 110	Economics I	3	Ag. E.	510 220	Farm Power	3
						Elective	1
Total		.....	17	Total		.....	16

JUNIOR

Educ.	405 400	Educ. Psych. II	3	Educ.	405 201	Prin. Sec. Educ.	3
		Agr. Engg. Elec.	2	Journ.	289 350	Agr. Journalism	3
Engl.	229 090	English Proficiency	0			Elective Agr. Science ..	6
		Literature or Language	3			Agr. Engg. Elective	2
		Elective Agr. Science ..	6			Elec. Social Science	3
		Elective Social Science	3				
Total		.....	17	Total		.....	17

SENIOR

Educ.	405 702	Voc. Educ.	3			Agr. Engg. Elective	2
Educ.	405 500	Meth. Tchg. Agr.	2			Gen. Educ. Elec.	3
Educ.	405 477	Tchg. Partic. Sec. Sch.	6			Elective	1
Ag. E.	510 405	Farm Mech. Meth.	3			Elective—Agr. Science	8
Ag. E.	506 351	Agr. Mach. Op.	2			Lit. or Lang.	3
Total		.....	16	Total		.....	17

Seven weeks during the first or second semester of the senior year are devoted to full-time student teaching. On-campus courses meet extra periods while the student is on campus, so he has no other academic responsibilities while teaching. When student teaching is taken in the spring semester, fall semester courses shown above are moved to spring semester. See page 245, "Admission to Teacher Education" and "Admission to Student Teaching."

Curriculums in Bakery Science and Management, Feed Science and Management and Milling Science and Management

These curriculums have options in (a) Administration, (b) Chemistry and (c) Operations. The freshman year is essentially the same for all curriculums. Students in each curriculum must indicate their option after the first semester of the sophomore year. The Administration options prepare students for careers in sales, purchasing, personnel, and so forth; the Chemistry options train individuals for research or quality control positions; the Operations option provides training in the tech-

nical engineering aspects of the respective industries. The baking, feed manufacturing and grain milling industries provide graduates with unusually fine opportunities for employment and advancement.

Bakery Science and Management

B. S. in Bakery Science and Management

FRESHMAN

First Semester					Second Semester			
			Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Gn. Ag.	035	100	Agr. in Our Society	2	Chem.	221 230	Chemistry II	3
Gr. Sc.	045	100	Prin. of Milling	3	Ec. So.	225 110	Economics I	3
Chem.	221	210	Chemistry I	5	Engl.	229 120	English Comp. II	3
Engl.	229	100	English Comp. I	3	Math.	245 150	Plane Trig.	3
Math.	245	100	College Algebra	3	Ph. Ed.	261 011	Physical Education	0
Ph. Ed.	261	011	Physical Education	0	Spch.	281 105	Oral Comm. I	2
					Arch.	105 207	Arch. Graph. I	2
							or	
					M. E.	560 213	Graphical Comm. I	3
Total				16	Total			16 or 17

SOPHOMORE

Gr. Sc.	045	632	Bakery Des. & Flow	2	Bact.	213 220	Gen. Micro.	4
Bot.	217	121	Biology I	4			Humanities Elec.	6
			Option A, B, or C	10			Option A, B, or C	6
Total				16	Total			16

JUNIOR

Gr. Sc.	045	630	Exp. Baking I	4	Gr. Sc.	045 631	Exp. Baking II	4
Bact.	213	645	Micro. of Foods	4	Gr. Sc.	045 650	Qual. Wheat & Fl.	3
Engl.	229	090	English Prof.	0			Option A, B, or C	10
			Option A, B, or C	8				
Total				16	Total			17

SENIOR

Gr. Sc.	045	633	Bakery Tech.	3	Gr. Sc.	045 651	Food Feed Pl. San.	4
			Soc. Sci. Elec.	3			Option A, B, or C	13
			Option A, B, or C	11				
Total				17	Total			17

OPTION A (Administration)

Biochem.	020	120	Introd. Org. & Biol. Chem.	5	Stat.	285 510	Stat. Qual. Control	3
					B. A.	305 273	Intro. to Accounting	5
Gr. Sc.	045	610	Flour & Feed Anal.	5	B. A.	305 305	Manag. Accounting	3
Chem.	221	250	Chemistry II Lab.	2	B. A.	305 325	Business Law I	3
Ec. So.	225	120	Economics II	3	B. A.	305 326	Business Law II	3
Math.	245	350	Elem. Dig. Comp. Tech.	2	B. A.	305 342	Sales Mgnt.	3
Phys.	265	211	Gen. Physics I	4	B. A.	305 410	Business Finance	3
Stat.	285	320	Elem. of Stat.	3	B. A.	305 440	Marketing	3
							Electives	9

OPTION B (Chemistry)

Biochem.	020	421	Gen. Biochemistry	3	Chem.	221 451	Organic Chem. II Lab.	3
Biochem.	020	422	Gen. Biochemistry Lab.	2	Chem.	221 400	Desc. Phys. Chem.	3
Gr. Sc.	045	610	Flour & Feed Anal.	5	Math.	245 220	Anal. Geom. & Calc. I	4
Gr. Sc.	045	620	Adv. Wheat & Fl. Test.	3	Math.	245 221	Anal. Geom. & Calc. II	4
Chem.	221	271	Chemical Analysis	4	Phys.	265 310	Engg. Physics I	5
Chem.	221	431	Organic Chem. I	3	Phys.	265 311	Engg. Physics II	5
Chem.	221	432	Organic Chem. I Lab.	2			Electives	11
Chem.	221	450	Organic Chem. II	3				

OPTION C (Operations)

Biochem.	020	120	Introd. Org. & Biol. Chem.	5	Ap. M.	510 220	Strength of Matls.	2
					Ap. M.	510 305	Statics	3
Chem.	221	250	Chemistry II Lab.	2	E. E.	530 419	Elec. Cir. & Mach.	4
Math.	245	220	Anal. Geom. & Calc. I	4	I. E.	550 401	Ind. Management	3
Math.	245	221	Anal. Geom. & Calc. II	4	M. E.	560 218	Graphical Comm. II	2
Math.	245	222	Anal. Geom. & Calc. III	4	M. E.	560 400	Elem. Thermodynamics	3
Phys.	265	310	Engg. Physics I	5			Electives	13
Phys.	265	311	Engg. Physics II	5				

Feed Science and Management

B. S. in Feed Science and Management

FRESHMAN

First Semester					Second Semester			
		Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Gn. Ag.	035 100	Agr. in Our Society	2	Chem.	221 230	Chemistry II	3
Gr. Sc.	045 100	Prin. of Milling	3	Engl.	229 120	English Comp. II	3
Chem.	221 210	Chemistry I	5	Math.	245 150	Plane Trig.	3
Engl.	229 100	English Comp. I	3	Ph. Ed.	261 011	Physical Education	0
Math.	245 100	College Algebra	3	Spch.	281 105	Oral Comm. I	2
Ph. Ed.	261 011	Physical Education	0	M. E.	560 213	Graphical Comm. I	3
						or	
				Arch.	105 207	Arch. Graph. I	2
						Option A, B, or C	3
Total			16	Total			16 or 17

SOPHOMORE

Gr. Sc.	045 210	Flow Sheets	2	Dy. Sc.	025 200	Fund. of Nutrition	3
Bot.	213 121	Biology I	4	Bot.	213 122	Biology II	4
Econ.	225 110	Economics I	3			Humanities Elec.	6
		Option A, B, or C	7			Option A, B, or C	3
Total			16	Total			16

JUNIOR

Gr. Sc.	045 410	Feed Tech. I	4	Gr. Sc.	045 660	Qual. Feed Ingred.	3
Engl.	229 090	English Prof.	0			Option A, B, or C	14
		Soc. Sci. Elec.	3				
		Option A, B, or C	10				
Total			17	Total			17

SENIOR

		Option A, B, or C	17	Gr. Sc.	045 651	Food & Feed Pl. San.	4
						Option A, B, or C	13
Total			17	Total			17

OPTION A (Administration)

Ag. Ec.	010 120	Grain Marketing	3	Phys.	265 211	Gen. Physics I	4
Biochem.	020 120	Introd. Org. & Biol.		Phys.	265 212	Gen. Physics II	4
		Chem.	5	Stat.	285 320	Elem. of Stat.	3
Gr. Sc.	045 610	Flour & Feed Anal.	5	Stat.	285 510	Stat. Qual. Control	3
Gr. Sc.	045 680	Feed Tech. II	4	B. A.	305 273	Intro. to Accounting	5
Chem.	221 271	Chemistry II Lab.	2	B. A.	305 305	Manag. Accounting	3
Econ.	225 120	Economics II	3	B. A.	305 325	Business Law I	3
Econ.	225 430	Money & Banking	3	B. A.	305 342	Sales Mgnt.	3
Math.	245 350	Elem. Dig. Comp. Tech.	2	B. A.	305 410	Business Finance	3
						Electives	8

OPTION B (Chemistry)

Biochem.	020 421	Gen. Biochemistry	3	Chem.	221 451	Org. Chem. II Lab.	2
Biochem.	020 422	Gen. Biochem. Lab.	2	Math.	245 220	Anal. Geom. & Calc. I	4
Gr. Sc.	045 610	Flour & Feed Anal.	5	Math.	245 221	Anal. Geom. & Calc. II	4
Chem.	221 271	Chemical Analysis	4	Math.	245 222	Anal. Geom. & Calc. III	4
Chem.	221 400	Desc. Phys. Chem.	3	Phys.	265 310	Engg. Physics I	5
Chem.	221 431	Organic Chem. I	3	Phys.	265 311	Engg. Physics II	5
Chem.	221 432	Organic Chem. I Lab.	2	Stat.	285 520	Stat. Meth. I	3
Chem.	221 450	Organic Chem. II	3			Electives	14

OPTION C (Operations)

Biochem.	020 120	Introd. Org. & Biol.		Math.	245 221	Anal. Geom. & Calc. II	4
		Chem.	5	Math.	245 222	Anal. Geom. & Calc. III	4
Gr. Sc.	045 210	Adv. Flow Sheets	2	Math.	245 240	Ser. & Diff. Equa.	4
Gr. Sc.	045 680	Feed Tech. II	4	Phys.	265 310	Engg. Physics I	5
Gr. Sc.	045 720	Adv. Fl. & Feed Tech.	3	Phys.	265 311	Engg. Physics II	5
Gr. Sc.	045 730	Fl. & Fd. Mill Constr.	3	Ap. M.	510 220	Strength of Matls.	3
Chem.	221 250	Chemistry II Lab.	2	Ap. M.	510 305	Statics	3
Math.	245 220	Anal. Geom. & Calc. I	4	E. E.	530 419	Elec. Cir. & Mach.	4
						Electives	11

Milling Science and Management

B. S. in Milling Science and Management

FRESHMAN

First Semester					Second Semester			
		Course		*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Gn. Ag.	035 100	Agr. in Our Society		2	Chem.	221 230	Chemistry II	3
Gr. Sc.	045 100	Prin. of Milling		3	Engl.	229 120	English Comp. II	3
Chem.	221 210	Chemistry I		5	Math.	245 105	Plane Trig.	3
Engl.	229 100	English Comp. I		3	Ph. Ed.	261 011	Physical Education	0
Math.	245 100	College Algebra		3	Spch.	281 105	Oral Comm. I	2
Ph. Ed.	261 011	Physical Education		0	M. E.	580 213	Graphical Comm. I	3
							or	
					Arch.	105 207	Arch. Graph. I	2
							Option A, B, or C	3
Total				16	Total			16 or 17

SOPHOMORE

Gr. Sc.	045 210	Flow Sheets		2	Gr. Sc.	045 400	Milling Tech. I	4
Bot.	213 121	Biology I		4	Bact.	213 220	Gen. Micro.	4
Ec. So.	225 110	Economics I		3			Humanities Elec.	6
		Option A, B, or C		7			Option A, B, or C	2
Total				16	Total			16

JUNIOR

Agron.	015 260	Mkt. Grad. Cereals		3	Gr. Sc.	045 650	Qual. Wheat & Flour	3
Engl.	229 090	English Prof.		0			Option A, B, or C	14
		Soc. Sci. Elec.		3				
		Option A, B, or C		11				
Total				17	Total			17

SENIOR

Gr. Sc.	045 630	Exp. Baking I		4	Entom.	030 100	Milling Entom.	4
		Option A, B, or C		13			Option A, B, or C	13
Total				17	Total			17

OPTION A (Administration)

Ag. Ec.	010 130	Grain Marketing		3	Phys.	265 211	Gen. Physics I	4
Biochem.	020 120	Introd. Org. & Biol. Chem.		5	Stat.	285 320	Elem. of Stat.	3
					Stat.	285 510	Stat. Qual. Control	3
Gr. Sc.	045 610	Flour & Feed Anal.		5	B. A.	305 273	Intro. to Accounting	5
Chem.	221 230	Chemistry II Lab.		2	B. A.	305 305	Manag. Accounting	3
Econ.	225 120	Economics II		3	B. A.	305 325	Business Law I	3
Econ.	225 430	Money & Banking		3	B. A.	305 342	Sales Mgnt.	3
Math.	245 350	Elem. Dig. Comp. Tech.		2	B. A.	305 410	Business Finance	3
							Electives	13

OPTION B (Chemistry)

Biochem.	020 421	Gen. Biochemistry		3	Chem.	221 450	Organic Chem. II	3
Biochem.	020 422	Gen. Biochemistry Lab.		2	Chem.	221 451	Organic Chem. II Lab.	2
Gr. Sc.	045 610	Flour & Feed Anal.		5	Math.	245 220	Anal. Geom. & Calc. I	4
Gr. Sc.	045 620	Adv. Wheat & Flour Test.		3	Math.	245 221	Anal. Geom. & Calc. II	4
					Phys.	265 310	Engg. Physics I	5
Chem.	221 271	Chemical Analysis		4	Phys.	265 311	Engg. Physics II	5
Chem.	221 400	Desc. Phys. Chem.		3			Electives	15
Chem.	221 431	Organic Chem. I		3				
Chem.	221 432	Organic Chem. I Lab.		2				

OPTION C (Operations)

Biochem.	020 120	Introd. Org. & Biol. Chem.		5	Math.	245 221	Anal. Geom. & Calc. II	4
					Math.	245 222	Anal. Geom. & Calc. III	4
Gr. Sc.	045 210	Adv. Flow Sheets		2	Phys.	265 310	Engg. Physics I	5
Gr. Sc.	045 670	Milling Tech. II		4	Phys.	265 311	Engg. Physics II	5
Gr. Sc.	045 720	Adv. Flour & Feed Tech.		3	Ap. M.	510 220	Strength of Matls.	3
					Ap. M.	510 305	Statics	3
Gr. Sc.	045 730	Fl. & Fd. Mill Constr.		3	E. E.	530 419	Elec. Cir. & Mach.	4
Chem.	221 230	Chemistry II Lab.		2			Electives	12
Math.	245 220	Anal. Geom. & Calc. I		4				

Curriculum in Biochemistry

B. S. in Biochemistry

FRESHMAN*

First Semester					Second Semester			
			Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Chem.	221	210	Chemistry I	3	Chem.	221	230 Chemistry II	3
Chem.	221	211	Chemistry I Lab.	2	Chem.	221	271 Chemical Analysis	4
Math.	245	220	Anal. Geom. & Calc. I	4	Math.	245	221 Anal. Geom. & Calc. II	4
Engl.	229	100	English Comp. I	3	Engl.	229	120 English Comp. II	3
Spch.	281	105	Oral Communication	2	Ph. Ed.	261	011 Physical Education	0
Ph. Ed.	261	011	Physical Education	0				
Biochem.	020	100	Biochem. Orientation	1				
Total				15	Total			14

SOPHOMORE

Math.	245	222	Anal. Geom. & Calc. III	4	Chem.	221	445 Chemical Separations	2
Chem.	221	431	Organic Chem. I	3	Chem.	221	450 Organic Chem. II	3
Chem.	221	432	Organic Chem. I Lab.	2	Chem.	221	451 Organic Chem. II Lab.	2
Phys.	265	310	Engg. Physics I	5	Phys.	265	311 Engg. Physics II	5
Total				14	Total			12

JUNIOR

Chem.	221	585	Physical Chem. I Lec.	3	Chem.	221	595 Physical Chem. II Lec.	3
Biochem.	020	655	Biochem. I	3	Chem.	221	598 Physical Chem. II Lab.	2
Biochem.	020	656	Biochem. I Lab.	2	Biochem.	020	665 Biochem. II	3
Engl.	229	090	English Prof.	0	Biochem.	020	666 Biochem. II Lab.	2
Total				8	Total			10

SENIOR

Modern Language**				3 or 5	Modern Language**			3 or 4
Chem.	221	666	Instrumental Analysis	4				
Stat.	285	520	Statistical Methods I	3				
Total				10	Subtotal			86

Restricted Electives:
- Biology 16
- Social Science 6
- Humanities 6

Nonrestricted Electives: 18

Total hours 132

Sufficient electives should be taken each semester so that the total semester load will be 16-17 hours.

* Students requiring Algebra and Trigonometry must take these courses during the freshman year or during the summer school prior to their freshman year. If students take Algebra and Trigonometry during the fall and spring semester of the freshman year, they must enroll in Physical Chem. I and II lectures during the summer between the junior and senior years if they wish to finish in four (4) years.

** The modern language requirement may be satisfied by a minimum of six hours of one of the following: German, Russian or French.

Curriculum in Dairy Foods Processing

B. S. in Agriculture

FRESHMAN

First Semester					Second Semester			
		Course		*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Gn. Ag.	035 100	Agr. in Our Society		2	Chem.	217 230	Chemistry II Rec.	3
Chem.	217 210	Chemistry I		5	Chem.	217 250	Chemistry II Lab.	2
Engl.	229 100	Engl. Comp. I		3	Ec. So.	225 110	Economics I	3
Math.	245 100	College Algebra		3	Engl.	229 120	Engl. Comp. II	3
Dy. & Pl. Sci.	025 201	Prin. of An. Sci.		2	Math.	245 150	Plane Trigonometry	3
					Spch.	281 105	Oral Communication I	2
Dy. & Pl. Sci.	025 202	Dairy Sci.		2	Ph. Ed.	261 011	Physical Education	0
Ph. Ed.	261 011	Physical Education		0				
Total				17	Total			16

SOPHOMORE

Bact.	213 220	General Microbiology		4	Dy. & Pl. Sci.	025 400	Mkt. Milk & Dy. Insp.	4
Zool.	293 200	General Zoology		4	Bact.	213 615	Dairy Bacteriology	4
Chem.	217 350	Gen. Organic Chem.		3	Bot.	217 200	General Botany	4
Chem.	217 351	Gen. Org. Chem. Lab.		2			Political Science	3
		Elective		3	Dy. & Pl. Sci.	025 220	Dairy Prod. Eval. I	1
Total				16	Total			16

JUNIOR

Dy. & Pl. Sci.	025 681	Dairy Foods Proc. I		2	Dy. & Pl. Sci.	025 683	Dairy Foods Proc. III	2
Dy. & Pl. Sci.	025 510	Dairy Technology		3			Humanities[1]	3
Ag. E.	010 455	Dairy Mechanics		3			Option[2]	8
Phys.	265 211	General Physics I		4			Communications Elec.	3
Engl.	229 090	English Proficiency		0				
		Humanities[1]		3				
		Elective		3				
Total				18	Total			16

SENIOR

Dy. & Pl. Sci.	025 682	Dairy Foods Proc. II		2	Dy. & Pl. Sci.	025 684	Dairy Foods Proc. IV	2
Stat.	285 320	Elements of Statistics		3	Dy. & Pl. Sci.	025 685	Dairy Foods Proc. Lab.	2
		Option		8	Ag. Ec.	010 245	Prin. of Agr. Mktg.	3
		Foods Proc. Elective		3	Dy. & Pl. Sci.	025 500	Dairy Seminar	1
					Dy. & Pl. Sci.	025 695	Dairy Plant Mngt.	2
					Dy. & Pl. Sci.	025 670	Quality Control of Dairy Products	3
							Option	4
Total				16	Total			17

1. See List of Humanities Electives, page 56.
2. At least 16 hours of option to be selected from courses listed below.

ADDITIONAL ELECTIVE COURSES

SCIENCE OPTION

Quantitative Analysis	4	Analytical Geometry & Calculus II	4
Organic Chemistry	5	Microbiology of Foods	5
Biochemistry	5	Sanitary Bacteriology Lab.	2
General Physics II	4	Prin. of Quantitative Microbiology	5
Analytical Geometry & Calculus I	4	Principles of Nutrition	4

ADMINISTRATION OPTION

Economics II	3	Personnel Administration	3
Introductory Accounting	5	Business Finance	3
Business Law I	3	Business Policy	3
Managerial Accounting	3	Administration	3
Sales Management	3	Principles of Accounting	3
Marketing	3	Taxation I	3

FOOD PROCESSING OPTION

Foods II	3	Meat Selection & Utilization H. E.	2
Experimental Baking I	4	Poultry Products Technology	3
Experimental Baking II	4	Meats Processing	1
Quality of Wheat & Flour	3	Dairy Prod. Eval. II	1
Elements of Meats Processing	2		

Curriculum in Natural Resources Conservation and Use

B. S. in Agriculture

This curriculum provides for a balanced program in communications, mathematics, and the basic sciences, with emphasis on biological, physical, and economic aspects of the development, use, and conservation of land, water, and other natural resources. Three options are available: (1) Soil and Water Conservation, (2) Economics of Conservation, and (3) Conservation of Recreation Areas. A College committee administers this curriculum and its members serve as advisers to students. Students should contact the Dean's office to determine their advisers. The following is a suggested schedule of courses.

FRESHMAN

First Semester		Second Semester	
Agri. in Our Society	2	Engl. Comp. II	3
Chemistry I	5	Plane Trig.	3
Engl. Comp. I	3	Oral Com. I	2
Col. Algebra	3	Gen. Botany	4
Am. Govt.	3	Chem. II Rec.	3
Phys. Ed.	0	Option and Electives	1
		Phys. Ed.	0
	16		16

SOPHOMORE

Econ. I	3	Soils	4
Gen. Geology	4	Prin. of Ag. Econ.	3
Plant Science	4	Gen. Zoology	4
Gen. Physics I	4	Option and Electives	6
Option and Electives	2		
	17		17

JUNIOR

Animal Sciences	4	Humanities	3
Gen. Psych.	3	Engl. Prof.	0
Math. or Stat.	3 or 4	Animal or Plant Ecol.	3
Humanities	3	Econ. Ent.	3
Option and Electives	3	Option and Electives	7
	17		16

SENIOR

Pop. & Human. Ecol.	3	Gen. Micro.	4
Econ. Geography	3	Option and Electives	13
Option and Electives	10		
	16		17

OPTION A: SOIL AND WATER CONSERVATION*

Chem. II Lab.	2	Gen. Org. Chem.	5

Select courses from five of the following areas:

Soil Mgnt. and Moist. Cons. or Mgnt. or Irrig. Soils	2 or 3	Soil Physics	3
Soil Dev. and Classif.	3	Calc., Quan. Anal., Physics II, or Hydrology	3 or 4
Soil Fert. or Chem. Prop. Soils	3	Electives	18-20
Range Mgnt. I, Turf Mgnt., or Forest Practice	3		41

OPTION B: ECONOMICS OF CONSERVATION**

Economics II	3	Agricultural Policy	3
Production Econ.	3	Rural Sociology	3
Land Economics	3	Electives	20
Land and Res. Conser.	3		
Farm Management	3		41

OPTION C: CONSERVATION OF RECREATION AREAS***

Gen. Org. Chem.	5	Landscape Design	3
Gen. Physics II	4	Community Recreation	3
Forest Conser.	3	Electives	18
Turf Management	2		
Arboriculture	3		41

* Students enrolling in this option will be advised through the Agronomy Department.

** Students enrolling in this option will be advised through the Agricultural Economics Department.

*** Students enrolling in this option will be advised through the Horticulture and Forestry Department.

TRANSFER STUDENTS

Some students desire to complete one or two years at a junior college or denominational college prior to attending the College of Agriculture.

The 66 semester hours listed below, with exceptions and variations footnoted, can be transferred to the College of Agriculture, and a degree earned in four semesters by capable students with good academic records, who enter the junior or denominational college prior to September 1, 1968, and the College of Agriculture at Kansas State before September 1, 1970.

Course	*Sem. Hrs.*	*Course*	*Sem. Hrs.*
English I & II	6	Economics I	3[2]
Speech	2	General Physics	5
Other written communications, Journalism, etc.	3[1 2]	Humanities	6
College Algebra	3	Social Sciences	6[1]
Trigonometry	3	General Botany	5
Calculus	5	General Zoology	5
Inorganic Chemistry	8	Physiology	3
Organic Chemistry	3	Total	66

1. For Bakery Science and Management, Feed Science and Management, or Milling Science and Management, replace with five hours additional inorganic chemistry (including quantitative analysis), two additional hours of organic chemistry and two hours of Engineering Graphics.

2. For Biochemistry, replace with one semester of quantitative analysis and/or a second semester of Organic Chemistry, Physics, or Calculus. Limited offerings at some junior college may necessitate five semesters at K-State.

A few courses in the College of Agriculture, especially in Dairy Foods Processing and in Horticulture and Forestry, are offered only once a year or once every other year. Students pursuing these majors should visit the K-State campus or correspond with the department to determine whether courses will be offered in the sequence necessary to permit graduation in minimum time, without missing important courses. Also, time conflicts between or among required courses sometimes exist.

Two semesters of physical education taken at a junior college fulfill our non-credit requirement in that field.

AGRICULTURAL BUSINESS

The Agribusiness complex of industries (processing, preservation, distribution, and retailing of farm-produced food, and manufacture and sale of farm-used equipment, feeds, and agricultural chemicals) employs a variety of technically trained personnel in increasing numbers. A farm background may or may not be required. Type of education required ranges from "general business" or accounting to professional and scientific agriculture to biological and physical sciences. Intensity of education needed ranges from the B. S. or B. A. degree to the Ph. D. degree.

Agricultural businesses have expanded in size and number in Kansas. The College of Commerce and College of Agriculture have identified below several programs that will prepare young people for some of the jobs in this vast complex. See page 236 (College of Commerce) and page 50 (College of Agriculture) for details of these programs and degree requirements. Academic years listed are estimates.

1. A B. S. degree in some discipline within the College of Agriculture (see majors and curriculums on p. 49), followed by a Master's degree in Business Administration (see p. 40). 5½ academic years.
2. A B. S. degree in some discipline within the College of Agriculture, followed by a B. S. degree in Business Administration (see p. 236). 5 academic years.
3. A B. S. degree in some discipline within the College of Agriculture, including in the degree program a group of courses in Business Administration (see options and areas of study on page 236). 4 academic years.
4. A B. S. degree in Business Administration, including in the degree program a group of elective courses in some discipline within Agriculture.

5. A B. S. degree in Business Administration, followed by a B. S. or a master's degree in some discipline within Agriculture. 5 or 6 academic years.

To take advantage of one of these programs, a student would enroll in the College of Agriculture or the College of Commerce. His B. S. program would be based on degree requirements listed in the respective College section of the catalog, and would need to be approved by his academic adviser (his department head, in the College of Agriculture) and his dean. If he pursues a second B. S. or a master's degree, he would transfer to the second college following receipt of his first degree.

RETAIL FLORICULTURE

This is a two-year technical program administered by the Department of Horticulture and Forestry. It combines a year of supervised practical training with a full year of University course work in preparation for employment in a retail flower shop. The first year of instruction is at Kansas State University where the course sequence is completed during the fall, spring and summer semesters. The second year, the student serves an apprenticeship at a selected retail florist business. Every effort will be made to select a florist shop in a city of the student's choice. The apprentice will be an employee of the flower shop during this year of training and will receive a salary sufficient to meet normal living expenses.

FALL

Art	209 100	Design I	2	
Engl.	229 100	Engl. Comp. I	3	
Hort.	040 130	Floral Arrangement	3	
Bot.	213 200	General Botany	4	
B. A.	305 343	Sales Communications	3	
			15	

SPRING

Hort.	040 140	Advanced Floral Arrangement	3
Hort.	040 200	Plant Science	4
Spch.	281 105	Oral Comm. I	2
B. A.	305 210	Personal Finance	2
B. A.	305 350	Small Business Operation	3
Hort.	040 150	Home Hort.	2
			16

SUMMER

B. A.	305 273	Prin. of Acctg.	3
C. & T.	611 215	Interior Design Ia	2
L. A.	110 100	General Landscape Design	3
			8

Summary:

Horticulture	12 credits
Business Admin.	11 credits
Art	2 credits
Botany	4 credits
English	3 credits
Speech	2 credits
Clothing and Textiles	2 credits
Landscape Architecture	3 credits
	39

NURSERY AND LANDSCAPE MANAGEMENT

This is a two-year technical program administered by the Department of Horticulture and Forestry. It provides training for young men to serve the growing industry represented by nurseries, garden centers, parks, and similar enterprises. Instruction for three semesters and a summer session in University classes is followed by four months of practical on-the-job training at a selected nursery. The student will be a regular employee of the nursery, receiving valuable experience and a salary sufficient to meet normal living expenses.

FALL

Bot.	213 210	General Botany	4
Hort.	040 260	Plant Materials I	3
Hort.	040 150	Home Horticulture	2
Engl.	229 100	Engl. Comp. I	3
Hort.	040 220	Plant Propagation	3
			15

SUMMER

Chem.	221 210	Chemistry I	5
L. A.	110 100	Landscape Design	3
			8

SPRING

Hort.	040 200	Plant Science	4
Hort.	040 270	Plant Materials II	3
Hort.	040 600	Landscape Hort.	3
Hort.	040 620	Arboriculture	3
Spch.	281 105	Oral Comm. I	2
B. A.	405 101	Fund. of Business	2
			17

FALL

L. A.	110 441	Planting Design	2
Agron.	015 270	Soils	4
Entom.	030 200	Econ. Entomology	3
Pl. Path.	050 400	Plant Pathology	2
B. A.	405 341	Salesmanship	2
		Electives	3
			16

AGRICULTURAL ECONOMICS

(The College of Agriculture section of the Department of Economics; see also College of Arts and Sciences.)

PAUL L. KELLEY,* *Head of Department*

Professors Coolidge, Coppersmith, Kelley,* Manuel,* McCoy,* Montgomery,* Orazem,* Pine,* Regnier, Schruben,* Scoville, Sjo* and Whitehair;* Associate Professors Erickson, Knight,* Koudele,* Richards, Sorenson,* Thomas and Trieb; Assistant Professors Baker, Buller,* Figurski, Frazier, Langemeier, McDonald, McReynolds, Olson, Overley, Schlender, Smythe, Treat, Vacin, Walker and Whipps; Emeritus: Dean Call,* President Farrell,* Dean Howe;* Professors Hodges and Jaccard; Associate Professor Otto**

Undergraduate programs of study in agricultural economics are available in each of four areas: agricultural production, agricultural science, agricultural business and industry, and agricultural services. Also, students may select the Economics of Conservation option of the Curriculum in Natural Resources Conservation and Use, see page 63.

The agricultural production program is designed primarily for students who plan to operate a farm after graduation or to seek a job closely related to farming, e.g., county agricultural agent. The program includes courses in the physical and biological sciences, applied agriculture, and general education, as well as agricultural economics.

The agricultural science program is intended for students who wish to prepare for graduate study or for employment as agricultural economists at the sub-professional level. While including courses in basic physical and biological science, agriculture, and general education, it emphasizes economics, mathematics, and statistics.

The agricultural business and industry program is designed for students seeking a career in the off-farm segment of agriculture, particularly with companies and industries that process or handle farm products or supply farmers with goods and services, including credit. Emphasis is on courses in economics, sociology, and business, with a background of biological and physical science, applied agriculture, and general education.

The Agricultural Services option combines technical agriculture and human relations, thus preparing students to work with rural people. Types of employment would include rural youth programs, international agriculture, poverty programs and administration of many types of rural action programs. Course emphasis is in technical agriculture, human behavior, and communication courses.

Sufficient flexibility is provided in all four programs to permit students, in consultation with faculty advisers, to select courses to fit individual needs.

Inspection trips and information obtained by research are used to supplement textbooks and reference materials for classroom purposes. Opportunity for capable students to assist with research projects on a part-time basis provides students an additional opportunity to learn principles involved in the various areas of agricultural economics.

Graduate study leading to the degrees Master of Science and Doctor of Philosophy is offered in the department. Research for theses may be in marketing, farm management, finance, land economics, conservation, prices, production economics, taxation, agricultural policy, international development, agricultural business and industry and other areas.

Prerequisite to graduate work in agricultural economics is acceptable undergraduate credit in economics, including agricultural economics. Graduate students majoring in agricultural economics take courses in general economics as well as in agricultural economics.

Research projects of the Kansas Agricultural Experiment Station and studies done in cooperation with other states and with federal agencies provide opportunities for graduate students to do research. Facilities available to graduate students include modern electronic computers.

COURSES IN AGRICULTURAL ECONOMICS

FOR UNDERGRADUATE CREDIT

010 130. Grain Marketing. (3) I. Price influences and relationships, buying and selling problems, domestic and export trade; grain trade

organization and regulation. Three hours rec. a week. Pr.: Econ. 110.

010 150. Livestock Marketing. (3) II. A study of factors affecting livestock prices, methods of marketing and market agencies; particular emphasis on use of marketing knowledge by producers in farm and ranch management, and problems of livestock marketing and processing firms. Three hours rec. a week. Pr.: Econ. 110.

010 201. Principles of Agricultural Economics. (3) I, II. A study of economic principles, with emphasis on their application to the solution of agricultural problems. The course treats problems encountered in the operation of farms and agribusiness firms as well as problems of concern to the agricultural industry in its relationship to other sectors of the United States economy and selected foreign countries.

010 221. Farm Management. (3) I, II. Organization and management of the farm, with special emphasis on principles and methods of analyzing factors which affect production and marketing decisions. Three hours rec. a week. Pr.: Econ. 110, Ag. Ec. 201, Math. 100.

010 222. Farm Planning Laboratory. (1) I. A review of accounting methods used in the keeping of farm records, tax regulations and their effect on farm organization and operation, and the use of the budget in farm planning. Two hours lab. a week. Pr.: Ag. Ec. 201.

010 231. Rural Banking. (4) II. Management of banks in rural areas including organization and personnel, sources and uses of funds, credit, and services, particularly to farmers and agricultural businesses; the role of rural banks in the U. S. banking system. Four hours rec. a week. Pr.: Econ. 110 and junior standing.

010 245. Principles of Agricultural Marketing. (3) I. Marketing functions, costs, efficiency; market organization and institutions; consumer behavior; food processing and industries; role of government; agricultural price determination. Pr.: Econ. 110.

010 300. Agricultural Economics Summary. (2) I, II. Summarization and correlation of courses pursued in college; problems requiring application of principles and broad understanding of the field; contemporary economic developments. Two hours rec. a week. Pr.: Senior standing.

010 305. Agricultural Economy of South Asia. (3) II. A descriptive study of the system of food production and the village economy of one fifth of the world's population and the significance of this system to the commercial mechanized agriculture of the industrial nations. Three hours rec. a week. Open to all undergraduates.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

010 401. International Agricultural Development. (3) II. A study of population and agriculture of the world, with emphasis on economic development. Attention is directed toward principles of economic growth and national and international policies that will stimulate development. Individual study is encouraged to meet student interests, i. e., Foreign Agricultural Service, technical assistance, missionary, exchange programs. Three hours rec. a week. Pr.: Econ. 110.

010 410. Agricultural Policy. (3) I. A study dealing with the economic problems of agriculture, with emphasis on the influence of private and governmental policies on such problems. Attention will be directed toward analyzing the effects of different types of private and governmental policies on the agricultural industry. Three hours rec. a week. Pr.: Econ. 110.

010 411. Consumption Economics in Agriculture. (3) I. Explanation of consumer demand and factors affecting consumer purchasing patterns; special emphasis on the relation of producer decisions and market performance to consumer demand. Three hours rec. a week. Pr.: Econ. 110.

010 421. Agricultural Prices and Market Structures. (3) I. Explanation of forces determining prices for agricultural resources and products; special emphasis on marketing methods and their effects upon farm prices and products offered; methods of price analysis. Three hours rec. a week. Pr.: Ag. Ec. 245, 480, or consent of instructor.

010 431. Economic Principles of Agricultural Business Firms. (3) II. A study of the concept of agribusiness and its relationship to the economy as a whole. Particular attention is given to the application of economic principles in the operation of marketing and farm supply firms. Three hours rec. a week. Pr.: Econ. 110 and B. A. 273.

010 441. Agricultural Economics Seminar. Credit arranged. Seminars of special interest will be offered upon sufficient demand in the areas of (a) Farm Management, (b) Marketing, (c) Land Economics, (d) Policy, (e) other selected areas. Pr.: Consent of instructor.

010 450. Land Economics. (3) I. Principles and procedures in acquiring and transferring rights in land resources through ownership, leasing, easements, and other means; social controls over land resources, including regulation, zoning, and taxation; evaluation and marketing of land resources. Three hours rec. a week. Pr.: Econ. 110.

010 451. Agricultural Finance. (3) II. Financial structure of agriculture; capital requirements for efficient operation of farms and agricultural businesses; sources of capital, with particular consideration given to credit, integration, and business organization. Three hours rec. a week. Pr.: Econ. 110.

010 470. Principles of Cooperation. (3) I. History and development of cooperatives, especially farmer marketing and purchasing cooperatives; philosophy, principles, and operating techniques essential for successful cooperatives activity; limitations and possibilities for cooperatives in the agricultural economy. Three hours rec. a week. Pr.: Econ. 110.

010 480. Agricultural Economics Statistics. (3) I. Principles and methods involved in the collection, analysis, interpretation, and presentation of statistical materials, with special reference to agricultural economics data. Three hours rec. a week. Pr.: Econ. 110 and Math. 100.

FOR UNDERGRADUATE AND GRADUATE CREDIT

010 620. Production Economics I. (3) I. Economic theory, under conditions of perfect and imperfect knowledge, applied to production problems; resource and output combinations, costs, firm size, and aggregate aspects of production. Three hours rec. a week. Pr.: Ag. Ec. 201 or consent of instructor.

010 641. Agricultural Economics Seminar. Credit arranged. S. Seminars of special interest will be offered upon sufficient demand in the areas of (a) Farm Management, (b) Agricultural Finance, (c) Marketing, (d) Land Economics, (e) Policy, (f) other selected areas. Pr.: Consent of instructor.

010 650. Agricultural Economics Problems. Credit arranged. I, II, S. Pr.: Consult instructor.

010 670. Land and Resource Conservation. (3) II. Economic evaluation of land use and alternative uses by time periods. The economics of conservation is applied in light of known and probable resource needs, including policy and planning, and the individual and society as associated with the major natural resources of the U. S. Three hours rec. a week. Pr.: Econ. 110 and junior standing.

FOR GRADUATE CREDIT

010 801. Seminar in International Agricultural Development. (3) II. Reading, study, analysis and group discussion of increasing per capita productivity of traditional agriculture, including contribution of education, development of institutions and other actions to advance the welfare of rural people. Pr.: Consent of instructor.

010 811. Seminar in Agricultural Policy. (3) I. An analysis of the re-

lation of government to the economic aspects of farming as individual enterprise and agriculture as an industry, including the international aspects of United States agriculture. Pr.: Consent of instructor.

010 820. Price Analysis. (3) II. Theory and analysis of price determination under alternative structure conditions; empirical investigation of price problems. Pr.: Ag. Ec. 421 or consent of instructor.

010 821. Advanced Farm Management. (3) I. A study of management concepts and their application to the farm business. Emphasis will be upon identification and measurement of the managerial input and the effect of management upon the efficient use of resources. Pr.: Ag. Ec. 221 and 620.

010 822. Seminar in Agricultural Marketing. Credit arranged. Offered on sufficient demand. Analysis of special problems and current developments faced by firms and agencies associated with the marketing process for agricultural products. Pr.: Consent of instructor.

010 823. Production Economics II. (3) II. Economic theories of choice under conditions of imperfect knowledge (i. e., under risk and uncertainty) and the application of these theories to production decisions. Pr.: Ag. Ec. 620 or consent of instructor.

010 829. Seminar in Land Economics. (2) I. Comprehensive analysis of problems dealing with the control and use of public and private land resources. Pr.: Ag. Ec. 450 or consent of instructor.

010 830. Analysis of Agricultural Resource Use. (3) II. Formulation and analysis of static and dynamic problems of agricultural resource use by firms and industries. Pr.: Basic courses in economics and statistics and consent of instructor.

010 831. Agricultural Marketing Management and Analysis. (3) I. Marketing problems of firms that market or process farm products and handle farm supplies, with special emphasis on decision processes with respect to products, distribution, price, and promotion; development of strategies and appraisal of management functions as they relate to marketing; tools of analysis for solving marketing problems. Pr.: Ag. Ec. 245 and B. A. 273 or consent of instructor.

010 832. Agricultural Marketing Organization and Institutions. (3) II. A study of the competitive framework, firm behavior, and economic performance in agricultural product and factor markets, including an analysis of institutional arrangements, legal restraints, and marketing control programs. Pr.: Econ. 710 or consent of instructor.

010 840. Seminar in Agricultural Economics. (3) Offered on sufficient demand. Problems and current developments in agricultural economics. Pr.: Consent of instructor.

010 851. Research in Agricultural Economics. Credit arranged. I, II, S. Research for thesis or master's report.

010 861. Seminar in Economic Research. (3) II. The scientific reasoning underlying the selection of research problems, the formulation and testing of hypotheses, and the evaluation and presentation of results. Pr.: Consent of instructor.

AGRONOMY

R. V. Olson,* *Head of Department*

Professors Bidwell, Bieberly,* Ellis,* Heyne,* Hobbs,* Jacobs,* Olson* and Pittenger;* Associate Professors Atkinson, Barnett,* Feltner,* Mader,* Russ,* Sloan, Wassom,* Wilkinson* and Withee;* Assistant Professors Casady,* Edelblute, Harper, Hyde,* Liang,* Lundquist, Moore, Murphy,* Nickell, Nilson, Overley, Paulsen,* Powers,* Raney, Skidmore,* Sorensen,* Swallow, Tobin, Vanderlip,* Walter, Whitney, Wilkins and Woodruff; Instructors Axelton, Burchett, Dickerson, Gronau, Lyles and Owensby; Emeritus: Professors Anderson,* Clapp, Cleavinger, Laude,* Lind and Zahnley**

Agronomy is a science of many aspects and attracts students with interests ranging from practical soil management to the physics and

chemistry of soils and from practical crop production to the study of photosynthesis, crop physiology and genetics. Undergraduate programs of study in agronomy are available in each of four broad areas: Agricultural science, including crop science, soil science and range management; agricultural production; agricultural services; and agricultural business and industry. Flexibility in programs of study are maintained in order to meet individual needs. In addition, personal attention is given to each student through the department advisory system and through the undergraduate Wheat State Agronomy Club. There is a demand for agronomists in research, industry, and both public and private service.

The agricultural production program is designed for the student who wishes to farm, enter county agent work, or for other areas which require a broad knowledge of agriculture, especially crops and soils. Courses in the physical, biological and agricultural sciences are emphasized but attention is also given to general education and human behavioral sciences.

The agricultural science program is intended for students preparing for graduate study or for employment as agronomists in the many specialized fields associated with crops, soils or range management. Students in these programs of study receive broad training in the physical and biological sciences but courses in agriculture, general education and mathematics are used to meet individual requirements and desires.

The agricultural business and industry program is designed for students seeking a career with the many agriculturally related businesses and industries. Emphasis is given to agriculture and business courses but the physical, biological and social sciences are used freely to round out the student's background.

The agricultural services program is designed for students who wish to work with agriculturally related programs in both the farm and nonfarm segments of our society including programs in business, education, recreation or government. The student receives broad training in both the social and biological sciences. Supporting courses are chosen from agriculture, the physical sciences, general education and communications.

The farms used by the Department of Agronomy comprise 460 acres of medium-rolling upland soil, and 200 acres of irrigated bottom land. The general fields and experimental plots, used for the breeding and testing of farm crops and for conducting experiments in soil fertility and methods of culture, afford the student opportunity for study and investigation.

Laboratories for soil and crop work are maintained for the regular use of students. Material is provided for the study of the grain and forage crops best adapted to different purposes and most suitable for growing in the state. Greenhouse space is provided for problem and research work in crops and soils.

Major work leading to the degrees Master of Science and Doctor of Philosophy is offered in the fields of crop production, crop physiology, crop ecology, pasture improvement, plant breeding, weed control, plant genetics, soil chemistry, soil fertility, soil physics, dry-land farming, soil management, irrigation, soil classification, and dynamics of wind erosion.

Prerequisite to major work in these fields is the completion of an undergraduate curriculum in general agriculture, or in science for students having an agricultural background and some agricultural training. Students who have not had training in the following fields will be required to enroll in the appropriate undergraduate courses before completing an advanced degree: Farm Crops, Soil Science, Inorganic Chemistry, Organic Chemistry, College Algebra, General Botany, Entomology, College Physics and Trigonometry.

FOR UNDERGRADUATE CREDIT

015 200. Plant Science. (4) I, II. Study of the principles of the production of economic plants, including morphology, taxonomy, physiology,

ecology, propagation, preservation, storage, and utilization. Three hours lec. and one two-hour lab. a week. Taught in cooperation with the Department of Horticulture and Forestry.

015 201. Crop Production. (4) I, II. Study of the fundamental principles of production management, identification, and grading of the major cereal, forage, oil, and miscellaneous crops. Three lectures and one three-hour lab. a week. Pr.: Agron. 200.

015 230. Grain Grading and Seed Analysis. (2) II. Application of the federal standards for grading farm crops and judging of grains and other crop products. Six hours lab. a week. Pr.: Agron. 200.

015 240. Forage Crops. (3) I. Adaptation, distribution, production, and utilization of forage crops; studies of species and types of principal forage crops. Two hours rec. and three hours lab. a week. Pr.: Agron. 200.

015 250. Grain and Seed Technology. (2) I. Commercial grading and judging of field crops and identification of principal types and varieties. Six hours lab. a week. Pr.: Agron. 230.

015 260. Market Grading of Cereals. (3) I. Market grades of cereals and factors that influence them. One hour rec. and six hours lab. a week. Pr.: Millg. 100.

015 270. Soils. (4) I, II. Fundamental principles underlying the formation, fertility, and management of soils. Three hours rec. and two hours lab. a week. Pr.: Chem. 210.

015 300. Soil Management and Moisture Conservation. (3) I, II. Principles and practices of soil and water management suited to semi-arid, sub-humid and humid areas. Three hours rec. a week. Pr.: Agron. 270.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

015 400. Development and Classification of Soils. (3) II. Influence of soil-forming agencies on soil characteristics and methods of classifying and mapping soils; field trips. Two hours rec. and three hours lab. a week. Pr.: Gl. Gg. 100, Agron. 270, or consent of instructor.

015 401. Microclimatology. (3) I. A description of climatological conditions near the ground and their applications to the biological sciences. Pr.: Math. 100, Phys. 211. (Joint listing with the Department of Physics. See 264 401.)

015 410. Range Management I. (3) II. Establishment, management, and utilization of tame and native pastures. Three hours rec. a week. Pr.: Agron. 200.

FOR UNDERGRADUATE AND GRADUATE CREDIT

015 600. Crop Problems. Credit arranged. I, II, S. Pr.: Dependent on problem. Studies may be chosen in the fields of:

Genetics, Crop Improvement, Pasture Improvement, Ecology, Weed Control, Plant Physiology, Production.

015 611. Crop Improvement. (2) I. Methods of pure seed production and breeding of agricultural crops. Two hours rec. a week. Pr.: Agron. 200, A. H. 400.

015 620. Weed Science. (3) I. Principles of weeds and herbicides relating to managerial and chemical weed control. Two hours rec. and one three-hour lab. a week. Pr.: Agron. 200, Chem. 190 or equiv.

015 621. Range Management Problems. Credit arranged. I, II, S. Prerequisite depends on the problem assigned.

015 630. Soil Problems. Credit arranged. I, II, S. Prerequisite depends on the problem assigned. Studies may be chosen in the fields of:

Chemistry, Physics, Conservation, Fertility, Development and Classification.

015 640. Chemical Properties of Soils. (3) I. A study of soils as a chemical and colloidal system, including their chemical and mineralogical

composition and reactions occurring in them. Three hours rec. a week. Pr.: Agron. 270, Gl. Gg. 100.

015 650. Soil Fertility. (3) I. A study of the relationship of soil chemistry to plant nutrition; forms of the essential elements in soils and the roles of these elements in plant nutrition; basic concepts of fertilizer application and manufacturing. Three hours rec. a week. Pr.: Agron. 200, 270.

015 660. Soil Physics. (3) II. A study of the physical properties of soils, including soil moisture, texture, structure, aeration, temperature, and properties of disperse systems. Two hours rec. and three hours lab. a week. Pr.: Agron. 270, Math. 100, Phys. 211.

015 665. Advanced Microclimatology. (3) I. Offered 1968-69 and alt. years thereafter. An advanced course in the theory of solar and thermal radiation, heat budgets, and turbulent transfer processes at the earth-atmosphere interface near the growing crop. Pr.: Phys. 212, Math. 222, Agron. 401 or consent of instructor.

015 670. Soil Analysis Application. (3) I. Offered 1969-70 and alt. years thereafter. Theories and procedures for the chemical analysis of soils. Applications of analysis in soil fertility evaluations and in research work are discussed. One hour rec. and six hours lab. a week. Pr.: Agron. 270, Chem. 300 or 444.

015 680. Field Course in Range Management. (2) S. A summer field and lecture course dealing with the principles of range ecology as applied to range management practices; emphasis on field techniques for range plant identification and mensuration, range site evaluation, range condition classification, plant succession, and the impact of various range management practices. Two weeks field course given jointly by Kansas State University and Fort Hays Kansas State College. Pr.: Agron. 410, Bot. 670 and 690 or 730. Suitable field experience may be substituted for these prerequisites with consent of instructor.

015 690. Plant Genetics. (3) I. An advanced course dealing with genetic principles. Three hours rec. a week. Pr.: A. H. 400.

015 700. Crop Ecology. (3) II. Study of crop plant growth with relation to genetic, climatic, biotic and soil factors, with special emphasis on the interdependency of these factors. Pr.: Agron. 200, 270 or consent of instructor.

015 701. Crop Physiology. (3) II. Principles of nitrogen metabolism, mineral nutrition, photosynthesis, gross substances, and hardiness applied to crop production. Two hours rec. and two hours lab. a week. Pr.: Bot. 600.

015 711. Identification of Range and Pasture Plants. (2) II. Offered 1969-70 and alt. years. Field and laboratory study of range and pasture plants, with special emphasis on grasses and their distinguishing characteristics. One hour rec. and two hours lab. a week. Pr.: Bot. 210.

015 720. Management of Irrigated Soils. (2) II. Principles of soil moisture retention, movement and measurement; reclamation and management of saline and alkali soils; water quality; management. Two hours rec. a week. Pr.: Agron. 200, 270.

015 730. Chemical Fertilizers. (3) II. A study of the processes involved in the formulation of chemical fertilizers, the physical and chemical properties of various fertilizer materials and the technology of fertilizer use. Three hours rec. a week plus a field trip to inspect fertilizer manufacturing facilities. Pr.: Agron. 200, 270.

015 740. Range Management II. (3) II. Offered 1969-70 and alt. years thereafter. Application of principles of plant ecology to management and conservation of natural grazing land and to the characterization and mensuration of range vegetation, with special emphasis on ranges. Two hours rec. a week and one credit of laboratory consisting of field trips to representative range areas. Pr.: Agron. 410, Bot. 670, and

one of the following (which may be taken conc.): Agron. 710, Bot. 690, 730.

015 750. Soil Erosion and Its Control. (3) I. Offered 1968-69 and alt. years thereafter. Mechanics of wind and water erosion, methods of predicting quantities of erosion, principles and practices for erosion control. Three hours rec. a week and one field trip. Pr.: Agron. 270, Phys. 211, or consent of instructor.

015 751. Soil Erosion Laboratory. (1) I. Offered 1968-69 and alt. years thereafter. Three hours lab. a week and one field trip. Pr.: Agron. 270, 750, or conc. enrollment.

FOR GRADUATE CREDIT

015 800. Methods of Plant Breeding. (3) II. Offered 1969-70 and alt. years thereafter. The application of principles and methods of breeding field crops, including laboratory, greenhouse, and field procedures. Two hours rec. and three hours lab. a week. Pr.: Agron. 200, A. S. I. 400, Pl. Path. 605.

015 810. Agronomy Seminar. (1) I. II. A discussion of agronomic developments. Pr.: Graduate standing.

015 820. Research in Crops. Credit arranged. I, II, S. Special problems which may extend through the year and furnish data for a master's or doctor's thesis. Pr.: Consult instructor.

015 825. Research in Genetics. Credit arranged. I, II, S. Special problems which may extend throughout the year and furnish data for a master's or doctor's thesis. Pr.: Consent of instructor.

015 830. Topics in Plant Breeding. Credit arranged. I, II, S. Discussion and lectures on important papers and contribntions in this field. Pr.: Consent of instructor.

015 840. Advanced Crop Ecology. (3) I. Offered 1968-69 and alt. years thereafter. Principles of growth and development of crops in relation to the environment. Three hours rec. a week. Pr.: Agron. 700, or equiv., and Bot. 600.

015 850. Topics in Plant Genetics. Credit arranged. I, II, S. Discussion and lectures on important papers and contributions in this field. Pr.: Consent of instructor.

015 860. Advanced Forage Crops. (3) I. Offered 1969-70 and alt. years thereafter. Important forage crop species are studied throughout current literature with regard to growth characteristics, utilization, and breeding procedures. Three hours rec. a week. Pr.: Agron. 240.

015 880. Research in Soils. Credit arranged. I, II, S. Special problems which may extend throughout the year and furnish data for a master's or doctor's thesis. Pr.: Consult instructor.

015 890. Soil Physical Chemistry. (3) I. Offered 1968-69 and alt. years thereafter. Application of physical chemistry to soils; cation and anion equilibria, cation activities, electrokinetics, sorption and other physicochemical reactions in soils. Two hours rec. and three hours lab. a week. Pr.: Agron. 640, 660, Chem. 585.

015 900. Advanced Soil Physics. (3) I. Offered 1969-70 and alt. years thereafter. An advanced study of prominent theories concerning the physical behavior of soils. Two hours rec. and three hours lab. a week. Pr.: Agron. 660, Math. 222, Phys. 211.

015 920. Soil Genesis. (2) II. Offered 1968-69 and alt. years thereafter. Theories of soil formation processes. Two hours rec. a week. Pr.: Agron. 400.

015 930. Developmental Genetics. (3) II. Offered 1968-69 and alt. years thereafter. Introduction to the relationships between genetic and biochemical systems, with emphasis on the "nature of the gene." Three hours lec. a week. Pr.: Agron. 690 or consent of instructor.

Genetics Seminar. (See A. S. I. 630.)

ANIMAL SCIENCE AND INDUSTRY

DON L. GOOD,* *Head of Department*

Professors Cox, Good,* Koch,* Moyer, Richardson* and E. Smith;* Associate Professors Drake,* Francis, Harbers,* Kropf,* Menzies,* W. Smith,* Tuma* and Wheat;* Assistant Professors Allen,* Brent,* Hines,* Kiracofe,* McAdams, McCormick (Temporary), McKee,* Phar, Schalles,* Westmeyer and Zoellner; Instructors Ahlschwede and Hoover; Emeritus: Professors Aicher, Aubel and Mackintosh*

The courses in the Department of Animal Science and Industry give the student special undergraduate instruction in the selection, breeding, feeding, management, and marketing of all classes of meat animals.

The animal science and industry farm and pastures consist of approximately 4,000 acres of land which are devoted to the maintenance of herds and flocks of purebred cattle, sheep, hogs, and horses, and to experimental projects with meat animals. All animals maintained by the department are used for class work.

The laboratory of the animal science and industry student is the feed lot, the judging pavilion, and the abattoir (as well as the animal nutrition laboratory, the wool laboratory, the meats laboratory, and the genetics and animal breeding laboratory), where the animal can be studied from the standpoint of maintenance, growth, reproduction, structure and body composition.

FOR UNDERGRADUATE CREDIT

005 101. Basic Animal Science and Industry. (2) I, II. A study of the field of animal science and industry, with special emphasis on the importance of livestock as a major phase of agriculture. Two hours rec. a week. Students cannot apply credit for both A. S. I. 101 and A. S. I. 102 or Dy. and Pl. Sc. 102 toward a B. S. degree.

005 102. Principles of Animal Science. (3) I, II. Basic principles which apply to the broad field of animal agriculture; survey of the industry; types, purposes and products of livestock; principles of breeding, selection, nutrition, lactation, reproduction, management and marketing. Three hours lec. a week. Taught in cooperation with the Departments of Dairy and Poultry Science and Animal Science and Industry (A. S. I. 103, Dy. Sc. 103, and Pl. Sc. 104 are companion courses in the respective departments. Students cannot apply credit for both A. S. I. 101 and A. S. I. 102 or Dy. and Pl. Sc. 102 toward a B. S. degree).

005 103. Animal Science and Industry. (1) I, II. A study of market types and classes of livestock, with emphasis on live animal and carcass evaluation. Two hours lab. a week. Pr.: A. S. I. 101 or 102 or consent of instructor.

005 205. Principles of Livestock Selection. (3) I. Origin, development, characteristics, and adaptation of different breeds of livestock, with special emphasis on the selection of breeding animals. One hour rec. and four hours lab. a week. Pr.: A. S. I. 101 and 111, or 200 and junior standing.

005 210. Judging Farm Animals. (2) II. Advanced evaluation of beef cattle, sheep, swine, and horses. Four hours lab. a week. Pr.: A. S. I. 205 or consent of instructor.

005 220. Form and Function in Livestock. (2) I. A detailed study of animal form and type; influence of type upon function; special training in presenting orally the relative merits of animals of all breeds. Four hours lab. a week. Pr.: A. S. I. 210.

005 230. Principles of Feeding. (3) I, II. The digestive system and processes of nutrition; origin, chemical analysis, and feeding values of different feeds; nutritive requirements for maintenance, growth, and production of farm animals. Three hours rec. a week. Pr.: Chem. 190 or equiv.

005 240. Livestock Feeding. (3) I. A résumé of digestion and nutrition dealing primarily with practical feeding. Open only to students in the

Curriculum in Veterinary Medicine. Three hours rec. a week. Pr.: Chem. 350, Physi. 635.

005 250. Elements of Meat Processing. (2) I, II. Meat consumption, principles of processing, curing, and freezing. Two hours lec. and rec. a week. Pr.: A. S. I. 101 and 111 or 200.

005 260. Meat Processing. (1) I, II. Killing, dressing, cutting, packaging, and freezing meat and meat products; field trip. Three hours lab. a week. Pr.: A. S. I. 101 and 111 or 200; 250 or conc. assignment.

005 270. Principles of Meat Evaluation. (2) I. Introduction to the subjective and objective standards employed in evaluating beef, veal, lamb, and pork carcasses, and also wholesale cuts. Application of these factors to carcass grade, and yield of edible portion; value and consumer acceptance. One hour lec. and three hours lab. a week. Pr.: A. S. I. 250, 260, or conc. enrollment, and at least sophomore classification.

005 280. Meat Selection and Utilization, H. E. (2) I. For students in home economics. Selection of meats and cutting meats, carcass grading, prepared meats and meat products, frozen meats and meat preparation. One hour lec. and three hours lab. a week.

005 290. Beef Cattle Production. (3) I, II. Three hours rec. a week. Pr.: A. S. I. 230.

005 300. Swine Production. (3) I, II. Three hours rec. a week. Pr.: A. S. I. 230.

005 310. Sheep Production. (3) I. Three hours rec. a week. Pr.: A. S. I. 230.

005 320. Horse Production. (2) I. Two hours rec. a week. Pr.: A. S. I. 230.

005 330. Livestock Production. (3) Offered on demand. Open only to juniors and seniors not majoring in animal science and industry. Practical insight into the production of beef cattle, horses, swine, and sheep. Three hours rec. a week. Pr.: A. S. I. 230.

005 340. Animal Science and Industry Practicums. (2) II. Open only to students majoring in animal science and industry and to students pursuing the Curriculum in Agricultural Education. Manual phases of livestock management. Four hours lab. a week.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

005 400. Genetics. (3) I, II, S. Variation, Mendelian inheritance, and related subjects. Three hours lec. a week. Pr.: Zool. 200 or Bot. 200.

005 410. Animal Breeding. (3) II. Physiology of reproduction; present status of livestock improvement; function of purebred livestock; breeding systems and practices; application of principles of genetics to problems of animal breeding. Three hours rec. a week. Pr.: A. S. I. 400.

005 430. Wool Grading and Classification. (1) I. A study of the factors determining the commercial classes and grades of wool and the desired fleece qualities of the various breeds of sheep; practice in judging, grading and scoring wool. Three hours lab. a week. Pr.: Conc. with or subseq. to A. S. I. 310.

005 440. Advanced Wool Grading and Classification. (1) I. Advanced work in the grading and classification of commercial and purebred fleeces, with particular emphasis on the grading procedures used by commercial wool marketing agencies. Laboratory exercises designed to acquaint the student with the physical properties of wool as they may affect its grading and classification. Three hours lab. a week. Pr.: A. S. I. 310, 430.

005 450. Classification, Grading and Selection of Meats. (1) I. Identification and judging of carcasses and wholesale cuts of beef, lamb, and pork. Application of grade standards to beef, lamb, and pork carcasses. Three hours lab. a week. Pr.: A. S. I. 250, 260.

005 480. Animal Science and Industry Seminar. (1) II. Open only to senior and graduate students majoring in animal science and industry. One hour rec. a week. Pr.: A. S. I. 230.

FOR UNDERGRADUATE AND GRADUATE CREDIT

005 600. Animal Nutrition. (3) I. Study of the nutrients, their function and requirements for livestock, with special attention to recent discoveries in the field of animal nutrition. Pr.: A. S. I. 230.

005 610. Population Genetics. (3) II. Application of genetic principles to livestock improvement; selection methods, mating systems, heritability estimates. Three hours rec. a week. Pr.: A. S. I. 400.

005 620. Population Genetics Laboratory. (1) II. Compilation and analyzing of genetic data. Three hours lab. a week. Pr.: A. S. I. 610 or conc. enrollment.

005 630. Genetics Seminar. (1) I. Study and criticism of genetic experiments with animals and plants and of the biological and mathematical methods employed. One hour rec. a week. Pr.: A. S. I. 400 or Zool. 645.

005 650. Animal Science and Industry Literature. (1) I, II. Preparation of abstracts and reports from scientific journals on current research in the field of animal husbandry. Pr.: Graduate standing or permission of instructor. Students may re-enroll in subsequent semesters for a total of two hours credit.

005 660. Animal Science and Industry Problems. Credit arranged. I, II, S. Pr.: A. S. I. 230 and other courses; consult instructor. Work offered in:

Animal Breeding, Animal Nutrition, Beef Cattle Production, Horse Production, Livestock Evaluation, Meats, Sheep Production, Swine Production.

005 670. Institutional Meats. (2) Spring semester, 1966-67, and alt. years. Particular attention to grades, brands, wholesale cuts, institutional cuts, fabricated meats, serving portions, shrinkage and variety meats; emphasis given to costs and prices as related to menus; field trip required. One hour rec. and three hours lab. a week. Pr.: A. S. I. 280 and junior standing.

005 676. Meat Technology. (3) II. Muscle and bone anatomy, growth, meat composition and nutritive value, meat processing techniques, microbiology and sanitation, food additives, meat color, packaging and quality control. Two hours lec. and three hours lab. a week. Pr.: A. S. I. 250 and 260 or consent of instructor; senior or graduate standing.

005 690. Meat-Packing Plant Operation. (2 to 6) S. A minimum of four weeks of supervised study, for each two hours credit, in a commercial meat-packing plant.

005 710. American Livestock and Meat Industries. (3) I, II, S. A study of the industries, their evalutionary progress leading to current organization and economic structure and future developments; reports on individually assigned selected readings. Pr.: A. S. I. 101, 230, 250, senior or graduate standing.

FOR GRADUATE CREDIT

005 800. The Wool Industry. (3) II. Supply and demand, production, marketing, manufacturing. Two hours rec. and three hours lab. a week. Pr.: A. S. I. 310.

005 805. Animal Breeding Seminar. (1) II. Evaluation of animal experimentation as related to reproduction and breeding.

005 825. Advanced Meat Animal Production. (2) S. Continued study of an advanced nature of the fundamentals and practices of beef cattle production, sheep production, and swine production. Maximum of six hours may be applied toward a degree. Pr.: Consent of instructor.

005 830. Advanced Meat Science. (2) II. Offered on sufficient demand. Basic biochemical, physiological, and histological properties of muscle

and related tissues; muscle contraction, rigor mortis and muscle hydration; maturation; processing by thermal, dehydration and cold sterilization techniques; meat flavor chemistry; meat research techniques. Two hours rec. a week. Pr.: A. S. I. 250 and 260, Biochem. 420 or consent of instructor.

005 835. Research Techniques in Reproduction. (3) II. Study of experimental techniques employed in animal reproductive research, with emphasis on current literature. Included will be essays of hormones, ovariectomy, parabiosis, hypothysectomy, vasectomy, superovulation and ova transplantation. Pr.: Background in both anatomy and physiology or consent of instructor.

005 840. Research in Animal Science and Industry. Credit arranged. I, II, S. Special problems in genetics and in the production of all kinds of livestock except dairy cattle. Pr.: Consult instructor.

005 850. Analytical Techniques in Animal Science and Industry. (3) I. Principles of analytical procedures used in animal science and industry. One hour rec. and six hours lab. a week. Pr.: Consent of instructor.

005 890. Graduate Seminar in Animal Science and Industry. (1) I, II. Discussion of technical problems and investigations in animal science and industry. Attendance required of all graduate students in animal science and industry. Maximum of two hours may be applied toward a degree.

BIOCHEMISTRY

HOWARD L. MITCHELL,* *Head of Department*

Professors Burkhard, Clegg,* Mitchell* and Parrish;* Associate Professors Nordin* and Ruliffson;* Assistant Professors Cunningham,* Hedgcoth* and Klopfenstein;* Emeritus: Professor Whitnah*

Biochemistry is a study of the most intricate of all chemical systems—the chemistry of living matter. It attempts to decipher the chemical nature of protoplasm, the basic material of all living matter, and the principles of metabolism. There are two broad divisions of biochemistry, plant biochemistry and animal biochemistry, though they have much in common.

Biochemistry as a profession offers many opportunities in teaching, research, industry, and public service. Biochemistry also is excellent preparaton for other areas of basic and applied science, for work in many of these fields depends on biochemical knowledge and methods. Employment in the biochemistry research laboratories while one is an undergraduate offers unusual opportunities to become acquainted with and gain experience in various aspects of biological and agricultural chemistry.

The Department of Biochemistry offers work leading to the degrees Bachelor of Science, Master of Science and Doctor of Philosophy, with a major in biochemistry, and minor or supporting work for majors in other departments. The department participates in interdepartmental programs in animal nutrition leading to the Doctor of Philosophy degree (see Animal Nutrition, page 79) and in Food Science leading to Master of Science and Doctor of Philosophy degrees (see Food Science, page 331).

The graduate program in the Department of Biochemistry is designed to develop scientists with a strong background in chemistry capable of doing independent biochemical research and qualified to train others in biochemistry. To accomplish these objectives, the Department of Biochemistry has many well-equipped laboratories, instruments, animal rooms, and auxiliary facilities for investigations in biochemistry. The department offers a wide range of courses in various areas of biochemistry and nutrition. There is excellent interdepartmental cooperation in graduate programs and research in basic sciences and agriculture.

Students with high scholastic standards and sound training in chem-

istry are well fitted for graduate study in biochemistry. To undertake major graduate work, one should complete a four-year curriculum at an accredited college or university that includes one year each of inorganic, analytical, organic, and physical chemistry, calculus, physics, and at least a semester of biological science, including a laboratory. If preparation of the entering graduate student is incomplete, additional training in deficient areas should be obtained before undertaking a full graduate schedule. Entering students take evaluation examinations in analytical, organic, physical chemistry and biochemistry, provided these courses were taken prior to admission. Results of these examinations are used in program planning.

COURSES IN BIOCHEMISTRY

FOR UNDERGRADUATE CREDIT

020 099. Biochemistry Seminar. (0) I, II. Lectures, discussions, and activities of biochemical interest.

020 100. Biochemistry Orientation. (1) I. Discussion of biochemistry as a discipline in the life sciences.

020 120. Introductory Organic and Biological Chemistry. (5) II. For students in home economics, nursing, and other areas desiring an integrated organic and biochemistry course to provide an understanding of carbohydrates, proteins, lipids and of digestive and metabolic systems. Three hours lec. and six hours lab. a week. Pr.: Chem. 110.

020 200. Elementary Biochemistry. (5) II. An elementary treatment of the chemistry and metabolism of carbohydrates, lipids, proteins and nucleic acids. Pr.: Chem. 191.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

020 410. General Plant Biochemistry. (4) I. Occurrence, properties, functions and metabolism of the organic compounds of plants. Three hours lec. and three hours lab. a week. Pr.: Chem. 190 or 350.

020 421. General Biochemistry. (3) I, II, S. A basic study of the chemistry and metabolism of carbohydrates, lipids, proteins and nucleic acids, but at a more advanced level than Biochem. 200. Pr.: Chem. 351.

020 422. General Biochemistry Laboratory. (2) I, II, S. Basic laboratory course to accompany Biochem. 421. Six hours lab. a week. Pr.: Quantitative chemical analysis and Biochem. 421 or conc. enrollment.

FOR UNDERGRADUATE AND GRADUATE CREDIT

020 655. Biochemistry I. (3) I. An introduction to carbohydrates, lipids, proteins and nucleic acids, physical biochemistry, enzymes and biological oxidations, glycolysis and Krebs cycle and related topics. Biochem. 655 and 665 are intended as basic courses for biochemistry majors, minors, and those interested in an intensive course covering the biochemistry of cellular constituents and their metabolic interrelations. Pr.:* Quantitative analysis, one year of organic chemistry, differential and integral calculus.

020 656. Biochemistry I Laboratory. (2) I. Basic laboratory course to accompany Biochemistry I. Six hours lab. a week. Pr.:* Biochem. 655 or conc. enrollment.

020 665. Biochemistry II. (3) II. A cont. of Biochemistry I. Additional carbohydrate metabolic schemes; lipid, amino acid, protein and nucleic acid metabolism; hormone and regulatory mechanisms; physiological and comparative aspects of biochemistry. Pr.:* Biochem. 655.

020 666. Biochemistry II Laboratory. (2) II. Basic laboratory course to accompany Biochemistry II. Six hours lab. a week. Pr.:* Biochem. 656 and 665 or conc. enrollment.

020 670. Principles of Animal Nutrition. (3) II. The nutrients, nutrient requirements, functions and utilization of nutrients; nutrient balances;

*Non-majors lacking these prerequisites should obtain consent of instructor before enrollment.

methods for animal nutrition studies and evaluation of feeds. Pr.:* Biochem. 655 and 656.

020 680. Biochemistry of Toxic Materials. (2) I. Offered 1969-70 and alt. years. The chemistry of drugs, antimetabolites, metals and agricultural chemicals; their absorption, distribution, mode of action and effect on biochemical systems, metabolism and detoxication. Pr.:* Biochem. 665.

020 690. Lipids. (2) II. Offered 1969-70 and alt. years. Chemistry of plant and animal lipids, their occurrence, metabolism and industrial uses. Pr.:* Biochem. 665.

020 705. Vitamins. (2) II. Offered 1969-70 and alt. years or on demand. A survey of the avitaminoses, chemical properties, biochemical roles, metabolic pathways and methods of assay of the vitamins. Pr.:* Biochem. 665.

020 706. Animal Nutrition Techniques. (2) II. Laboratory investigations on vitamins, amino acids, minerals and energy. Practical experience in laboratory animal care, diet preparation, data collection and analysis. Pr.:* Biochem. 655 and 656.

020 710. Intermediary Metabolism. (3) II; S on sufficient demand. Metabolic role of carbohydrates, lipids, proteins and amino acids, purines, pyrimidines, vitamins, minerals and hormones; biological oxidations; mechanisms of energy production and utilization. Pr.:* Biochem. 656 and 665.

020 715. Nucleic Acids. (2) II. Chemistry, function, metabolism, and biological roles of nucleic acids, purines, pyrimidines, nucleosides, nucleotides, and related compounds. Pr.:* Biochem. 665.

020 725. Advanced Biochemistry Laboratory. (2) II. Specialized laboratory techniques for advanced biochemical investigations. Pr.:* Biochem. 666.

020 745. Hormones. (2) I. Offered 1968-69 and alt. years or on demand. A study of the structure, biosynthesis, biochemical role, metabolism and interrelations of internal secretions. Pr.: Biochem. 665.

020 799. Problems in Biochemistry. Credit arranged. I, II, S. Problem may include laboratory and/or library work in various phases of biochemistry, agricultural chemistry or nutrition. Pr.:* Background adequate for problem undertaken.

FOR GRADUATE CREDIT

020 806. Biochemistry Seminar. (0-1) I, II. Seminar for graduate students in biochemistry.

020 812. Proteins. (2) I. Offered 1969-70 and alt. years. Lectures and readings on the chemical nature of proteins; fractionation; purification, structure, chemical and physical properties of proteins and amino acids. Pr.:* Biochem. 656 and 665.

020 815. Plant Biochemistry. (3) I. A more advanced treatment of the material of Biochem. 410, with greater emphasis on the chemistry involved. Two hours lec. and three hours lab. a week. Pr.:* Biochem. 655 and 656.

020 816. Chemistry of Carbohydrates. (2) I. Offered 1968-69 and alt. years. Lectures and readings on structural chemistry of carbohydrates, their general properties, biological and chemical reactions and the methods of characterization. Pr.:* Biochem. 656 and 665.

020 818. Enzyme Chemistry. (2) II. Offered 1968-69 and alt. years. Lectures and readings on the chemical nature of enzymes, their reactions and assay. Pr.:* Biochem. 665.

020 819. Enzyme Laboratory. (2) II. Offered 1968-69 and alt. years. A laboratory course to accompany Biochem. 818. Pr.:* Biochem. 656 and 818 or conc. enrollment.

*Non-majors lacking these prerequisites should obtain consent of instructor before enrollment.

020 825. Advanced Animal Nutrition. (3) I. Offered 1968-69 and alt. years or on sufficient demand. Lectures and readings on protein and amino acid requirements, metabolism, evaluation of protein quality, energy metabolism, nutrient interrelationships. Pr.:* Biochem. 655, 656, and a course in nutrition.

020 890. Theoretical Biochemistry. (2) II. Offered 1968-69 and alt. years. Mathematical treatment of enzyme kinetics, theory of biological oxidation and energy transformations, multiple equilibria, physical chemistry of proteins and membrane phenomena. Pr.:* Biochem. 665.

020 999. Research in Biochemistry. Credit arranged. I, II, S. Research in biochemistry, agricultural chemistry and nutrition, which may be used for preparation of the M. S. or Ph. D. thesis. Pr.:* Sufficient training for research undertaken.

DAIRY AND POULTRY SCIENCE

C. L. Norton,* *Head of Department*

Professors Bartley, Claydon,* Craig,* Huston,* Larson,* Marion,* Norton,* Sanford* and Ward;* Associate Professors Bassette,* Bonewitz* and Farmer;* Assistant Professors Adams,* Call, Jackson, Mickelsen,* Mitchell* and Morrill;* Instructors Kahrs, Mugler and Roberts; Emeritus: Professors Martin* and Payne**

A wide application of science to the problems of poultry production, milk production and dairy foods processing requires technically trained men. Courses in bacteriology, chemistry, mathematics, accounting, engineering, and business provide excellent background for training in the dairy industry.

Instruction in dairy production includes dairy cattle nutrition, management, breeding, milk secretion and judging. University-owned herds involving four breeds provide animals for class work and for research projects.

In dairy foods processing the student studies the science of manufacturing, distributing and merchandising milk and milk products, including fluid milk, ice cream, butter-concentrated products and cheese. Teaching and research facilities include a modern automated dairy-processing plant.

The Avery Poultry Research Center, comprising 10 new buildings having a floor space of approximately 33,000 square feet and capable of handling 13,800 birds, provides excellent facilities for the breeding, rearing and management of stock for the classroom and for experimental work. In addition, modern laboratory and teaching facilities are available for both poultry and dairy training in Leland Call Hall, constructed and dedicated in 1964.

Major work leading to the degree Master of Science is offered in the fields of dairy cattle management, physiology, nutrition, and breeding. The Master of Science degree is offered in dairy foods processing that emphasizes chemical and bacteriological aspects of dairy products processing, development, and control. Major work leading to the degree Master of Science is offered in the fields of poultry management, poultry products technology, poultry nutrition, and genetics.

Major work leading to the degree Doctor of Philosophy is offered in the fields of animal nutrition, animal breeding, genetics, and food science.

Prerequisite to major graduate work in these fields is the completion of a four-year curriculum substantially equivalent to that required of undergraduate students majoring in poultry science, dairy production, or dairy foods processing. This will include not only several courses in the major field, but also sufficient physical and biological science courses to prepare the student for advanced work in the chosen field.

FOR UNDERGRADUATE CREDIT

025 102. Principles of Animal Science. (3) I, II. Basic principles which apply to the broad field of animal agriculture; survey of the industry;

types, purposes and products of livestock; principles of breeding, selection, nutrition, lactation, reproduction, management and marketing. Three hours lec. a week. Taught in cooperation with the Department of Animal Science and Industry. (A. S. I. 103, Dy. and Pl. Sc. 103 and 104 are companion courses in the respective departments. Students cannot apply credit for both Dy. and Pl. Sc. 102 or A. S. I. 102 and A. S. I. 101 toward a B. S. degree.)

025 103. Dairy Science. (1) I, II. Application of basic principles of animal agriculture to dairying. Two hours lab. a week. Pr.: Dy. and Pl. Sc. 102 or A. S. I. 101 or consent of instructor.

026 104. Poultry Science. (1) I, II. Application of basic principles of animal agriculture to the poultry industry. Two hours lab. a week. Pr.: Dy. and Pl. Sc. 102 or A. S. I. 101 or consent of instructor.

026 111. Poultry Practicums. (2) II. Especially designed for students in the Curriculum in Agricultural Education. Poultry judging and practical poultry management as applied to vocational education. One hour rec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 102 and 104.

025 196. Dairy Cattle Judging. (2) II. Six hours lab. a week. Pr.: Dy. and Pl. Sc. 102 and 103.

025 200. Fundamentals of Nutrition. (3) I. Elementary principles of comparative nutrition of farm animals. Two hours rec. and three hours lab. a week.

026 210. Poultry Judging. (3) I. Production characteristics and evolution of present breeds and types. Judging the standard breeds and varieties by comparison; judging hens for egg and meat production on the basis of certain physical characteristics. One hour rec. and six hours lab. a week. Pr.: Dy. and Pl. Sc. 102 and 104.

025 220. Dairy Products Evaluation I. (1) II. Fundamentals of organoleptic examination of dairy products according to official standards and commercial grades; introduction to sampling techniques, consumer testing and data processing. Three hours lab. a week.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

025 400. Market Milk and Dairy Inspection. (4) II. A study of the problems of the milk-plant operator, including production, procurement, processing, selling, and quality control; inspection of farms and milk plants. Two hours rec. and six hours lab. a week. Pr.: Bact. 220.

025 420. Advanced Dairy Cattle Judging. (1) I. Three hours lab. a week. Pr.: Dy. and Pl. Sc. 196.

025 460. Dairy Products Evaluation II. (1) I. Advanced judging of dairy products to qualify for intercollegiate contests. Three hours lab. a week. Pr.: Junior standing, Dy. and Pl. Sc. 220, or consent of instructor.

025 500. Dairy Seminar. (1) II. Study of dairy periodicals, bulletins, books, other dairy literature. One hour rec. a week. Pr.: Junior standing in dairy science.

025 510. Dairy Technology. (3) I. The relationship of physical and chemical properties of the various components of milk to handling and processing of dairy products. Two hours rec. and three hours lab. a week. Pr.: Chem. 350.

FOR UNDERGRADUATE AND GRADUATE CREDIT

026 600. Poultry Products Technology. (3) I. Offered in odd years. Emphasis on the technological problems that exist between producer and consumer in the production and distribution of poultry and eggs. Poultry processing, tenderness, self-life and packaging. Egg grading, preservation, chemical changes, bacterial problems, and egg products. Two hours rec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 102, 104; Chem. 190, 191; or 350, 351; Bact. 220, or consent of instructor.

025 601. Milk Secretion. (3) II. Anatomy, histology, and evolution of the mammary gland; hormonal control of mammary development and

function; theories of milk secretion, modern methods of milking. Two hours rec. and three hours lab. a week. Pr.: Junior standing or consent of instructor.

025 605. Artificial Breeding of Farm Animals. (3) I. Study of the reproductive processes in farm animals, factors affecting reproductive efficiency, and artificial breeding practices. Two hours rec. and three hours lab. a week. Pr.: Consent of instructor.

025 610. Dairy Cattle Nutrition. (3) I. Application of principles of nutrition to feeding of dairy cattle; exercises in practical feeding problems; designing and balancing rations. Two hours lec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 200, or 102 and 103, or consent of instructor.

026 612. Nutrition of the Fowl. (3) II. Designed for advanced students. The nutritive requirements of the fowl are considered together with metabolism of nutrients, digestion, and excretion. Poultry feeds, the compilation of rations, and feeding practices are discussed. The feeding and care of chicks on deficient diets for a period of several weeks provide practical application of nutrition problems. Two hours rec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 102 and 104.

025 615. Chemistry of Foods. (3) I. Relationship of chemical composition of foods to properties and to physical and chemical stability. Special attention will be given to dairy products, red meats, vegetables and cereal grains. Pr.: Biochem. 421, 422.

026 620. Avian Metabolism. (3) I. Offered in even years. Special emphasis on the physiological processes in reproduction, digestion, absorption, circulation, respiration, excretion and internal secretions. Three hours rec. a week. Pr.: Dy. and Pl. Sc. 102 and 104, Zool. 205.

025 621. Dairy Cattle Management. (3) II. Offered in even years. Production practices, record keeping, labor-saving equipment, milking systems, stabling methods, dairy farm planning and analysis, field study trip. Two hours lec. and two hours lab. a week. Pr.: Dy. and Pl. Sc. 201 and 202 and junior standing.

026 630. Poultry Problems. (2) I, II. Investigations of a practical nature which may be continued into the next semester if necessary. The area of study might include incubation, brooding, feeding, management, breeding, survey of literature, or closely related subjects. Pr.: Dy. and Pl. Sc. 102 and 104 or consent of instructor.

025 635. Genetics of Poultry and Dairy Cattle I. (4) I. Introduction to the genetics of qualitative and quantitative traits in dairy cattle and poultry; methods and comparison of individual, family and combined individual and family selection in the two classes of animals; systems of mating and their effectiveness. Three hours rec. and three hours lab. a week. Pr.: One semester each of elementary genetics and statistics.

026 640. Poultry Management. (3) II. A detailed study of all phases of farm and commercial flocks, including cost of production. Three hours rec. a week. Pr.: Dy. and Pl. Sc. 102 and 104, senior or graduate standing, or consent of instructor.

026 650. Poultry Seminar. (1) I. Required of all juniors majoring in poultry science and continued into the senior year. Also required of graduate students. One hour rec. or conference a week. Pr.: Dy. and Pl. Sc. 102 and 104.

026 660. Poultry Industry Training. (3) S. Nine weeks of supervised practical experience in an approved commercial poultry plant, hatchery, or farm. The employer and resident instructor will collaborate in arriving at a grade. Open to upperclassmen and graduate students. Pr.: Dy. and Pl. Sc. 102 and 104.

025 665. Dairy Production Problems. Credit arranged. I, II, S. Pr.: Junior standing.

025 670. Quality Control of Dairy Products. (3) II. Offered odd years or on demand. The role of the control laboratory in maintaining stand-

ards and quality of dairy foods and ingredients; bacteriological, physical and chemical techniques for evaluating quality and sanitation. One hour rec. and five hours lab. a week. Pr.: Bact. 220 and 520.

025 675. Dairy Manufacturing Problems. Credit arranged. I, II, S. Pr.: Junior standing in dairy manufacturing.

025 681. Dairy Foods Processing I (Butter). (2) I. Offered odd academic years. Principles and theory of manufacture of butter and modified butter products. Chemical, physical, bacteriological, and processing factors affecting quality and acceptability; recent processing developments. Two hours lec. a week. Pr.: Dy. and Pl. Sc. 510, Bact. 220, and junior standing.

025 682. Dairy Foods Processing II (Cheese). (2) I. Offered odd academic years. Milk protein classification, rennet action, isoelectric precipitation of milk proteins; chemical, physical, and bacteriological factors affecting ripening and quality; factory operations. Pr.: Bact. 520, Dy. and Pl. Sc. 510 or consent of instructor.

025 683. Dairy Foods Processing III (Concentrated Products). (2) II. Offered odd academic years. Evaporation, spray and roller drying, processing, packaging and storage of concentrated and dried milk products; properties of dried milk. Pr.: Dy. and Pl. Sc. 510 or consent of instructor.

025 684. Dairy Foods Processing IV (Frozen Desserts). (2) II. Offered odd academic years. Formulations, composition and properties; manufacturing of ice cream, ice milks, sherbets, and ices; quality factors, defects. Pr.: Dy. and Pl. Sc. 510 or consent of instructor.

025 685. Dairy Foods Processing Laboratory. (2) II. Application of processing techniques used in the manufacture of butter, cheese, dehydrated and concentrated dairy products and frozen desserts; field trips. Two three-hour labs. a week. Pr.: Bact. 220 and consent of instructor.

025 695. Dairy Plant Management. (2) II. Offered odd years or on demand. Trends in the dairy industry, types of organizations, location of plants, plant design and construction, selection of equipment, plant operation, plant records, inventory control, production planning, purchase of supplies, sales, profit and loss statements and legal aspects of plant management. Pr.: Consent of instructor.

025 710. Dairy Fermentations. (3) I. On demand. Isolation and culture of bacterial species causing desirable and undesirable changes in dairy products; special characteristics of the organisms as evidenced by growth in milk; typical changes produced in other dairy products and conditions affecting development. One hour lec. and six hours lab. a week. Pr.: Bact. 220 and 520.

025 720. Processing and Chemical Analysis of Fats and Oils. (2) I. Classification, chemical and physical properties, methods of analysis, stability and refining of fats and oils; commercial methods of manufacturing lard, butter, margarine, shortening, salad oils and mayonnaise. One lec. and one two-hour lab. a week. Pr.: Biochem. 421, 422 or equiv.

025 735. Genetics of Poultry and Dairy Cattle II. (4) II. Advanced genetics of qualitative and quantitative traits in dairy cattle and poultry. Methods of utilizing information for maximum rates of improvement in avian and mammalian species. Consideration of experimental breeding results in laboratory and avian species and applicability to domestic animals. Three hours rec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 635.

FOR GRADUATE CREDIT

025 805. Animal Breeding Seminar. (1) II. Evaluation of animal experimentation as related to reproduction and breeding.

025 810. Graduate Seminar in Dairy Science. (1) I, II. A study of current literature in the field of dairy science. One hour rec. a week.

025 820. Rumen Metabolism. (3) II. Metabolism, absorption, digestion and passage of nutrients in the ruman of dairy cattle; factors affecting the environment of the rumen; certain aspects of rumen function and dysfunction; techniques used in rumen research. One hour rec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 200; Biochem. 402 or 655, or consent of instructor.

025 830. Mammalian Reproduction. (3) II. Comparative anatomy, histology, and cytology of mammalian reproductive systems, with emphasis on study of endoctrine control and cyclic changes. Two hours rec. and three hours lab. a week. Pr.: Consent of instructor.

025 998. Research in Dairy Science. Credit arranged. I, II, S. Special investigation of dairy production or manufacturing which may be used as a basis for a master's thesis. Credits obtained may also be applied toward the degree Doctor of Philosophy. Pr.: Consent of instructor.

026 999. Research in Poultry Science. Credit arranged. I, II, S. Investigations which may form the basis of a master's or doctor's thesis. Conferences by appointment. Pr.: Dy. and Pl. Sc. 102 and 104; consent of instructor.

Avian Microbiology. (See Bact. 600.)

Avian Anatomy. (See Anat. 801.)

Genetics Seminar. (See A. S. I. 630.)

ENTOMOLOGY

HERBERT KNUTSON,* *Head of Department*

Professors Knutson, Painter* and Wilbur;* Associate Professors Elzinga,* Gates, Harvey,* Hopkins,* Rettenmeyer* and Thompson;* Assistant Professors Blocker,* Brooks, DePew, Eshbaugh, Kadoum,* Mills,* Pitts* and Wilde;* Instructor Craven; Emeritus: Professors Parker* and Smith**

UNDERGRADUATE

Entomology is the study of insects and their near relatives. Applied entomology stresses their relations to plants and animals, including man. The courses fall into two groups: (1) broad, general, cultural courses suitable for any students, such as 200, 211, 600, 630, 660, 670, and (2) professional courses which include most of the remainder. They provide training for research, resident and extension teaching and administration in the services of colleges, experiment stations, health services, other agencies of the states and the federal government, industry, foundations, and private practice, at home and abroad.

Courses listed for alternate years may be given in unscheduled years if a sufficient number of students indicate to the head of the department before the middle of the previous semester the course that they desire. Consult department for prerequisites.

For a minor, 200 or 211 and five or six additional credit hours should be completed.

For a major, in addition to the minor, professional courses and a broad, basic training in agriculture or the biological and physical sciences are needed to provide a satisfactory foundation for graduate work.

GRADUATE

Major work leading to the degrees Master of Science and Doctor of Philosophy is offered. Field facilities for research at Manhattan include four field insectaries; greenhouses; a programmed environmental control laboratory of the walk-in type and several smaller chambers; and land for experimental use at three locations.

The Department is now located in portions of Waters Hall and Annex, following major remodeling. Facilities include several temperature- and humidity-controlled rooms for rearing and holding insects and other experimental animals and laboratories for use of radioisotopes. Major laboratories are provided for study of insect behavior, toxicology, physiology and biochemistry, and for biology and ecology of insects attacking man and animals and stored products, and isolated laboratories for insec-

ticide testing and for chemical and bioassay determination of insecticide residues. Facilities for investigation of biology and control of insects attacking trees, shrubs and ornamental plants and field crops are also provided.

Facilities are further enhanced by the location at Manhattan of a large branch research laboratory of the United States Department of Agriculture, at which work is conducted on stored-products pests.

There is a department library and a good insect collection. All rooms and laboratories are air conditioned.

The staff is engaged in numerous federal, state, commercial, and special projects including projects sponsored by the National Science Foundation and the U. S. Public Health Service.

Entomologists are stationed at the Fort Hays Branch Agricultural Experiment Station at Hays in north-central Kansas, and at the Garden City Branch Station at Garden City in southwestern Kansas. These entomologists study various insect problems occurring in their respective portions of the state.

Approximately six Ph. D. and six M. S. degrees have been awarded annually during the past few years.

The Kansas State Entomology Club is student managed and has a membership of about 50, including faculty. The department actively sponsors seminars, symposia, professional meetings and social events, and helps support the Kansas Entomological Society and its publication, the Journal of the Kansas Entomological Society.

Several graduate research assistantships, fellowships and one graduate teaching assistantship are available, and other students are employed for work on research projects and teaching by the hour or month.

FOR UNDERGRADUATE CREDIT

030 100. Milling Entomology. (4) II. Elementary structure, life histories, classification, and control of insects and their near relatives; insect and rodent pests of flour mills, elevators, granaries, warehouses and bakeries, and standard methods of mill and granary sanitation. Laboratory provides opportunities for basic studies and practical experience in mill sanitation. Three hours rec. and three hours lab. a week.

030 200. Economic Entomology. (3) I, II. Elementary anatomy, physiology, and classification of insects; the life histories, habits, and control of the more important insect pests. Two hours rec. and three hours lab. a week.

030 211. General Entomology. (3) I, II. A basic study of insects and related arthropods, their classification, behavior, and relations to plants and animals, including man. Two hours rec. and three hours lab. a week.

FOR UNDERGRADUATE AND GRADUATE CREDIT

030 610. Insects of Stored Products. (3) I. Taxonomy, ecology and behavior of stored-products insects and current practices involved in their control. Pr.: Entom. 100, or 200, or 211 or consent of instructor.

030 620. Medical Entomology. (3) I. Insects and other arthropods as parasites and disseminators of disease; life cycles, biology, and control of insect parasites of man and animals. Two hours rec. and three hours lab. a week. Pr.: Entom. 200 or 211.

030 630. Insect Ecology. (3) I. Offered 1968-69 and alt. years. Influence of biotic, physical and edaphic factors of environments on insects. Two hours lec. and four hours lab. a week. Pr.: Entom. 200 or 211, or equiv. in zoology.

030 640. Entomological Methods. (3) Offered on demand. Methods, materials, and techniques used; population sampling, insect collecting and preserving; planning experimental work: rearing of laboratory insects; recording and use of environmental data; use of constant temperature and humidity equipment. Pr.: Entom. 200 or 211 or equiv.

030 650. Insect Control by Host Plant Resistance. (2) Offered on demand. Resistance of varieties of crop plants to insect attack and their

utilization in insect control; insect habits and physiology in relation to the cause of resistance and methods of breeding resistant varieties of crops. Pr.: Entom. 200 or 211, and a course in either plant or animal genetics.

030 656. Properties of Insecticides. (2) I. Offered 1968-69 and alt. years. Chemical and biological properties of insecticides and acaricides; relation of structure to toxicity; hazards; symptomatology, and treatment of poisoning; formulation and methods of analysis. One lec. and fours hours lab. a week. Pr.: Entom. 200 or 211, organic chemistry.

030 660. External Insect Morphology. (3) I. External anatomy of representative insects belonging to a number of orders, structure of the exoskeleton, a basis for taxonomy and hexapod morphology. One hour rec. and six hours. lab. a week. Pr.: Entom. 200 or 211.

030 670. Internal Insect Morphology. (3) II. Offered 1968-69 and alt. years, or on demand. Internal anatomy of representative insects; plan and structure of the internal systems. One hour rec. and six hours lab. a week. Pr.: Entom. 660.

030 675. Insect Physiology. (3) I. Offered 1969-70 and alt. years. Processes of growth, maturation and reproduction; sensory perception, nervous and hormonal control systems, locomotion, biorhythms and diapause; nutritional requirements, digestion, circulation, respiration, water regulation and excretion. Pr.: Entom. 670 or consent of instructor.

030 690. Principles of Taxonomy. (1) II. The methods and principles of systematic entomology and zoology; characterization of taxonomic categories; international rules of zoological nomenclature. Pr.: Entom. 200 or 211, 700, or equiv. in Zool. should be taken conc.

030 700. Taxonomy of Insects I. (2) II. Determination of major families of insects, taxonomic literature, use of catalogs. Six hours lab. a week. Pr.: Entom. 660, and conc. registration in Entom. 690 recommended. The student will present at the beginning of the course a correctly prepared collection of insects at least equivalent to that submitted for Entom. 200 or 211, for use in laboratory identification.

030 711. Taxonomy of Immature Insects. (3) II. Offered 1969-70 and alt. years. Classification and bionomics of immature stages of insects; practice in their identification. Six hours lab. a week. Pr.: Entom. 690 and 700.

030 750. Entomological and Zoological Literature. (2) I. Bibliographies, biological journals, and keys to the literature of all types in the zoological sciences; the preparation and publication of technical papers. Especial emphasis is given to the best time-saving aids and methods for all aspects of library work needed for thesis preparation. Pr.: Entom. 200 or 211, and beginning biology courses.

030 770. Advanced Applied Entomology I. (3) I. Offered 1969-70 and alt. years. Includes representative insects from horticultural and forest entomology; host plant resistance to insects; and insecticides; general considerations; methods of evaluation and development; residue problems. Two hours rec. and three hours lab. a week. Pr.: Entom. 200 or 211.

030 780. Advanced Applied Entomology II. (3) II. Offered 1969-70 and alt. years. Includes representative insects of field and forage crops, stored products, livestock and the household; general considerations of insecticides; regulatory and extension entomology. Two hours rec. and three hours lab. a week. Pr.: Entom. 200 or 211; Entom. 770 desirable.

030 795. Entomology Seminar. (1) I, II. Pr.: Consult seminar committee. Required of all Ph. D. candidates once yearly.

030 799. Problems in Entomology. Credit arranged. I, II, S. For nonthesis studies. Work is offered in various fields of entomology. Pr.: Consent of instructor.

FOR GRADUATE CREDIT

030 800. Advanced Economic Entomology. (1 to 3) I, II, S. A specialized study of the biology and control of selected insects of economic importance. Pr.: Consent of instructor.

030 820. Advanced Physiology of Insects. (4) II. Offered 1969-70 and alt. years. Metabolism and utilization of carbohydrates, lipids and nitrogen compounds; energy production, neuromuscular mechanisms, hormones and morphogenesis, homeostasis, pheromones and defensive secretions; special topics. Pr.: Entom. 675 and a course in biochemistry.

030 850. Taxonomy of Insects II. (1 to 3) Offered on demand. Intensive study of a selected group of insects. Pr.: Entom. 660, 690, 700, and consent of instructor.

030 855. Arachnology. (3) I. Offered 1969-70 and alt. years. A study of Arachnids, with emphasis on spiders and mites: their classification, structure, and relationships to plants and animals, including man. One hour lec. and six hours lab. a week. Pr.: Entom. 200 or 211 and consent of instructor.

030 856. Action and Metabolism of Insecticides. (2) II. Offered 1968-69 and alt. years. Comparative physiological and biochemical action of insecticides; metabolism and fate in living systems; insect resistance; research techniques. One hour lec. and four hours lab. a week. Pr.: Entom. 656 and biochemistry or consent of instructor.

030 860. Insect Behavior. (3) II. Offered 1969-70 and alt. years. Major types of behavior patterns and methods for analyzing the behavior of insects and other arthropods. Two hours lec. and four hours lab. a week. Pr.: Entom. 630.

030 999. Research in Entomology. Credit arranged. Thesis or dissertation credit. I, II, S. Work is offered in applied entomology, host plant resistance, insect physiology, toxicology, ecology, behavior, medical entomology, pest control technology, insects attacking shade trees and ornamentals, stored products, taxonomy, and morphology. Pr.: At least nine hours of entomology and basic work in zoology, botany, bacteriology, chemistry, mathematics, and consent of department.

GRAIN SCIENCE AND INDUSTRY

WILLIAM HOOVER,* *Head of Department*

Professors Farrell, Finney, Hoover, Johnson,* MacMasters,* Pfost,* Pomeranz, Schoeff, Shellenberger,* Ward and Wilcox; Associate Professor Deyoe; Assistant Professors Headley,* Hurley,* Miller* and Robinson; Instructors Balding and Hayes*

The Department of Grain Science and Industry offers three curriculums leading to Bachelor of Science degrees in Bakery Science and Management, Feed Science and Management, and Milling Science and Management. In each curriculum an option is selected in Administration, Chemistry, or Operations.

Major work leading to the degrees Master of Science and Doctor of Philosophy is offered in specialized administration, chemical and engineering fields related to baking, feed and grain milling. Prerequisite to major study in these fields is a Bachelor of Science degree from this department or equivalent degree in chemistry, engineering, physics, agriculture, or business administration.

Modern teaching and research facilities include a pilot bakery, feed mill and pilot flour mill. Associated laboratories permit the study of the physical, chemical, and biochemical properties of cereals and related products.

Graduates are prepared for positions of responsibility in the baking, feed, and milling industries such as business administration, plant management, quality control, nutrition, sales and services. Those students graduating with advanced degrees are especially qualified for positions in administration, teaching, research, and related activities.

FOR UNDERGRADUATE CREDIT

045 100. Principles of Milling. (3) I, II. Introduction to flour and feed milling processes. Two hours lec. and three hours lab. a week.

045 210. Flow Sheets. (2) I, II. The construction and assembly of a flow sheet. Six hours lab. a week. Pr.: Gr. Sc. 100, M. E. 213, or Arch. 207.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

045 400. Milling Technology I. (4) II. Study of the principles of wheat cleaning and conditioning equipment and the operation of a pilot pneumatic flour mill and wheat cleaning house. Two hours lec. and six hours lab. a week. Pr.: Gr. Sc. 100 and 210.

045 410. Feed Technology I. (4) II. Introduction to the engineering aspects of formula feed manufacture, including principles of conveying, grinding, mixing, pelleting, the formulation of concentrates, premixes, and rations using a digital computer. Three hours lec. and three hours lab. a week. Pr.: Dy. Sc. 200 and Gr. Sc. 210.

045 490. Feed Manufacturing Processes. (3) II, S. Selection of plant location, plant design, equipment and flows. Study of the technical phases of formula feed manufacture, including principles of feed formulation, effect of processing and ingredients on nutritional acceptability of feeds, and quality control program. Not open to majors in feed science and management. Two hours lec. and three hours lab. a week. Pr.: Math. 100, 150; A. S. I. 230 or consent of instructor.

FOR UNDERGRADUATE AND GRADUATE CREDIT

045 610. Flour and Feed Analysis. (5) II. Methods of analysis and quantitative tests of flour and feed composition. Two hours lec. and nine hours lab. a week. Pr.: Chem. 230 or 271, Biochem. 120.

045 620. Advanced Wheat and Flour Testing. (3) I. Physical and chemical methods used in testing wheat and flour. One hour lec. and six hours lab. a week. Pr.: Gr. Sc. 610.

045 630. Experimental Baking I. (4) I. Practice in laboratory baking tests; comparison of methods, formulas, and flour; interpretation of results. Two hours lec. and six hours lab. a week. Pr.: Biochem. 120.

045 631. Experimental Baking II. (4) II. Advanced study of the basic properties, chemical and biological reactions of ingredients used in production of bakery products. Special emphasis is placed on the fundamental principles of biological and chemical leavening and the rheological properties of dough and ingredients. Two hours lec. and six hours lab. a week. Pr.: Gr. Sc. 630.

045 632. Bakery Design and Flow. (2) I. Study of process design and flow, equipment selection, layout and operation for bakeries. Emphasis is placed on the functional requirements of equipment and flow needed to sustain the chemical and biological reactions involved in baking. One hour lec. and three hours. lab. a week. Pr.: M. E. 213 or Arch. 207.

045 633. Bakery Technology. (3) II. Physical and engineering principles involved in baking processes. Operation of bakery equipment and control of systems. Study of heat problems, materials handling and sanitation. Laboratory tests of equipment to determine parameters involved in their operation. Two hours lec. and three hours lab. a week. Pr.: Gr. Sc. 630, 632 and Phys. 211.

045 640. Advanced Flow Sheets. (2) II. The design of flows for various cereal processing methods. Six hours lab. a week. Pr.: Gr. Sc. 210.

045 650. The Qualities of Wheat and Flour. (3) II. The qualities of wheat and flour as affected by growth, storage and physical, chemical and biological factors. Three hours lec. a week. Pr.: Biochem. 120.

045 651. Food and Feed Plant Sanitation. (4) II. A study of food and feed plant sanitation, with emphasis on causative agents, methods of control, sanitary plant design and governmental regulations. Three

hours lec. and three hours lab. a week. Pr.: Bact. 220 or minimum of eight hours of biological science; junior standing.

045 660. Qualities of Feed Ingredients. (3) II. The quality of feed ingredients and processed feeds as affected by origin, processing, storage, and physical and biological factors. Three hours lec. a week. Pr.: Biochem. 120.

045 670. Milling Technology II. (4) I. Theory and practice of wheat cleaning, conditioning, breaking, granulation, separation, and purification by unit operations and operation of pilot pneumatic flour mill. Two hours lec. and six hours lab. a week. Pr.: Gr. Sc. 400.

045 680. Feed Technology II. (4) I. Advanced study of engineering principles of feed plant production, safety, materials handling, grinding, mixing and pelleting. Three hours lec. and three hours lab. a week. Pr.: Gr. Sc. 410, Phys. 212 or 311.

045 710. Fundamentals of Grain Storage. (2) I. Basic science of grain storage, including role of moisture in grain, physical factors which influence deterioration, chemical changes in storage, role of microorganisms, respiration and heating, influence of insects on storage. Pr.: Gr. Sc. 650 or 660 or consent of instructor.

045 711. Principles of Food Analysis. (3) II. A review of analytical tools available to the food chemist, with emphasis on applications in quality control and research. Pr.: Chem. 444 and Biochem. 421.

045 720. Advanced Flour and Feed Technology. (3) II. Advanced study of engineering principles used in flour and feed manufacture. Two hours lec. and three hours lab. a week. Pr.: Gr. Sc. 670 or 680.

045 730. Flour and Feed Mill Construction. (3) I. The design and layout of flour and feed plants. Eight hours lab. and one hour unassembled lab. a week. Pr.: Gr. Sc. 670 or 680 or consent of instructor.

045 790. Grain Science Problems. Credit arranged. I, II, S. Pr.: Consent of staff.

FOR GRADUATE CREDIT

045 800. Graduate Seminar in Grain Science. (1) I, II. Discussion of technical problems in the cereal industry. One hour rec. a week. Attendance required of all graduate students in Grain Science.

045 801. Enzyme Applications. (2) I. Theories of enzyme action and the function of enzymes; commercial methods of manufacture and industrial uses of enzymes, with special emphasis on the role of enzymes in the food industries. Two hours lec. a week. Pr.: Biochem. 121, 122 or consent of instructor.

045 810. Research in Grain Science. Credit arranged. I, II, S. Research may be used as basis for the graduate thesis. Pr.: Consent of staff.

GENERAL AGRICULTURE

CARROLL V. HESS, *Dean, College of Agriculture*
FRANK R. CARPENTER, *Assistant Dean*

035 100. Agriculture in Our Society. (2) I. The development of the agricultural industry in the United States. The role of the land-grant colleges and universities in the development of the agricultural industry. The purposes of higher education in agriculture. Career opportunities for graduates in agriculture.

035 110. Agricultural Student Magazine. (1) I, II. Planning, interviewing, preparing stories, headlines, layouts, etc., for Ag Student Magazine, published by students in the College of Agriculture.

035 398. Honors Colloquium in Agriculture. (1) I, II. Open to students in the Honors Program for the College of Agriculture. Discussion of current topics related to agriculture. Discussion to be led by students,

instructors, and invited guests. May be taken for not more than two credits.

035 610. Problems in Agricultural Publications. (1-3) I, II. Writing for trade and popular agricultural publications in area of individual student's competence, with emphasis on content of stories and principles involved in understanding and accepting content expressed. Appt. Junior standing.

HORTICULTURE AND FORESTRY

R. W. CAMPBELL,* *Head of Department*

Professors Amstein, Campbell, Carpenter,* Gallaher and Keen;* Associate Professors Greig,* Hall* and Morrison; Assistant Professors Abmeyer, Biswell, Deutsch, Gaylor, Geyer, Grey, Hadle, Kepler, Miles, Odom* and Winzer; Instructors Atchison, Bratton, Geisler, Gould, Jones, Leuthold, Long, Loucks, Naughton, Nighswonger, Pinkerton, Shreve, Slusher and Strickler; Emeritus: Professors Filinger* and Pickett* and Assistant Professor Willis*

The horticulture undergraduate curriculum provides necessary background for students preparing for employment in a variety of professions and jobs—e.g., plant science research, production and related businesses. Courses of the General Agriculture Curriculum (p. 52) are supplemented by the requirements of the Department of Horticulture-Forestry (p. 55) with the additional requirements of the selected option (p. 54) to provide a broad base. These are further supported by specialized courses in fruit and nut science, vegetable science, turf management, ornamental horticulture and both the growing and retailing phases of floriculture. The departmental staff includes specialists in all those areas, and a Bachelor of Science degree in agriculture with a major in horticulture is granted upon the successful completion of programs of study.

The graduate program in horticulture prepares the student for college teaching, research and extension or comparable positions in industry. Graduate programs leading to the Master of Science and/or Doctor of Philosophy degrees are available. A Bachelor of Science degree from a recognized college or university whose undergraduate program is substantially equivalent to the program at this University is prerequisite to admittance to graduate work in this department. Students desiring to enter a graduate program are urged to follow the Agriculture Science option.

The department has a variety of facilities for both undergraduate and graduate study and research. These include the orchards and vegetable plots at the horticultural farm, nut research farm, turf farm, forestry plots, greenhouses, cold storage units, controlled atmosphere chambers, and research laboratories equipped for scientific plant studies. Many horticulture courses require student visitations and work at these facilities.

A Pre-Forestry curriculum is available combining the basic introductory courses of the Curriculum in Agriculture (p. 52) with the introductory courses in Forestry (p. 54). Upon its completion after the sophomore year, students transfer to a university offering a professional forestry degree.

A two-year short course in Retail Floriculture (p. 65) is available for students interested in floral arrangement and retail flower shop management. A two-year short course in Nursery and Landscape Management (p. 65) prepares young people for work in nurseries, garden centers, parks, and similar enterprises.

FOR UNDERGRADUATE CREDIT

040 130. Floral Arrangement. (3) I, II. Floral arrangement for the home and commercial flower shop. The basic fundamentals of floral design will be emphasized. Two hours rec. and three hours lab. a week. Pr.: Consent of instructor.

040 140. Advanced Floral Arrangement. (3) II. Stylized floral design for the commercial flower shop, including corsages, wedding designs, fu-

neral pieces and party and banquet decorations. Two hours rec. and three hours lab. a week. Pr.: Hort. 130 or consent of instructor.

040 150. Home Horticulture. (2) I, II. An introductory general interest course designed to present the various aspects of horticultural activity. The course deals briefly with the supporting and basic sciences and how these respective areas enter into the field of horticulture. Discussions of each phase of horticulture and how they relate to modern living are included. Two hours rec. a week.

040 160. Horticulture Seminar. (0) I, II. A discussion of current topics in horticulture and closely related fields by students, faculty, and invited speakers. Required of all horticulture majors the first two semesters in attendance. Meets every Tuesday for first eight weeks of semester.

040 200. Plant Science. (4) I, II. Study of the principles of the production of economic plants, including morphology, taxonomy, physiology, ecology, propagation, preservation, storage, and utilization. Three hours lec. and one two-hour lab. a week. Pr.: Bot. 210, General Botany. Taught in cooperation with the Department of Agronomy.

040 220. Plant Propagation. (3) II. Designed to develop proficiency in the various skills and techniques necessary for propagation of horticultural plants. The basic fundamentals of seed structure and vegetative makeup of plants will be emphasized. Two hours rec. and three hours lab. a week. Pr.: Bot. 210, General Botany.

040 230. Greenhouse Construction and Management. (3) II. Offered in the spring of 1969 and alt. years thereafter. Greenhouse construction, heating, air conditioning, and crop planning. Two hours rec. and three hours lab. a week.

040 260. Plant Materials I. (3) I. Perennials, annuals, and conifers for landscape planting, planting plans, field trips. Two hours rec. and three hours lab. a week. Pr.: Bot. 210.

040 270. Plant Materials II. (3) II. Trees, shrubs, woody vines for landscape planting. Field trips and reports required. Two hours rec. and three hours lab. a week. Pr.: Bot. 210.

040 280. Forest Conservation. (3) I. An introduction to American forestry—what it is and what foresters do. Distribution of the forest resource, establishment, management practices, protection, harvest, utilization, and policy. Three hours rec. a week.

040 290. Dendrology. (4) II. Identification, classification, silvical characteristics, distribution, and economic significance of important North American angiosperm and gymnosperm tree forms. Three hours rec. and three hours lab. a week.

FOR UNDERGRADUATE AND GRADUATE CREDIT

040 600. Landscape Horticulture. (3) I, II. Fundamental principles of producing, planting, and maintaining ornamental plantings of trees, shrubs, perennials, and turf in the nursery, home grounds, parks, and similar areas. Taught in cooperation with Landscape Architecture. Two hours rec. and three hours lab. a week. Pr.: Bot. 210.

040 610. Turf Management. (2) I. Offered in the fall and a Summer Workshop 1968 and alt. years thereafter. Methods and principles of establishing and maintaining special purpose turf. Pr.: Hort. 200, Agron. 270 or consent of instructor.

040 620. Arboriculture. (3) II. Offered in the spring and a Summer Workshop 1969 and alt. years thereafter. Principles and practices of maintaining shade and ornamental trees under urban environments. Two hours rec. and three hours lab. a week. Pr.: Hort. 200, Agron. 270 and consent of instructor.

040 630. Forestry Practices. (3) I. Principles of forestry techniques and their application to Great Plains woodland areas. Laboratory provides introduction to tree identification, forestry instrument use, forest in-

dustries, and management of timber tracts. Two hours rec. and three hours lab. a week. Pr.: Hort. 200 or equiv.

040 640. Horticultural Problems. Credit arranged. I, II, S. Problems and reports in floriculture, olericulture, ornamental horticulture, and pomology. Pr.: Advanced undergraduate standing and consent of instructor.

040 650. Principles of Fruit and Nut Growing I. (3) I. Offered in the fall of 1969 and alt. years thereafter. Discussion of principles of cultivation of long-term, perennial, woody plants and the systems of cultivating important fruit and nut crops. Orchard planning, propagation, and management and fruit production, harvesting, and marketing discussed. Two hours rec. and three hours lab. a week. Pr.: Hort. 200 or equiv.

040 660. Principles of Fruit and Nut Growing II. (3) I. Offered in the fall of 1968 and alt. years thereafter. Detailed discussion of selected and important pomological topics. Laboratory includes exercises on practical and research topics, with emphasis on latter. Two hours rec. and three hours lab. a week. Pr.: Hort. 200 or equiv.

040 670. Systematic Olericulture and Pomology. (3) I. Offered in the fall of 1969 and alt. years thereafter. Study of characteristics of vegetable and fruit varieties, especially as related to their maintenance, adaptation and identification and to classification systems. Two hours rec. and three hours lab. a week. Pr.: Hort. 150.

040 675. Storage of Horticultural Products. (3) I. Offered in the fall of 1968 and alt. years thereafter. Storage structures, harvesting and handling in relation to storage; post-harvest physiological changes associated with the storage of fresh flowers, fruits, nursery stock, and vegetables. Three hours rec. a week. Pr.: Junior standing and consent of instructor.

040 680. Spraying. (3) II. Offered in the spring of 1969 and alt. years thereafter. Development of pest control program for crops, with emphasis on pesticide application equipment, chemicals, and procedures. Two hours rec. and three hours lab. a week. Pr.: Upperclassmen and graduate students.

040 690. Vegetable Crops I. (3) II. Offered in the spring of 1969 and alt. years thereafter. Study of ecological principles involved in the production of vegetable crops, with emphasis on environmental conditions. Two hours lec. and three hours lab. or field trip a week. Pr.: Hort. 200.

040 700. Vegetable Crops II. (3) II. Offered in the spring of 1970 and alt. years thereafter. Study of applied physiological responses of selected vegetable crops; the effects of these responses on grade, quality, storage, and marketing of these products. Three hours lec. a week. Field trip required. Pr.: Hort. 200.

040 710. Principles of Floriculture. (3) II. Offered in the spring of 1970 and alt. years thereafter. Study of the culture of greenhouse crops. Three hours rec. a week. Pr.: Hort. 200.

040 720. Horticultural Crop Breeding. (3) II. Offered in spring of 1969 and alt. years thereafter. Problems and breeding practices related to fruit, ornamental, or vegetable plants. Pr.: One course in genetics and consent of instructor.

040 790. Plant Science Literature. (2) I. Study of history and literature of the plant sciences, preparation of written reports, and presentation of oral reports. Review all forms of literature summaries. Two hours rec. a week. Pr.: Advanced undergraduate standing and consent of instructor.

FOR GRADUATE CREDIT

040 800. Research in Horticulture. Credit arranged. I, II, S. Investigations in pomology, olericulture, floriculture, and ornamental horticulture. Data collected may form basis for a thesis or dissertation. Pr.: Consult instructor.

040 820. Advanced Vegetable Crops. (1-3) I, II. A specialized study related to the physiological development and handling of selected vegetable crops. Pr.: Hort. 690 or 700 and consent of instructor.

040 830. Advanced Pomology. (1-3) I, II. Morphological and physiological changes occurring in fruit plants. Pr.: Hort. 650 and 660 and consent of instructor.

040 840. Advanced Floriculture. (1-3) I, II. Production of commercial cut flowers and potted plants, including the relationship of light, temperature, soils, and other factors. Pr.: Hort. 710.

040 850. Horticulture Graduate Seminar. (1) I, II. A discussion of investigational works in the various branches of horticulture. Pr.: Hort. 790 and graduate standing.

040 860. Advanced Ornamental Horticulture. (1-3) I, II, S. Intensive study of a special phase of ornamental horticulture. Pr.: Hort. 600, 610 or 620.

PLANT PATHOLOGY

JOHN F. SCHAFER,* *Head of Department*

Professors Hansing, King, Schafer* and Sill;* Associate Professor Dickerson;* Assistant Professors Browder,* Burleigh,* Edmunds,* Sauer,* Stuteville* and Willis; Emeritus: Professors Elmer* and Melchers**

Plant pathology is the study of plant diseases caused by fungi, bacteria, viruses, nematodes and other agents. The curriculum (See suggested curriculum, p. 54) at Kansas State University is designed to give a broad background in the biological, physical and agricultural sciences. Avenues open for plant pathology majors include research for many agencies, teaching, extension, administration and sales. Industry, government and private foundations use plant pathologists on a world-wide basis.

The student has the opportunity to take a minor in several complementary fields. Minors in plant pathology should complete the 400, 600 and two other courses.

Major work leading to the degrees Master of Science and Doctor of Philosophy is offered. Prerequisite to major graduate work is the completion of a four-year curriculum equivalent to that required for the undergraduate degree. Many enter into plant pathology graduate work after receiving a Bachelor of Science degree in biology, agronomy, horticulture and other similar disciplines.

Fields open for graduate work include diseases of small grains, field crops, stored grains, fruit and vegetable crops, ornamentals and turf. Work in any of these areas may involve host-parasite relationships, physiological basis of resistance, control, transmission, ecological factors relating to disease development, epidemiology, pathogenicity and biochemical and biophysical properties of plant pathogens.

Departmental facilities include greenhouses, controlled environmental chambers, physiological laboratories and experimental fields. Students have access to an electron microscope laboratory, the Computing Center, herbarium, and science libraries.

The department annually awards some graduate research assistantships. Other graduate and undergraduate students are employed on an hourly basis on several research projects.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

050 400. Plant Pathology. (2) I, II (S on demand). An introductory course on the nature, cause, and control of crop diseases. One hour rec. and two hours lab. a week. Pr.: Biol. 210 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

050 600. General Plant Pathology. (3) I. A study of the fundamental principles and technics of phytopathology, with critical consideration of crop diseases caused by fungi, bacteria, viruses, and nematodes. One

hour rec. and six hours lab. a week. Pr.: Pl. Path. 400 or consent of instructor.

050 610. Fungus Diseases of Plants. (3) II in even years. Major fungus diseases of cereal, forage, fruit, vegetable, and ornamental crops; their causes, life histories, host-parasite relationships, symptoms, and controls. Two hours rec. and three hours lab. a week. Pr.: Pl. Path. 400 or consent of instructor.

050 620. General Nematology. (3) I. The morphology, taxonomy, biology of and technics used in the study of plant parasitic and soil and freshwater free-living nematodes. Six hours of combined rec. and lab. a week. Pr.: Pl. Path. 400 or consent of instructor.

050 630. Principles of Plant Disease Control. (3) II in odd years. Methods of control of fungi, bacteria, viruses, and nematodes. Methods included are cultural, physical, biological, chemical, and host resistance. Two hours rec. and three hours lab. a week. Pr.: Pl. Path. 400 or consent of instructor.

050 730. General Virology. (3) II. (Same as Biol. 730.) The theoretical and experimental bases of virology, with special emphasis on the role of the virus as a controlling force in cellular biology; principles of host-virus interactions; introduction to use of mammalian cell cultures as the host for virus propagation. Pr.: Twelve hours of biological sciences, including Biol. 220 or equiv. and Biochem. 420 or equiv. Consent of instructor. (Taught in cooperation with the Division of Biology.)

050 781. Virus Diseases of Plants. (3) I in even years. Nature, transmission, symptoms, control, and economic importance of plant virus diseases. Two hours rec. and three hours lab. a week. Pr.: Pl. Path. 400 or consent of instructor.

050 790. Problems in Plant Pathology. Credit arranged. I, II, S. Work is offered in plant pathology, plant virology, and plant nematology. Pr.: Background of courses needed for problem undertaken.

FOR GRADUATE CREDIT

050 800. Advanced Nematology. (3) II in even years. Emphasis will be on taxonomy, with discussions on the biology, ecology, and physiology of plant parasitic and associated nematodes. Six hours of combined rec. and lab. a week. Pr.: Pl. Path. 620 or consent of instructor.

050 850. Plant Pathological Technic. (3) II in odd years. Technic in methods of isolation, culture, and inoculation used in studying the causal organisms of plant diseases. One hour rec. and six hours lab. a week. Pr.: Pl. Path. 600 or consent of instructor.

050 970. Seminar in Plant Pathology. (1) I, II. Reports in the field of plant pathology. Pr.: Consent of instructor.

050 990. Research in Plant Pathology. Credit arranged. I, II, S. Work is offered in plant pathology, plant virology, and plant nematology. Pr.: Sufficient training to carry on the line of research undertaken.

International Agricultural Programs

GLENN H. BECK, *Vice President for Agriculture*
VERNON C. LARSON, *Director*
WARREN L. PRAWL

Over the past decade, the contribution of United States universities to the foreign assistance effort has been impressive. The effort has not been a one-way street. Universities have gained from their experience in overseas service. Such service has broadened the horizons of participating faculty members, deepened their understanding of their own disciplines and strengthened the capacity of the university to prepare young men and women for today's world. Agricultural courses increasingly include the international dimension.

Kansas State University has been engaged in foreign assistance programs since 1956 when a contract was signed with the U. S. State Department's Agency for International Development for assisting with the agricultural development in India. Since that time, KSU faculty members have contributed over 58 man-years of service to the KSU/AID/India Project at Andhra Pradesh Agricultural University, Hyderabad, India. Presently there are two principal components of the program:

1. Agricultural University Development—the program involves advisers who assist Indian faculty members at Andhra Pradesh Agricultural University in the development of an Indian land-grant university.
2. Agricultural Production Project—an action-oriented project involving advisers who work with counterpart Indian staff members implementing programs designed to increase food grain production.

Kansas State University is also operating an AID-sponsored contract for supplying agricultural specialists for service on the KSU/AID/Nigeria Project at Ahmadu Bello University, Samaru, Northern Nigeria. Most faculty members have teaching responsibilities in the Institute for Agricultural Research. The main objectives are:

1. Development of the Faculties of Agriculture and Veterinary Medicine (curriculum, physical plant and equipment).
2. Training of counterpart Nigerians for faculty responsibility in the Faculties of Agriculture and Veterinary Medicine.

Additionally, a Participant Training Program is administered in the Office of International Agricultural Programs. Selected participants from foreign countries are enrolled for both undergraduate and graduate training at Kansas State University primarily in the fields of agriculture and veterinary medicine. Such programs focus attention on the need for trained specialists who can assume positions of responsibility in international agricultural development. Curriculum flexibility provides an opportunity for students to enroll in courses which deal directly with international agricultural development or which have an agricultural development emphasis. Faculty advisers for students counsel students who are interested in electives in international agricultural development.

The College of Architecture and Design

EMIL C. FISCHER, *Dean*
ROBERT P. EALY, *Associate Dean*
F. GENE ERNST, *Assistant Dean*

The College of Architecture and Design provides professional study in Architecture, Architectural Structures, Interior Architectural Design, Landscape Architecture, Building Construction and Regional and Community Planning. The undergraduate and graduate programs are carefully designed to develop understanding and sensitivity for the needs of man and his physical environment. The Curriculum in Architecture is accredited by the National Architectural Accrediting Board.

The Landscape Architecture Curriculum is accredited by the American Society of Landscape Architects in Cooperation with the National Commission on Accrediting.

Men and women associated with these professions are responsible for the design of our churches, schools, homes, business and public buildings, recreational areas as well as our cities, and require a well-rounded education to equip them to become responsible leaders in their respective professional areas. An outstanding faculty and excellent studio and library facilities provide a stimulating environment for professional development.

The College of Architecture and Design offers the bachelor's degree in each of the following areas:

Architecture—Curriculum on page 98
Architectural Structures—Curriculum on page 99
Interior Architectural Design—Curriculum on page 100
Landscape Architecture—Curriculum on page 101
Building Construction—Curriculum on page 102

General descriptions of these curriculums, course offerings and graduate programs are presented on pages 104-110.

GRADUATE PROGRAMS

The College of Architecture and Design offers work at the graduate level in Architecture, Architectural Structure, Interior Design, Environmental Technology and Urban Design leading to the degree Master of Architecture. The graduate degrees Master of Landscape Architecture and Master of Regional and Community Planning are also offered. Additional information on the graduate programs is included under Graduate School, page 40.

HONORS PROGRAM

The Honors Program in the College of Architecture and Design is integrated with similar programs in other Schools and Colleges of the University and provides the eligible student with an excellent opportunity for interdisciplinary study. Students ranked in the top five per cent of entering freshmen and transfer students with superior academic records are eligible to participate. Final approval is based upon an interview with the Assistant Dean of the College of Architecture and Design and acceptance of the program by the student.

Participation in the Honors Program will permit students to enroll in Honors Sections of courses, if offered, and participate in a variety of seminars and stimulating discussions in several fields.

SUMMER SCHOOL

Entering freshmen and transfer students will find that many of the courses may be taken during the summer session. This is especially advantageous for those who wish to remove deficiencies in mathematics, physics, or applied mechanics.

Summer work is also offered in Architectural Design, Landscape Architecture, Theory of Structures, and Regional and Community Planning.

Detailed information on specific courses is contained in the Summer

School Catalog, which may be obtained from the Director of Admissions of Kansas State University.

ELECTIVES

Students in Architecture and Design are encouraged to select their electives from one or two of the areas of secondary interest listed below. A complete list of recommended courses in each area is maintained by the college office and each adviser.

Art
Art History
Business Administration
English
Geology and Geography
History
Humanities
Landscape Architecture
Modern Language
Philosophy
Psychology
Regional and Community Planning
Sociology and Anthropology

Curriculum in Architecture

Bachelor of Architecture

FIRST YEAR

First Semester					Second Semester				
			Course	*Sem. Hrs.*				*Course*	*Sem. Hrs.*
Engl.	229	100	Engl. Comp. I	3	Engl.	229	120	Engl. Comp. II	3
Arch.	105	131	Fund. Design I	2	Spch.	281	105	Oral Comm. I	2
Arch.	105	207	Arch. Graph. I	2	Arch.	105	132	Fund. Design II	2
Math.	245	220	Anal. Geom. & Calc. I	4	Arch.	105	208	Arch. Graph. II	2
L. A.	110	101	Landscape Design	3	Hist.	241	111	West. Civ. I	3
Ph. Ed.	261	011	Physical Education	0	Psych.	273	110	Gen. Psych. or	
Arch.	105	110	Arch. Lecture	0	Soc.	277	211	Intro. to Soc.	3
			Elective	2	Ph. Ed.	261	011	Physical Education	0
					Arch.	105	118	Arch. Assembly	0
Total				16	Total				15

SECOND YEAR

Phys.	265	211	Gen. Phys. I	4	Phys.	265	212	Gen. Phys. II	4
Arch.	105	231	Design Analysis	4	Arch.	105	270	Hist. of Arch. I	2
Phil.	259	150	Elem. Logic	3	Arch.	105	232	Prin. Environ. Des.	4
			Elective	3	Ap. M.	510	205	App. Mech. A	3
Arch.	105	118	Arch. Assembly	0				Elective	3
					Arch.	105	118	Arch. Assembly	0
Total				14	Total				16

THIRD YEAR

Arch.	105	331	Arch. Design I	5	Arch.	105	332	Arch. Design II	5
M. E.	560	406	Air Cond. A	3	Arch.	105	421	Timber Struc.	2
Ap. M.	510	220	Str. of Materials A	3	Arch.	105	320	Theory of Struc.	3
Ap. M.	510	224	Str. of Matls. A Lab.	1	E. E.	530	406	Illumination A	2
Arch.	105	311	Arch. Constr. I	3	Arch.	105	312	Arch. Constr. II	3
Arch.	105	375	Hist. of Arch. II	2	Arch.	105	378	Hist. of Arch. III	2
Arch.	105	118	Arch. Assembly	0	Arch.	105	118	Arch. Assembly	0
Engl.	229	090	English Prof.	0					
Total				17	Total				17

FOURTH YEAR

Arch.	105	341	Arch. Design III	5	Arch.	105	342	Arch. Design IV	5
Arch.	105	422	Theory of Struc. II	4	Arch.	105	428	Theory of Struc. III	4
Arch.	105	335	Bldg. Equip. I	3	Arch.	105	437	Bldg. Equip. II	3
			Elective	3	Arch.	105	413	Environ. Seminar	3
Arch.	105	379	Hist. of Arch. IV	2				Elective	2
Arch.	105	118	Arch. Assembly	0	Arch.	105	118	Arch. Assembly	0
Total				17	Total				17

FIFTH YEAR

Arch.	105	351	Arch. Design V	5	Arch.	105	352	Arch. Design VI	5
Arch.	105	615	Plan. Prin.	3	Arch.	105	635	City Plan I or	
Arch.	105	353	Prof. Practice	2	Arch.	105	645	Urban Design I	3
			Elective	6				Elective	7
Arch.	105	390	Inspection Trip	0	Arch.	105	118	Arch. Assembly	0
Arch.	105	118	Arch. Assembly	0					
Total				16	Total				15

Number of hours required for graduation, 160.

Only four hours of electives may be taken in basic military science. Select electives from areas of secondary interest. These need not be taken in order listed in curriculum.

Option in Architectural Structures

Bachelor of Architecture

FIRST YEAR

First Semester					Second Semester			
		Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Engl.	229 100	Engl. Comp. I	3	Engl.	229 120	Engl. Comp. II	3
Chem.	221 210	Chemistry I	5	Chem.	221 230	Chemistry II	3
Math.	245 220	Anal. Geom. & Calc. I	4	Math.	245 221	Anal. Geom. & Calc. II	4
Arch.	105 207	Arch. Graph. I	2	Arch.	105 208	Arch. Graph. II	2
Arch.	105 131	Fund. Design I	2	Arch.	105 132	Fund. Design II	2
Ph. Ed.	261 011	Physical Education	0	Spch.	281 105	Oral Comm. I	2
Arch.	105 110	Arch. Lecture	0	Ph. Ed.	261 011	Physical Education	0
				Arch.	105 118	Arch. Assembly	0
Total			16	Total			16

SECOND YEAR

Phys.	265 310	Engg. Phys. I	5	Phys.	265 311	Engg. Phys. II	5
Math.	245 222	Anal. Geom. & Calc. III	4	Math.	245 240	Series and Diff. Eq.	4
Econ.	225 110	Economics I	3	Ap. M.	510 305	Statics	3
Arch.	105 231	Design Analysis	4	Arch.	105 232	Prin. Environ. Des.	4
				Arch.	105 118	Arch. Asesmbly	0
Total			16	Total			16

THIRD YEAR

Ap. M.	510 415	Mech. of Materials	3	C. E.	525 331	Anal. Stat. Det. Str.	3
Ap. M.	510 418	Mech. of Matls. Lab.	1	Arch.	105 421	Timber Struc.	2
Arch.	105 311	Arch. Constr. I	3	Arch.	105 312	Arch. Constr. II	3
Ap. M.	510 412	Dynamics	3	Arch.	105 332	Arch. Design II	5
Arch.	105 331	Arch. Design I	0	M. E.	560 400	Elem. Thermo.	3
Arch.	105 118	Arch. Assembly	0	Arch.	105 118	Arch. Assembly	0
		Elective	2	Engl.	229 090	English Prof.	0
Total			17	Total			16

FOURTH YEAR

C. E.	525 332	Anal. Stat. Indet. Str.	3	Arch.	105 422	Theory of Struc. II	4
C. E.	525 422	Soil Mech. I	3	M. E.	560 406	Air Cond. A	3
Arch.	105 335	Bldg. Equip. I	3	Arch.	105 437	Bldg. Equip. II	3
Arch.	105 301	Apprec. Arch.	3	C. E.	525 426	Foundations	3
E. E.	530 403	Elem. Cir. & Cont.	4	Ap. M.	510 471	Fluid. Mech.	3
Arch.	105 118	Arch. Assembly	0	Arch.	105 118	Arch. Assembly	0
Total			16	Total			16

FIFTH YEAR

Arch.	105 428	Theory of Struc. III	4	Arch.	105 680	Theory of Struc. IV	4
E. E.	530 406	Illumination A	2	Arch.	105 391	Senior Project in Arch. Struc.	3
Arch.	105 353	Prof. Practice	2			Elective	7
C. E.	525 213	Plane Surveying	3				
		Elective	6	Arch.	105 118	Arch. Assembly	0
Arch.	105 118	Arch. Assembly	0				
Total			17	Total			14

Number of hours required for graduation, 160.

Only four hours of electives may be taken in Basic Military Science. See minor curricula for electives. These need not be taken in order listed in curriculum.

Option in Interior Architectural Design

Bachelor of Architecture

FIRST YEAR

First Semester					Second Semester			
		Course		*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Engl.	229 100	Engl. Comp. I		3	Engl.	229 120	Engl. Comp. II	3
Arch.	105 131	Fund. Design I		2	C. & T.	610 340	Int. Design II	2
Arch.	105 207	Arch. Graph. I		2	Arch.	105 132	Fund. Design II	2
L. A.	110 101	Landscape Design		3	Arch.	105 208	Arch. Graph. II	2
		Elective		3	Hist.	241 111	West. Civ. I	3
Spch.	281 105	Oral Comm. I		2	Psych.	273 110	Gen. Psych. or	
Ph. Ed.	261 011	Physical Education		0	Soc.	297 211	Intro. to Soc.	3
Arch.	105 110	Arch. Lecture		0	Ph. Ed.	261 011	Physical Education	0
					Arch.	105 118	Arch. Assembly	0
Total				15	Total			15

SECOND YEAR

Phys.	265 211	Gen. Phys. I		4	M. L.	253 135	French II	4
M. L.	253 131	French I		5	Arch.	105 270	Hist. of Arch. I	2
Arch.	105 231	Design Analysis		4	Arch.	105 232	Prin. Environ. Des.	4
C. & T.	610 640	Int. Design III		3	Phil.	259 150	Elem. Logic	3
Arch.	105 118	Arch. Assembly		0	Phys.	265 212	Gen. Phys. II	4
					Arch.	105 118	Arch. Assembly	0
Total				16	Total			17

THIRD YEAR

Arch.	105 331	Arch. Design I		5	Arch.	105 332	Arch. Design II	5
Econ.	225 110	Economics I		3	Arch.	105 308	Design Workshop II	2
Arch.	105 307	Design Workshop I		2	M. E.	560 406	Air Cond. A	3
Arch.	105 311	Arch. Constr. I		3	Arch.	105 312	Arch. Constr. II	3
Arch.	105 375	Hist. of Arch. II		2	Arch.	105 378	Hist. of Arch. III	2
Engl.	229 090	English Prof.		0			Elective	2
Arch.	105 118	Arch. Assembly		0	Arch.	105 118	Arch. Assembly	0
Total				15	Total			17

FOURTH YEAR

Arch.	105 481	Int. Arch. Des. I		4	Arch.	105 482	Int. Arch. Des. II	4
Arch.	105 309	Finishing		2	B. A.	305 440	Marketing	3
E. E.	530 406	Illumination A		2	C. & T.	610 645	Hist. of Furn. Des.	3
C. & T.	610 260	Textiles		3	Arch.	105 437	Bldg. Equip. II	3
Arch.	105 379	Hist. of Arch. IV		2			Elective	4
Arch.	105 118	Arch. Assembly		0	Arch.	105 118	Arch. Assembly	0
Arch.	105 413	Environ. Seminar		3				
Total				16	Total			17

FIFTH YEAR

Arch.	105 581	Int. Arch. Des. III		5	Arch.	105 582	Int. Arch. Des. IV	5
Arch.	105 353	Prof. Practice		2	Arch.	105 683	Contem. Furn. Design	4
C. & T.	610 740	Hist. of Fab. Design		3			Elective	7
		Elective		6	Arch.	105 118	Arch. Assembly	0
Arch.	105 390	Inspection Trip		0				
Arch.	105 118	Arch. Assembly		0				
Total				16	Total			16

Number of hours required for graduation, 160.

Only four hours of electives may be taken in Basic Military Science. See minor curricula list for electives. These need not be taken in order listed in curriculum.

Curriculum in Landscape Architecture

Bachelor of Landscape Architecture

FIRST YEAR

First Semester					Second Semester				
			Course	*Sem. Hrs.*				*Course*	*Sem. Hrs.*
L. A.	110	101	Landscape Design	3	Arch.	105	208	Arch. Graph. II	2
Arch.	105	207	Arch. Graph. I	2	Arch.	105	132	Fund. Design II	2
Arch.	105	131	Fund. Design I	2	Engl.	229	120	Engl. Comp. II	3
Engl.	229	100	Engl. Comp. I	3	Hist.	241	111	Hist. West. Civ.	3
Bot.	217	210	Gen. Botany	4	Math.	245	150	Plane Trig.	3
Ph. Ed.	261	011	Physical Education	0	Soc.	277	211	Intro. to Soc.	3
			Elective	2	Ph. Ed.	261	011	Physical Education	0
L. A.	110	201	L. A. Assembly	0	L. A.	110	201	L. A. Assembly	0
Total				16	Total				16

SECOND YEAR

Geog.	235	207	Int. Phys. Geog.	4	Arch.	105	232	Prin. Environ. Des.	4
Arch.	105	231	Design Anal.	4	C. E.	525	213	Plane Surveying	3
Hort.	040	260	Plant Matls. I	3	Hort.	040	270	Plant Matls. II	3
Arch.	105	311	Arch. Constr. I	3	Arch.	105	313	Constr. Drawings	3
			Elective	2	Spch.	281	105	Oral Comm. I	2
L. A.	110	201	L. A. Assembly	0	L. A.	110	201	L. A. Assembly	0
Total				16	Total				15

THIRD YEAR

L. A.	110	442	Pltg. Design I	3	L. A.	110	443	Pltg. Design II	3
L. A.	110	361	Elem. Land. Arch. I	4	L. A.	110	362	Elem. Land. Arch. II	4
L. A.	110	381	Hist. and Th. Land. Arch.	3	L. A.	110	472	Land. Constr. II	3
					Hort.	040	600	Land. Hort.	3
L. A.	110	471	Land. Constr. I	3	B. A.	305	325	Bus. Law I	3
Soc.	277	531	Urban Soc.	3	L. A.	110	201	L. A. Assembly	0
Engl.	229	090	English Prof.	0					
L. A.	110	201	L. A. Assembly	0					
Total				16	Total				16

FOURTH YEAR

L. A.	110	444	Pltg. Design III	3	L. A.	110	462	Elem. Land. Arch. IV	4
L. A.	110	461	Elem. Land. Arch. III	4	C. E.	525	618	Engg. Photo Int.	3
Arch.	105	615	Plan. Prin.	3	L. A.	110	420	Com. Planning	3
L. A.	110	473	Land. Constr. III	3				Elective	2
Phil.	259	150	Elem. Logic	3				Plant Science Elec.	3
L. A.	110	501	L. A. Seminar	1	L. A.	110	501	L. A. Seminar	1
					L. A.	110	480	L. A. Insp. Trip	0
Total				17	Total				16

FIFTH YEAR

L. A.	110	561	Land. Arch. Design I	5	L. A.	110	562	Land. Arch. Design II	5
L. A.	110	585	Design of Parks Rec.	3	L. A.	110	599	Sen. Proj. L. A.	3
Arch.	105	413	Environ. Seminar	3	L. A.	110	591	Prof. Practice	2
			Elective	4				Elective	5
L. A.	110	501	L. A. Seminar	1	L. A.	110	501	L. A. Seminar	1
Total				16	Total				16

Number of hours required for graduation, 160.

Eighteen hours are electives. Of these, only four hours of military science may be counted as electives.

Curriculum in Building Construction

B. S. in Building Construction

FRESHMAN

First Semester					Second Semester			
		Course		*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Engl.	229 100	Engl. Comp. I		3	Engl.	229 120	Engl. Comp. II	3
Math.	245 220	Anal. Geom. & Calc. I		4	C. E.	525 213	Plane Surveying	3
Spch.	281 105	Oral Comm. I		2	Arch.	105 208	Arch. Graph. II	2
Arch.	105 207	Arch. Graph. I		2	Phys.	265 211	Gen. Phys. I	4
Psych.	273 110	Gen. Psych. or			Econ.	225 110	Economics I	3
Soc.	277 211	Intro. to Soc.		3	Ph. Ed.	261 011	Physical Education	0
Ph. Ed.	261 011	Physical Education		0	Arch.	105 118	Arch. Assembly	0
Arch.	105 110	Arch. Lecture		0			Elective	2
Total				14	Total			17

SOPHOMORE

Phys.	265 212	Gen. Phys. II		4	Arch.	105 313	Constr. Drawing	3
Arch.	105 311	Arch. Constr. I		3	Ap. M.	510 205	Appl. Mech. A	3
B. A.	305 325	Business Law I		3	I. E.	550 401	Indus. Management	3
B. A.	305 273	Prin. of Accounting		3	Geol.	234 100	Gen. Geology	3
Phil.	259 150	Elem. Logic		3	Arch.	105 301	Apprec. of Arch.	3
Arch.	105 118	Arch. Assembly		0			Elective	2
					Arch.	105 118	Arch. Assembly	0
Total				16	Total			17

JUNIOR

Ap. M.	510 220	Str. of Materials A		3	Arch.	105 421	Timber Struc.	2
Ap. M.	510 224	Str. of Matls. A Lab.		1	Arch.	105 320	Theory of Struc. I	3
M. E.	560 406	Air Cond. A		3	E. E.	530 406	Illumination A	2
Arch.	105 345	Constr. Prob. I		3	Arch.	105 437	Bldg. Equip. II	3
Arch.	105 335	Bldg. Equip. I		3	Math.	245 350	Computing Techniques	2
Stat.	285 320	Elem. Statistics		3	Arch.	105 353	Prof. Practice	2
Arch.	105 118	Arch. Assembly		0			Elective	3
Engl.	229 090	English Prof.		0	Arch.	105 118	Arch. Assembly	0
Total				16	Total			17

SENIOR

Arch.	105 422	Theory of Struc. II		4	Arch.	105 428	Theory of Struc. III	4
Arch.	105 346	Constr. Estimating		3	Arch.	105 355	Constr. Safety	2
Arch.	105 354	Constr. Management		3	Arch.	105 392	Senior Proj.—	
Arch.	105 413	Environ. Seminar		3			Bldg. Constr.	3
Arch.	105 118	Arch. Assembly		0			Elective	5
		Elective		3	Arch.	105 118	Arch. Assembly	0
					Econ.	225 620	Labor Economics	3
Total				16	Total			17

Number of hours required for graduation, 130.

Only four hours of electives may be taken in Basic Military Science. See Minor Curricula for electives. These need not be taken in order listed in curriculum.

ARCHITECTURE

EMIL C. FISCHER, *Chairman of Curriculum*

Professors Chadwick, Fischer,* Heintzelman,* Helm,* Krider,* Miles,* Thorson* and Wright;* Associate Professors Chang,* Christensen,* Durgan,* Jahnke and Miller;* Assistant Professors Blackman, Cool, Ernst, Hall,* Lippenberger, Melaragno,* Sanner,* Sheppard and Slack;* Instructors Butke and Wendt; Adjunct Professor Shaver; Emeritus: Professor Weigel*

For Curriculums, see pages 98-102

The Curriculum in Architecture prepares students to design all types of buildings. Design problems include residences, governmental and business buildings, schools and churches. A carefully integrated sequence of courses and individual guidance in the design laboratories encourage students to develop creative solutions for these problems. Instruction stresses not only aesthetic considerations but also the proper integration of structure and mechanical equipment.

The curriculum includes courses that develop a student's facility to prepare sketches, contractors' drawings, specifications and structural designs in wood, steel, and concrete.

The Architectural Structures option is offered for the student particularly interested in the design and integration of the mechanical, electrical, and structural systems and equipment in buildings. After thorough inspection in basic mathematics and science, the student applies these principles to structural problems, related equipment, and service problems found in buildings.

Advanced students in Architectural Structures maintain close cooperation with students in the Architectural Curriculum to develop the proper team approach and assure the integration of all the elements necessary for the development of a proper physical environment.

Students in the Interior Architectural Design option are concerned with problems of design related directly to this specialization. After a thorough introduction in basic design, students develop studio exercises involving the design and detailing of interior spaces. The sequence of courses includes problems integrating acoustical considerations, illumination, and mechanical equipment with materials and spatial design. This curriculum is offered for those desiring to specialize in this particular aspect of design.

All student drawings and designs may be retained by the College of Architecture and Design at the discretion of the faculty.

These undergraduate curriculums terminate with the Bachelor of Architecture degree. Graduates enter the architectural profession and practice their various specialties in private practice, public service, or in association with large contractors, engineers, or manufacturers of building products.

The Building Construction Curriculum is designed to prepare graduates for one of the many phases of the construction industry. Instruction includes an introduction to the preparation of architects' drawings, a thorough grounding in structures, business practices and techniques related directly to building. Courses in office management, material storage and procurement, layout, forming and scaffolding, estimating and organization techniques prepare the student for positions as construction superintendents, office managers, estimators and related positions with large contractors. This curriculum terminates with the degree Bachelor of Science in Building Construction.

Students are encouraged to secure practical experience, during the summer vacation, either on construction projects or in the offices of architects, engineers, or contractors.

Within each curriculum, there are several hours reserved for "electives." Each student is encouraged to include a block of courses in one of several related areas of study. These areas of secondary interest are listed on page 97.

Graduate Work:

The degree Master of Architecture is offered in Architectural Design, Architectural Structures and Interior Architectural Design, Urban De-

sign and Environmental Technology, and is available to students holding a bachelor's degree from a recognized college or university with an undergraduate program substantially equivalent to that at this University.

Facilities for graduate work include a well-equipped library of architectural reference material, a large slide collection, exhibition gallery, and well-lighted design studios.

COURSES IN ARCHITECTURE

FOR UNDERGRADUATE CREDIT

105 110. Architectural Lectures. (0) I. Presentation and discussion of the professions of Architecture, Architectural Engineering, Landscape Architecture and Regional Planning. One hour lec. a month. The dean, members of the faculty, and representatives of the above professions will present the lectures.

105 118. Architectural Assembly. (0) I, II. Presentation of professional problems and practices by students, faculty, architects, and various organizations associated with the building industry. One hour lec. a month.

105 131. Fundamentals of Design I. (2) I, II. Exercises in three-dimensional visualization and expression related to spatial organization in Architecture and Landscape Architecture. Six hours lab. a week.

105 132. Fundamentals of Design II. (2) I, II. Cont. of Arch. 131. Experiments and exercises related to the effect of color on spatial design in Architecture and Landscape Architecture. Six hours lab. a week. Pr.: Arch. 131.

105 207. Architectural Graphics I. (2) I, II. Introduction to architectural drawing; preparation for visualizing and graphically presenting subsequent drawing and design problems; emphasis placed on proper use of instruments, lettering, analyzing, and recording architectural ideas accurately. Six hours lab. a week. Pr.: Plane Geometry.

105 208. Architectural Graphics II. (2) I, II. Introduction of third dimensional aspect in drawing—perspective, shades, and shadows. Six hours lab. a week. Pr.: Arch. 207 or equiv.

105 231. Design Analysis. (4) I, II. Exercises in the analysis and synthesis of design principles related to three-dimensional spatial concepts. Problems include experiments demonstrating the effect of color, texture, materials and structure on the organization of space in Architecture and Landscape Architecture. Twelve hours lab. a week. Pr.: Arch. 132.

105 232. Principles of Environmental Design. (4) I, II. Exercises emphasizing a creative approach to the design of architectural spaces. Problems involve an analysis of the interaction of man's functional, material, and aesthetic needs in Architecture and Landscape Architecture. Twelve hours lab. a week. Pr.: Arch. 231.

105 270. History of Architecture I. (2) II. Pre-classical and classical architecture and allied arts. Two hours rec. a week.

105 301. Appreciation of Architecture. (3) I, II. An analysis of the evolution of architectural styles to determine the relation of architectural expression to the needs of society. Three hours rec. a week. May not be taken for credit by students enrolled in the architectural design and interior curricula.

105 307. Design Workshop I. (2) I, II. Introduction to various materials, construction methods, and application of principles related to design and construction for interiors. Six hours lab. a week. Pr.: Arch. 232.

105 308. Design Workshop II. (2) I, II. Design and construction of special projects for interiors. Six hours lab. a week. Pr.: Arch. 307.

105 309. Finishing. (2) I, II. Methods of finishing various materials for interiors. Six hours lab. a week. Pr.: Arch. 232.

105 311. Architectural Construction I. (3) I, II. Study of the technology of building materials and their assembly. Nine hours lab. a week. Pr.: Sophomore classification for landscape and building construction students; junior classification for all others.

105 312. Architectural Construction II. (3) I, II. Cont. of Arch. 311 applied to the production of a complete set of working drawings of a building. Nine hours lab. a week. Pr.: Arch. 311 and 331.

105 313. Construction Drawings. (3) II. Field layout problems. Emphasis on construction procedures, site topography, and shop drawings. Building construction and landscape architecture majors. Pr.: Arch. 311, C. E. 213, or C. E. 213 taken concurrently.

105 320. Theory of Structures I. (3) I, II. Bar stresses in trusses; solid and framed arches; mathematical and graphical solutions of stresses and deflections in beams under static and moving loads. Three hours rec. a week. Pr.: Ap. M. 220.

105 331. Architectural Design I. (5) I, II. Discussion and analysis of simple building types relating the principles of environmental technology to man's needs. Faculty evaluation of graphical presentations. Fifteen hours lab. a week. Pr.: Arch. 232.

105 332. Architectural Design II. (5) I, II. Cont. of Arch. 331. Fifteen hours lab. a week. Pr.: Arch. 331.

105 335. Building Equipment I. (3) I. Sanitation, hot and cold water supply, plumbing, drainage, venting, sewage disposal, vertical transportation and hardware relating to all types of buildings; design problems. Two hours rec. and three hours lab. a week. Pr.: Arch. 332, Gen. Phys. 211, or Engg. Phys. 311.

105 341. Architectural Design III. (5) I, II. Cont. of Arch. 332. Discussion and analysis of more complicated building types. Faculty evaluation of graphical presentations. Fifteen hours lab. a week. Pr.: Arch. 320, 332, and 421.

105 342. Architectural Design IV. (5) I, II. Cont. of Arch. 341. Fifteen hours lab. a week. Pr.: Arch. 320, 341, 421, and 422.

105 345. Construction Problems I. (3) I. The solution of practical problems normally encountered in the erection of buildings, layouts, design of form work and scaffolding; materials storage and handling; job organization demonstrations, research and drawings. Nine hours lab. a week. Pr.: Arch. 311.

105 346. Construction Estimating. (3) I. Principles, theories and methods of building estimating. Nine hours lab. a week. Pr.: Arch. 313.

105 351. Architectural Design V. (5) I, II. Discussion and analysis of urban building groups, site planning and integration of all facets of environmental technology and structural systems. Fifteen hours lab. a week. Pr.: Arch. 320, 342, 421, 422, and 428.

105 352. Architectural Design VI. (5) I, II. Thesis—programming, development and presentation of a complete building including the mechanical, acoustical and structural problems that influence the design. Fifteen hours lab. a week. Pr.: Arch. 351.

105 353. Professional Practice. (2) I, II. The preparation of building documents; interpretation of building codes and analysis of A. I. A. documents; office organization, client and contractor relationships. Two hours rec. a week. Pr.: Arch. 312 and senior classification.

105 354. Construction Management. (3) I. Business and management procedures of contracting construction project operations; critical path, planning and scheduling, investigations and reports. Three hours rec. a week. Pr.: Arch. 346 or taking concurrently Arch. 353.

105 355. Construction Safety. (2) II. Accident prevention, safety techniques, practices, identification of hazards, planning, worker education, law and codes. Two hours rec. a week.

105 366. Problems in Architectural Design. Credit arranged. S. Study

of specific design problems under the direct supervision of a member of the architectural faculty. Pr.: Approval of instructor.

105 375. History of Architecture II. (2) I. Medieval architecture and allied arts. Two hours rec. a week.

105 378. History of Architecture III. (2) II. Renaissance architecture and allied arts. Two hours rec. a week.

105 379. History of Architecture IV. (2) I. Cont. of Arch. 378 through modern architecture and allied arts. Two hours rec. a week. Pr.: Arch. 378.

105 390. Inspection Trip. (0) Required. I. An inspection trip is made to one of the larger cities of the Middle West by the senior students in architectural engineering and the fourth-year students in architecture. The inspection party is under the charge of one or more faculty members of the College of Architecture and Design. Time allotted to the trip is from three days to one week.

105 391. Senior Project—Architectural Structures. (3) II. Student working individually with laboratory support will prepare and present a thesis of appropriate scope and complexity and be required to defend the thesis before a selected jury. Nine hours lab. a week. Pr.: Terminal semester.

105 392. Senior Project—Building Construction. (3) II. The student will be required to present a report of appropriate scope and defend the report before a selected jury. Six hours lab. a week. Pr.: Terminal semester.

105 399. Honors Seminar in Architecture. Credit arranged. On sufficient demand. Selected topics in architecture and engineering. Primarily for honors students.

FOR UNDERGRADUATE AND GRADUATE CREDIT

105 413. Environmental Seminar. (3) II. A discussion of the influence of environmental technology upon design concepts. Three hours rec. a week. Pr.: Approval of instructor.

105 421. Timber Structures. (2) I, II. Analysis and design of timber structures using solid and laminated materials. Two hours rec. a week. Pr.: Ap. M. 224 or 415. Pr. or conc.: Arch. 320 or C. E. 330.

105 422. Theory of Structures II. (4) I, II. Analysis and design of metal structures; emphasis on buildings. Two hours rec. and six hours lab. a week. Pr.: Arch. 320 and 421.

105 428. Theory of Structures III. (4) I, II, S. Design of reinforced concrete building frames; footings, columns and floor systems, attention being given to costs and economical design. Two hours rec. and six hours lab. a week. Pr.: Ap. M. 224.

105 437. Building Equipment II. (3) II. Fundamentals of architectural acoustics, transmission loss, auditorium acoustics, noise control; design problems. Two hours rec. and three hours lab. a week. Pr.: Arch. 332, Gen. Phys. 211, or Engg. Phys. 311.

105 460. Mosaic. (2) I, II. Design and execution of mosaic compositions in glass, stone and other materials; study of historic and modern examples of mosaic and related media, with particular reference to their architectural uses and techniques. Six hours lab. a week. Pr.: Arch. 131 and 132, or approval of instructor.

105 475. Problems in Architectural Presentation. Credit arranged. I, II, S. Study of various methods of graphically representing architectural problems to develop professional office techniques. Pr.: Third-year standing and approval of instructor.

105 481. Interior Architectural Design I. (4) I. Discussion and analysis of spaces of various simple building types; emphasis on selection and application of materials for specific uses; graphical presentation of their spatial relationship. Fifteen hours lab. a week. Pr.: Arch. 332.

105 482. Interior Architectural Design II. (4) II. Cont. of Arch. 481. Discussion and analysis of more complicated spaces; relation of interior-

exterior and vertical-horizontal spaces; graphical presentation of these problems. Fifteen hours lab. a week. Pr.: Arch. 481.

105 581. Interior Architectural Design III. (5) I. Discussion and analysis of spaces from the 15th century to the present; the characteristics of period design as related to the need and technological development of the time; graphical presentation of historical examples. Fifteen hours lab. a week. Pr.: Arch. 482.

105 582. Interior Architectural Design IV. (5) II. Analysis, development and presentation of complex spatial organization integrating such factors as sound control, mechanical equipment, and lighting; problems coordinated with Arch. 342. Fifteen hours lab. a week. Pr.: Arch. 581.

105 660. Environmental Aesthetics. (3) I, II. Problems involving aesthetics in areas related to student's major field. Nine hours lab. a week. Pr.: Senior standing in Architecture, Landscape Architecture, Interior Design, Architectural Structures, Urban Design.

105 680. Theory of Structures IV. (4) I. Cont. of Theory III, with special emphasis being placed on the complete problem of the structure as a whole. Three hours rec. and three hours lab. a week. Pr.: Arch. 428.

105 683. Contemporary Furniture Design. (4) II. Student will develop studies, models and technical drawings of furniture for various building types. Problems will include the coordination of materials, design and structural techniques. Availability of shops will permit the development of full-scale projects. Twelve hours lab. a week. Pr.: Arch. 308 and 309.

105 690. Advanced Environmental Seminar. Credit arranged. I, II. Architectural design aspects of environmental systems related to human perception and reaction to environmental variables. Pr.: Senior standing in Architecture, Landscape Architecture, Interior Design, Architectural Structures, Urban Design.

105 765. Problems in Architecture. Credit arranged. I, II, S. Under direct supervision of some member of the departmental staff; study of specific architectural problems. Pr.: Approval of instructor.

FOR GRADUATE CREDIT

105 810. Research in Architecture. Credit arranged. I, II, S. Original investigation or advanced study in architectural design, planning, industrial design, and related fields. Pr.: Approval of instructor.

105 815. Theory of Design. (3) II. Theories of leaders in design professions including related cultural and technological fields. Three hours rec. a week. Pr.: Degree in Architecture, Landscape Architecture, Interior Design, Architectural Structures, Urban Design.

105 820. Advanced Interior Architectural Design. (4) I, II. Problems in synthesizing and integrating environmental and structural systems with interior space and furnishings. Pr.: Degree in Architecture, Landscape Architecture, Interior Design, Architectural Structures, Urban Design.

105 830. Advanced Architectural Design. Credit arranged. I, II, S. A study of important buildings and groups of buildings. May furnish material for the master's thesis. Pr.: Arch. 352.

105 885. Structural Systems Design. (3) I, II. A study of integrated structural, mechanical and electrical systems; economic evaluation. Two hours rec. and three hours lab. a week. Pr.: Arch. 105, 680 or consent of instructor.

LANDSCAPE ARCHITECTURE

ROBERT P. EALY,* *Director*

Professor Ealy, Associate Professor Parks,* Assistant Professor Day,* Instructors Barnes and Bartlett, Professor Emeritus Quinlan*

The degree Bachelor of Landscape Architecture is conferred upon those who successfully complete this course of study at Kansas State

University. The curriculum is designed to prepare students for the field of professional landscape architecture and is a carefully balanced program drawing from several related areas. Special emphasis is placed upon space organization, land planning, topographical manipulation, landscape planning and construction, and the role of adapted plant materials in the landscape. Field trips may be required of students in all courses numbered 361 and above.

The Curriculum in Landscape Architecture is accredited by the American Society of Landscape Architects.

Graduates may be employed by professional firms of landscape architects, and by municipal, state and national governmental agencies working with housing, parks, highways and other land-planning areas. Many graduates later establish their own professional offices and some enter the teaching field. Others go on to do graduate work in landscape architecture or city and regional planning.

Graduate Work:

The degree Master of Landscape Architecture is available to those holding a bachelor's degree from a recognized college or university with an undergraduate program substantially equivalent to the program in landscape architecture at this University.

COURSES IN LANDSCAPE ARCHITECTURE

FOR UNDERGRADUATE CREDIT

110 100. General Landscape Design. (3) I, S. An introductory course in the fundamental principles of landscape design, and an appreciation of man's natural environment. Three hours rec. a week.

110 101. Landscape Design. (3) I. An introduction to the basic principles of landscape design as they relate to man's natural environment and his improvement of the landscape. For landscape architecture and architecture majors only. Three hours lec. a week.

110 201. Landscape Architecture Assembly. (0) I, II. Required of all landscape architecture majors in first, second and third years. Presentations related to the profession and the program of study. One hour lec. a month.

110 361. Elements of Landscape Architecture I. (4) I. Graphic expression of landscape architectural site developments; emphasis on site analysis, program analysis and the resultant development of concept as a point of departure in landscape architectural design. Twelve hours lab. a week. Pr.: L. A. 101, Arch. 232.

110 362. Elements of Landscape Architecture II. (4) II. Cont. of L. A. 361. Twelve hours lab. a week. Pr.: L. A. 361 and 471.

110 381. History and Theory of Landscape Design. (3) I. Economic and aesthetic theory of landscape design; history and historic styles. Three hours rec. a week. Pr.: L. A. 101.

FOR UNDERGRADUATE AND GRADUATE CREDIT

110 420. Community Planning. (3) I, II. Growth and development of cities and towns; land subdivision. Eight hours lab. a week.

110 440. Problems in Landscape Design. Credit arranged. I, II, S. Assigned problems and reports in the area of landscape architecture. Pr.: Junior classification.

110 442. Planting Design I. (3) I. Use of plants as design elements in landscape architectural developments; preparation of sketches and plans. Nine hours lab. a week. Pr.: Hort. 260 and 270, Arch. 232.

110 443. Planting Design II. (3) II. Cont. of L. A. 442. Nine hours lab. a week. Pr.: L. A. 442.

110 444. Planting Design III. (3) I. Preparation of planting plans and their use as working drawings; specification writing, contractor relationships and maintenance procedures. Nine hours lab. a week. Pr.: L. A. 443.

110 461. Elements of Landscape Architecture III. (4) I. Investigations of more complex site developments, with emphasis on the interrelations among land forms, simple structures and man. Twelve hours lab. a week. Pr.: L. A. 362 and 472.

110 462. Elements of Landscape Architecture IV. (4) II. Cont. of L. A. 461. Twelve hours lab. a week. Pr.: L. A. 461 and 473.

110 471. Landscape Construction I. (3) I. Field problems in topographic expression; preparation of site and grading plans; earthwork and utilities. Eight hours lab. a week. Pr.: Arch. 208, C. E. 213, L. A. 101.

110 472. Landscape Construction II. (3) II. Cont. of L. A. 471. Eight hours lab. a week. Pr.: L. A. 471.

110 473. Landscape Construction III. (3) I. Preparation of construction details; estimates and specifications for landscape architectural site developments. Nine hours lab. a week. Pr.: L. A. 472.

110 480. Landscape Architecture Inspection Trip. (0) II. Required of all fourth-year landscape architecture majors. A two- to five-day trip to visit professional offices and completed projects in the region. Faculty member will be in charge.

110 501. Landscape Architecture Seminar. (1) I, II. Required of all fourth- and fifth-year landscape architecture majors. Meets second and fourth Thursdays of each month. Discussion of current trends in landscape architecture and related fields by students, faculty and invited speakers.

110 561. Landscape Architectural Design I. (5) I. Design and development of large-scale sites, with emphasis on massing studies of all the elements of the landscape and their relation to health, welfare and safety of, and enjoyment by man. Fifteen hours lab. a week. Pr.: L. A. 420, 443, 462 and 473.

110 562. Landscape Architectural Design II. (5) II. Cont. of L. A. 561. Annual field trip required. Fifteen hours lab. a week. Pr.: L. A. 561.

110 585. Design of Parks and Recreation Areas. (3) I. Site planning of national, state, municipal and private parks and specialized recreation areas. Nine hours lab. a week. Pr.: L. A. 462 and 473.

110 591. Professional Practice. (2) II. Ethics, office practice and procedure, contracts and specifications. A professional resumé is required. Two hours rec. a week. Pr.: Fifth-year classification.

110 599. Senior Project in Landscape Architecture. (3) I, II, S. Investigation of a landscape architectural problem of regional significance. Designed as a terminal project for landscape architecture majors. Studio time by appt. Pr.: Fifth-year classsification.

110 650. Site Analysis and Planning. (3) II. An ecological approach to analysis of the earth's surface as a base plane for the projects of the architect, landscape architect and planner. Six hours lab. a week. Pr.: L. A. 101, C. E. 213, or consent of instructor.

110 660. A Survey of Landscape Architecture. (3) II. Landscape architecture and the role of the landscape architect as a member of the design team charged with improving our environment. Three hours rec. a week. Pr.: Fourth-year classification in architecture.

110 741. Problems in Landscape Architecture. Credit arranged. I, II, S. Specific problems and/or reports in the area of landscape architecture. Pr.: Advanced undergraduate standing or graduate standing.

FOR GRADUATE CREDIT

110 870. Problems in Advanced Landscape Architecture. (1-3) I, II, S. Special studies and designs in advanced landscape architecture. Pr.: L. A. 473.

110 880. Problems in Advanced Landscape Construction. (1-3) I, II, S. Specialized study of large-scale landscape planning involving landscape construction and grading. Pr.: L. A. 562.

110 890. Research in Landscape Architecture. Credit arranged. I, II, S. Investigations in landscape architecture and related areas, of such caliber as to form the basis for a graduate thesis. Pr.: Graduate standing in landscape architecture.

CURRICULUM IN REGIONAL AND COMMUNITY PLANNING

VERNON P. DEINES, *Director*

Associate Professor Deines; Adjunct Assistant Professor Edmonds; Assistant Professors Ernst, McGraw* and Weisenburger*

Study leading to the two-year professional graduate degree Master of Regional and Community Planning has been offered on an interdepartmental basis since 1957 by the Curriculum in Regional and Community Planning in cooperation with the Departments of Architecture, Civil Engineering, Economics, Geography and Geology, Landscape Architecture, Political Science and Sociology and the Colleges of Agriculture, Commerce, Education and Home Economics. The program is directed towards providing broad interdisciplinary training in the social sciences and the design professions for directors of planning and development in cities, counties, regions and states; schools, colleges and universities; business firms, industrial plants, and military installations; and other relevant organizational frameworks.

Graduate students with undergraduate degrees in administration, agriculture, architecture, commerce, economics, education, engineering, geology and geography, government, home economics, landscape architecture, law, planning, political science and sociology, who meet the requirements of the Graduate School for admission, are fully acceptable. Students with other academic backgrounds may be accepted upon approval of the interdepartmental committee and subject to such conditions as they may impose.

Undergraduate students may elect to take planning courses either in preparation for graduate study or in fulfillment of undergraduate minor options and electives.

Graduate students may also work towards the traditional one-year Master of Arts or Master of Science degree in their discipline or profession with a minor in planning.

Regional and community planning requires the application of intelligent forethought to the total development of cities, counties, regions, states and the nation. This encompasses both the understanding of the physical environment, traditional in city planning, as well as the recognition of the economic, social and political forces of the society. Professional planners prepare plans and set policies to guide community and regional growth. The design principles of architecture, landscape architecture, and civil engineering are combined with the knowledge of the social sciences, such as economics, geography, political science and sociology, and the techniques of the allied professions, such as agriculture, commerce, education, government, law and home economics.

Since 1945, rapidly increasing awareness of the problems of urbanization has created a demand for professionally trained planners. Although some positions have been filled by allied professionals from other fields, the more responsible positions require advanced professional graduate training. Graduate planners are employed as staff members or directors of city, county, regional, metropolitan, state and national planning agencies, including housing and urban renewal recreation and open space, transportation, and economic and social development; practice as planning and design consultants in these fields; and work in business, government, education, industry and the military in the planning and development of large-scale projects, including shopping centers, civic centers, campuses, industrial parks, and military facilities.

COURSES IN REGIONAL AND COMMUNITY PLANNING

FOR UNDERGRADUATE CREDIT

105 215. Introduction to Planning. (3) I, II, S. The origins and evolution of planning in response to economic, social, political and physical problems. The planning process and its relationship to the design professions and the social and behavioral sciences. Three hours rec. a week. Pr.: Sophomore standing.

FOR UNDERGRADUATE AND GRADUATE CREDIT

105 605. Planning Graphics. (2) I. Study and application of visual communication media utilized in regional and community planning to simulate the spatial and aspatial aspects of the environment. Pr.: Approval of instructor.

105 615. Planning Principles. (3) I, II, S. Examination of principles and elements of regional and community planning, including growth forms, physical patterns, planning stages, standards, control measures and procedures. Pr.: Senior standing or approval of instructor.

105 625. Planning Theory. (3) I. Review of basic theories of regional and community growth and change; analysis of the process of urbanization in relation to societal determinants and environmental constraints, and the synthesis of a process of planning. Pr.: Completion of Soc. 531 and Pol. Sci. 616, or equiv.

105 635. City Planning I. (3) I, S. Review of the principles and elements of city growth and change. Criteria and methodology for city analysis and planning are examined and applied to the elements of cities. Pr. or conc.: Arch. 615 or 625.

105 645. Urban Design I. (3) I, II. Review of recent historical developments of urban form and space. Criteria and methodology for urban design and planning are examined and applied to the elements of cities. Pr. or conc.: Arch. 615 or 625.

105 655. Regional Planning I. (3) II. Review of the principles and elements of regional growth and change. Criteria and methodology for regional analysis and planning are examined and applied to the elements of regions. Pr.: Arch. 615 or 625.

105 695. Topics in Planning. Credit arranged. I, II. S. The study of selected concepts and trends in regional and community planning and development. Pr.: Arch. 615 or graduate standing.

105 710. Urban Visual Analysis. (2) II. Survey and analysis of urban form and space in relation to aesthetic theories and values. Methods of visual perception and analysis are reviewed and applied to contemporary urban form and space. Pr.: Arch. 645 or equiv.

105 750. Housing and Renewal. (3) II. Review and evaluation of federal, state and local policies and programs of urban renewal and housing. Pr.: Arch. 615 or 625.

FOR GRADUATE CREDIT

105 805. Internship in Planning. (0) I, II, S. Assignment to a planning staff for a period of at least 10 weeks; supervision by a professional planner with periodic reports of activities to planning faculty. Pr.: Completion of two semesters of graduate study in planning.

105 825. Advanced Planning Theory. (3) II. Review of empirical and normative theories of regional and community planning; analysis of principles, hypotheses, concepts and laws of planning and synthesis of a theory of planning. Pr.: Arch. 615 or 625.

105 835. City Planning II. (3) I. Synthesis of city growth and change in relation to planning theory and socio-economic-political determinants. Criteria and methodology for city analysis and planning are reviewed and applied to the elements of the contemporary city. Pr.: Arch. 635 or equiv.

105 845. Urban Design II. (3) II. Synthesis of urban form and space in relation to aesthetic theories and values and socio-economic-political

determinants. Criteria and methodology for urban design and planning are reviewed and applied to contemporary urban form and space. Pr.: Arch. 645 or equiv.

105 855. Regional Planning II. (3) I. Synthesis of regional growth and change in relation to planning theory and socio-economic-political determinants. Criteria and methodology for regional analysis are reviewed and applied to the elements of the contemporary region. Pr.: Arch. 655 or equiv.

105 875. Planning Legislation and Regulation. (3) I, II. Basic state enabling legislation for urban, metropolitan and regional planning, zoning, subdivision regulation, urban renewal and housing codes; federal assistance and planning guides; local interagency relationships. Pr.: Approval of instructor.

105 890. Research in Planning. Credit arranged. I, II, S. Original research and advanced study in regional and community planning, urban design, and related fields for thesis or master's report. Pr.: Registration in Graduate School and completion of two semesters of graduate study in planning.

CENTER FOR COMMUNITY PLANNING SERVICES

PROFESSOR VERNON P. DEINES, *Director*

The Center for Community Planning Services, a joint function of the Interdepartmental Program in Regional and Community Planning and the College of Architecture and Design at Kansas State University, has as its goal increased public awareness of community and regional planning and development. The Center for Community Planning Services at Kansas State University has a threefold function: the creation of public understanding of comprehensive planning, the supply of basic information about new techniques and programs in planning, and the conduct of research on planning problems and methods. These functions of the Center are closely related to the interdepartmental graduate program in community and regional planning.

The public understanding of comprehensive planning is accomplished through the community development short courses which have been held since 1961 (six two-hour sessions presented to communities embarking on a planning program), the annual Kansas planning conference which has been held since 1954 (jointly sponsored by the University of Kansas, Kansas State University and the Kansas Department of Economic Development), and through cooperative action with other state and university extension programs (such as the present Title I program with Continuing Education). The supply of basic information about new techniques and programs in planning is achieved through a planning information service (inquiries are handled on an individual basis and pamphlets of general information are distributed), a planning procedures and programs library (manuals and technical references are available for use), and the annual Kansas planning conference (special exhibits and brochures are available for viewing). The conduct of research on planning problems and methods is accomplished through the directed research of the faculty and graduate students in the interdepartmental planning program (supported by state and federal agencies), and by cooperative action with other state and university research efforts (the state planning program is a current example).

During the last six years over 60 Kansas communities have received the six-lesson short course in "Community Development" with sponsorship from cities, counties or local civic groups. In 1967 alone some 500 community leaders participated in the short courses and meetings held by the Center. This has resulted in the application by a number of cities and counties for planning assistance. These grants, administered through the Planning Division of the Kansas Department of Economic Development, have resulted in studies leading to comprehensive planning for a

number of Kansas communities. As a result of the short courses and meetings, local leaders have had a better understanding of the planning process and have undertaken planning programs with strong local support.

The responsibility for the community industrial survey program was transferred in the fall of 1967 to the Center for Community Planning Services from the Division of Engineering and Industrial Extension. This program has, since its inauguration in the fall of 1947, made a significant contribution to the local development efforts in the state with the completion of more than 100 surveys for Kansas communities. The community surveys are studies of the assets and liabilities of a community, aimed at the formulation of a program of local expansion and stabilization for the community. As a general rule, the local Chamber of Commerce is the sponsoring organization, although other civic groups and local governing bodies have acted in that capacity. The study is conducted under the direction of Center personnel, using local people in the gathering of data and circulation of questionnaires. The report is then compiled and published at the University.

Recent research studies have included a study of shopping centers, an analysis and development of effective local outdoor advertising control, a comparative analysis of Air Force and civilian land use planning, a study of small city central business districts, reservoir development, a plan for air base community centers, the development of regional delineation procedures, the study of highway aesthetics, and the formulation of an urban extension model. These studies are reported in detail in the 1966 Engineering Experiment Station bulletin. Current research studies include rural and county planning, recreational planning, neighborhood analysis, industrial development, central business district redevelopment, state planning and gaming simulation.

In the future, the Center will continue to serve as the focus for community and regional planning and development services at Kansas State University in cooperation with other extension, research, and education units of the University, private organizations and foundations and state and federal agencies.

The College of Arts and Sciences

JOHN CHALMERS, *Dean*
WILLIAM L. STAMEY, *Associate Dean*
ORVAL EBBERTS, *Assistant Dean*
MARJORIE ADAMS, *Assistant Dean*
JOHN P. MURRY, *Assistant to the Dean*
MICHAEL A. NOVAK, *Assistant to the Dean*

The College of Arts and Sciences through its 21 departments and two divisions offers programs of study which enable the student to acquire a broad preparation for life in a democratic society, to obtain a sound basis for his professional training, or to receive training in the specific skills required for service in his chosen field of endeavor.

The courses offered in the College of Arts and Sciences provide the student an opportunity to develop his skill in communication with others, to appreciate the heritage of the past, to understand the laws of nature, to participate in the arts, and to maintain a healthy body. Courses in specific subject matter provide the professional training for scientists, research workers, teachers, technicians, and writers.

Students who enter the College of Arts and Sciences with a potential for unusual scholastic attainment will be invited to participate in the Honors Program. This selection is based on the performance of the student in high school and an evaluation of his ability in comparison with all entering students at Kansas State. The evaluation is determined by a study of performances on entrance tests which are administered to each student. Students participating in the Honors Program will have the requirements of their curriculums adjusted to their individual abilities and thus will be offered the opportunity o fobtaining a more individualized program of study in consultation with an Honors Program adviser. Students previously enrolled in the College of Arts and Sciences who have demonstrated outstanding scholastic achievement may also be invited to participate in the Honors Program.

The College of Arts and Sciences offers all students an opportunity to undertake independent study and thereby to strengthen their capacity for independent judgment. This program provides for independent reading in areas of general interest. The course is:

199. Arts and Sciences. (2) I. Summer reading of selected important books in natural sciences, social sciences, and humanities, and examination in early fall. Pr.: Pre-registration in May to enroll the following fall.

A list of the areas in which a student in the College of Arts and Sciences may major together with the degree received is given in the following table. The specific requirements for a degree in the various curriculums are indicated on pages 115-123.

In each of the curriculums there are requirements in general education that are to be fulfilled by courses chosen by the student in consultation with his adviser. The aim of these requirements is to provide breadth in the student's program through some study in each of the major areas of knowledge outside the field of specialization. Introductory and intermediate level courses are available for this purpose in departments in the natural sciences, social sciences, and humanities.

DEGREES AND MAJORS

A. B.[1]	*B. S.*[1]	*B. of Music*	*B. S. in Music Education and Physical Education*
Art		Music	Music
Biology	Biology		Physical Education
Chemistry	Chemistry		
Economics	Economics		
English			
General (Area Major)	General (Area Major)		
Geology	Geology		
Geography	Geography		
History	History		
Mathematics	Mathematics		
Modern Language			
Philosophy			
	Physics		
Political Science	Political Science		
Psychology	Psychology		
Sociology, Anthropology	Sociology and Anthropology		
Speech	Speech		
Statistics and	Statistics and		
Computer Science	Computer Science		
Technical Journalism	Technical Journalism		
Pre-Professional	Pre-Professional		
Physical Therapy	Physical Therapy		
Pre-Medicine	Medical Technology		
Pre-Dentistry	Pre-Dentistry		
Pre-Law	Pre-Law		
	Pre-Medicine		
	Pre-Nursing[2]		
	Pre-Pharmacy[3]		
Pre-Social Work	Pre-Social Work		
	Pre-Veterinary[4]		

1. Students working toward an A. B. or B. S. degree may if they wish teacher certification for secondary schools fulfill requirements for a major in most departments in the College of Arts and Sciences and teacher certification requirements in the College of Education (See page 244).

2. Requirements for a degree to be completed in a professional school of nursing.

3. Requirements for a degree to be completed in a professional school of pharmacy.

4. Pre-Veterinary requirements may also be completed in the College of Agriculture (See page 54).

BACHELOR OF ARTS DEGREE

120 hours required for graduation

I. General Requirements

A. English Composition I and II; English Proficiency.
2 courses

B. Oral Communication I (or Oral Communication II, Argumentation and Debate, or Language and Communication as recommended by Department of Speech).
1 course

C. Modern Languages.
2 years in 1 language (or equivalent competence)

D. Mathematics.
1 course

*E. Humanities (from Departments of Art, English, History, Modern Languages, Music, Philosophy, and Speech).
3 courses, including one course above the introductory level (400 level or above)

* No more than three courses in history to fulfill E and F.

*F. Social Science (from Departments of Economics, History, Political Science, Psychology, Sociology and Anthropology, Technical Journalism, and Division of Geography).

3 courses, including one course above the introductory level (400 level or above) (excluding Geography 150 and 151)

G. Natural Science (from Division of Biology and Departments of Chemistry, Geology, Geography 150 and 151, Mathematics, Physics, or Statistics and Computer Science).

4 courses, including one laboratory and one course above the introductory level (a course which has a prerequisite in the same department in which it is located)

H. Physical Education (or marching band or varsity sports).

2 courses

***II.** Major Requirements: Remaining hours in major and additional tool and related courses and electives.

Pre-professional programs will be administered as before by the appropriate department or, where not applicable, by the Office of the Dean of Arts and Sciences.

BACHELOR OF SCIENCE DEGREE

120 hours required for graduation

I. General Requirements

A. English Composition I and II; English Proficiency.

2 courses

B. Oral Communication I (or Oral Communication II, Argumentation and Debate, or Language and Communication as recommended by Department of Speech).

1 course

C. Humanities and Social Sciences (from Departments of Art, Economics, English, History, Modern Languages, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology, Speech, Technical Journalism or Division of Geography).

7 courses, taken from at least two departments, including 1 course in Philosophy, 2 advanced level courses (400 level or above or second year of foreign language) (excluding Geography 150 and 151)

D. Natural Science (from Division of Biology and Departments of Chemistry, Geology, Geography 150 and 151, Mathematics, Physics, or Statistics and Computer Science).

4 courses, including one laboratory and one course above the introductory level (a course which has a prerequisite in the same department in which it is located)

E. Physical Education (or marching band or varsity sports).

2 courses

***II.** Major Requirements: Remaining hours in major and additional tool and related courses and electives.

Pre-professional programs will be administered as before by the appropriate department or, where not applicable, by the Office of the Dean of Arts and Sciences.

BACHELOR OF MUSIC DEGREE

Hours required for graduation, men and women 128

The student in this curriculum is offered the option of majoring in instrument or voice. These options give the student the opportunity for personalized major instruction in voice, piano, violin, organ, or other instruments and the opportunity to minor in another of these fields. See also page 182.

* Each department and division within the College of Arts and Sciences may offer either the B. S. or A. B. degree or both the B. S. and A. B. degrees.

REQUIREMENTS

I. Communications: English Composition I and II, six hours; Oral Communication, two hours; English Proficiency.

II. Physical Education, two semesters.

III. General Psychology (three hours) and Physics for Musicians (three hours).

IV. General Education (see page 246): Natural science and social science with one course in each area, 11 hours.

V. Modern Language, nine to 18 semester hours.

VI. Remaining hours in major, additional tool and related courses, and free electives. For major requirements, see catalog statement for Department of Music, page 182.

Students in the first year of this curriculum may plan their courses as follows:

VOICE OPTION

FRESHMAN

First Semester		Second Semester	
Course	*Hours*	*Course*	*Hours*
English Composition I	3	English Composition II	3
General Psychology	3	Oral Communication I	2
Physical Education	0	Physics for Musicians	3
Theory of Music I	3	Physical Education	0
Voice	4	Theory of Music II	3
Piano (Minor)	1	Voice	4
Music Organization	1	Piano (Minor)	1
Recital Attendance	0	Music Organization	1
		Recital Attendance	0
Total	15	Total	17

INSTRUMENTAL OPTION

FRESHMAN

First Semester		Second Semester	
Course	*Hours*	*Course*	*Hours*
English Compositon I	3	English Composition II	3
General Psychology	3	Oral Communication I	3
Physical Education	0	Physics for Musicians	3
Theory of Music I	3	Physical Education	0
Applied Major	4	Theory of Music II	3
Piano	1	Applied Major	4
Music Organization	1	Piano	1
Recital Attendance	0	Music Organization	1
		Recital Attendance	0
Total	15	Total	17

BACHELOR OF SCIENCE IN MUSIC EDUCATION DEGREE
BACHELOR OF SCIENCE IN PHYSICAL EDUCATION DEGREE

Hours required for graduation, men and women 126*

This curriculum provides the following major fields: pre-elementary education, secondary education, music education, physical education. Special curriculums exist in Agricultural Education, page 256, and Home Economics Teaching, page 314.

The theoretical and practical instruction given in this curriculum, with a major in physical education for men or physical education for women, prepares the student for teaching physical and health education and for coaching athletic games. By proper selection of electives, the student may qualify to teach one or more subjects outside the field of specialization.

The curriculum in education offers a major in music education with two options: voice or instrumental music. The student who completes this curriculum with a major in music education is eligible to receive a special state certificate to teach music and by proper choice of subjects may qualify for certification in a subject matter field.

Students in other curriculums may qualify for teacher certification by meeting the requirements included in this curriculum, plus 20 hours of professional education courses (section III below) as electives.

* Except for Music Education, which requires 128 hours for men and women.

Pre-Education Majors

Freshman and sophomore students desiring the Bachelor of Science Degree in Elementary Education or the Bachelor of Science Degree in Secondary Education are enrolled in the Pre-Education Curriculum in the College of Arts and Sciences. Pre-Secondary Education students are advised by an Arts and Sciences adviser in their major teaching field and by a College of Education adviser. Pre-Elementary Education students are advised by a College of Education adviser. The College of Education adviser for Pre-Education advises in the Dean's Office of the College of Arts and Sciences. All Pre-Education students must make application for admission to Teacher Education during their sophomore year. (See page 244.) Acceptance into Teacher Education is required of those students who wish to enroll in the College of Education at the beginning of the junior year.

Major Fields

Pre-Elementary Education[1]
Music Education
Pre-Secondary Education[2]
Physical Education
Men
Women

REQUIREMENTS

I. Communications: English Composition I and II, six hours; Oral Communication, two hours; English Proficiency.

II. General Education (see page 246):

1. Social science (including history), 12 hours.
2. Humanities (literature, language), six hours.[2]
3. Natural science, 16 hours, including at least one course in biology and one course in physical science, but not including more than four hours of mathematics.

For students in Music Education: Natural science, 12 hours, with one course in each of physical science and biological science.

4. Each student, except those in Music Education, must include a scientific laboratory in his program of study.[3]
5. Electives in humanities, social science and natural science to total, when combined with I and II—1, 2, 3, 50 hours.

III. Professional Education.

1. Educational Psychology I and II, six hours.
2. Principles of Elementary Education or Principles of Secondary Education and Educational Psychology, six hours.
3. A minimum of six semester hours in directed teaching and a minimum of two semester hours in methods for secondary majors.

IV. Physical Education, two semesters.

V. Remaining hours in major, additional tool and related courses, and free electives. The requirements for a major in a particular field follow. In certain cases, some of the major requirements may be substituted for some of the General Education requirements (II).

Elementary Education: Ph. Ed. 356; Art 170; Music 205; Engl. 470; Educ. 470, 471, 472, 473. The selection of electives must be planned so that there will be at least 15 hours of elective and required courses in one of the following fields: art or music, biological science, English and speech, home economics, physical science and mathematics, social science. Courses in one of these fields may not be used as part of the 54-hour state department general education requirement.

1. For elementary education majors sixteen (16) hours of natural science including eight (8) hours of biological science and eight (8) hours of physical science. Must include one laboratory course. In addition three (3) hours of mathematics are required. Three (3) hours of personal and community health are also required.

2. Music education majors may take only four hours.

Music Education: Music 201, 202, 304, 305, 501, 502, 506, 507, 516, 517 (all from Theory of Music); 421, 422, 651, 652 (from Music History and Literature); 412 (from Music Education); Educ. 416 (six semester hours); and Phys. 126. Majors on the vocal option must include Music 413 (Music Education); majors on the instrumental option must include Music 530, 531, (Applied Music), and 630 (Music Education). Each student must take a major of eight semester hours in Applied Music. For those on the vocal option, minors in Applied Music, one of which must be piano, to the extent of eight semester hours are required. For those on the instrumental option, minors in applied music, one of which must be piano, to the extent of four semester hours are required. Each student must participate in musical organizations to the extent of eight semester hours at a rate of one semester hour per semester.

Recital attendance (Music 050) is required in each semester.

Physical Education: For Women, Ph. Ed. 158, 206, 290, 306, 320, 331, 351, 356, 366, 380, 481, 486, 506 or 560, 515, 526, 531, 555, 566, 575, 580.

Physical Education: For Men, Ph. Ed. 206, 225, 230, 235, 241, 245, 290, 351, 356, 410, 450, 455, 460, 595. Sports Option (six hours to be chosen from Ph. Ed. 415, 420, 426, 430); and Physical Education Option (two hours to be chosen from Ph. Ed. 111, 116, 481 and course not selected in Sports Option).

Students in the first year of the Pre-Elementary Curriculum may plan their courses as follows:

FRESHMAN

First Semester		Second Semester	
Course	*Hours*	*Course*	*Hours*
English Composition I	3	English Composition II	3
Natural Science	4	Natural Science	4
General Psychology	3	Personal and Community Health	3
Oral Communication	2	Social Science	3
Physical Education	0	Physical Education	0
Social Science	3	Elective	3
Total	15	Total	16

Students in the first year of Pre-Secondary Curriculum may plan their courses as follows:

FRESHMAN

First Semester		Second Semester	
Course	*Hours*	*Course*	*Hours*
English Composition I	3	English Composition II	3
Natural Science	4	Natural Science	4
Oral Communication	2	Social Science	3
General Psychology	3	Physical Education	0
Physical Education	0	Electives or Major Course	3
Social Science or Major Course	3		

MUSIC EDUCATION

FRESHMAN

First Semester		Second Semester	
Course	*Hours*	*Course*	*Hours*
English Composition I	3	English Composition II	3
Science Elective	3	Science Elective	3
Theory of Music I	3	Theory of Music II	3
Music Organization	1	Music Organization	1
Applied Music	2	Applied Music	2
Oral Communication	3	General Psychology	3
Physical Education	0	Physical Education	0
Total	15	Total	15

PHYSICAL EDUCATION (MEN)

FRESHMAN

First Semester		Second Semester	
Course	*Hours*	*Course*	*Hours*
English Composition I	3	English Composition II	3
Oral Communication I	2	Social Science Elective	3
Social Science Elective	3	History of Physical Education	2
General Psychology	3	Tumbling and Trampolining	1
Introduction to Physical Education	1	General Zoology	4
Games and Combatives	2	Elective	2
Elective	1	Physical Education	0
Physical Education	0		
Total	15	Total	15

PHYSICAL EDUCATION (WOMEN)

FRESHMAN

First Semester		Second Semester	
Course	*Hours*	*Course*	*Hours*
English Composition I	3	English Composition II	3
General Psychology	3	Tumbling, Recreational Sports	2
Personal and Community Health	3	General Zoology	4
Physical Science Elective	3 or 4	Social Science Elective	3
Oral Communication I	2	Team Sports I	2
Introduction to Physical Education	1	Physical Education	0
Physical Education	0	Physical Education Lecture	0
Physical Education Lecture	0		
Total	15 or 16	Total	14

GENERAL CURRICULUM (Undeclared majors)
Pre-Professional Programs

Teacher Certification Programs

I. General Curriculum (Undeclared Major or Area Major)

A. Biological Science

B. Humanities

C. Physical Science

D. Social Science

Fulfill General Requirements for the A. B. degree (p. 115) or B. S. degree (p. 116) and one of the following four major requirements:

A. Biological Science: General Microbiology, General Botany, General Entomology, and General Zoology; in addition, at least three courses taken from two or more of the following fields: bacteriology, botany, entomology psychology, and zoology. At least two of these courses must be above the introductory level. 30 hours.

B. Physical Science; Chemistry I and II, General Geology, Plane Trigonometry, and General Physics 1 and II; in addition, at least three courses taken from two or more of the following fields: chemistry, geology, mathematics, and physics. At least two of these courses must be above the introductory level. 34 hours.

C. Humanities: Appreciation of Architecture, Survey of Art History I or II, Shakespeare, and Appreciation of Music; in addition, at least six courses taken from two or more of the following fields: art, English, history, languages (above the required proficiency), music, philosophy, and speech. At least four of these courses must be above the introductory level. 30 hours.

D. Social Science: One course each in four of the six following areas: Anthropology, Economics, Geography, Sociology, History, and Political Science; in addition, at least six courses taken from two or more of the following fields: anthropology, economics, geography, political science, history, psychology, and sociology. At least four of these courses must be above the introductory level. 30 hours.

II. Pre-Professional Programs

A. **Pre-Veterinary Curriculum:** 64 semester hours are required for application to enter the College of Veterinary Medicine. Pre-Veterinary students will fulfill General Requirements for the B. S. degree including English Composition I and II, Oral Communication, six hours of social sciences, and six hours of humanities. For the natural science requirements of that curriculum (Category ID) the following courses should be used: College Algebra and Plane Trigonometry, Chemistry I and II, Chemistry II Laboratory, General Organic Chemistry and Laboratory, General Physics I and II, General Zoology, Genetics or Heredity and Evolution. Animal science course requirements may be satisfied by completing Principles of Animal Science as well as Animal Husbandry, Dairy Science, and Poultry Science laboratories. The number of electives allowed will depend on the selection of other courses and may vary from one to three. Upon satisfactory completion of these courses and those of the first two years in Veterinary Medicine, the student will be eligible for a Bachelor of Science degree through the College of Arts and Sciences. Pre-Veterinary requirements may also be completed in the College of Agriculture (See p. 54).

B. **Pre-Medicine Curriculum:** Fulfill General Requirements for the A. B. (p. 115) or B. S. degree (p. 116) except the natural sciences. The following courses are to be used to satisfy the natural sciences and major requirements: College Algebra, Plane Trigonometry, General Physics I and II, Chemistry I and II, Chemical Analysis, Organic Chemistry I and II, Organic Chemistry Laboratory I and II, General Zoology, Heredity

and Evolution, and Embryology. For additional information consult an adviser in the Office of the Dean of Arts and Sciences.

C. **Pre-Dentistry Curriculum:** Students who wish to enter a dental school after graduation should fulfill General Requirements for the A. B. degree (p. 115) except the natural sciences. The following courses are to be used to satisfy the natural sciences and major requirements: Chemistry I and II, Chemistry II Laboratory, General Organic Chemistry and Laboratory, General Physics I and II, College Algebra, Plane Trigonometry, General Botany, General Zoology, Human Physiology, General Microbiology or Biology of Bacteria.

Students who choose to enter a dental school at the end of the junior year should fulfill General Requirements for the B. S. degree (p. 116) except the natural sciences. The following courses are to be used to satisfy the natural sciences and major requirements: Chemistry I and II, Chemistry II Laboratory, General Organic Chemistry and Laboratory, General Physics I and II, General Zoology, General Botany, General Microbiology, Heredity and Evolution, College Algebra, Plane Trigonometry, Human Physiology, and General Psychology and one year's work at an approved dental school (32 hours).

D. **Pre-Law Curriculum:** Students may major within one department or major within the General Curriculum. They may graduate with a B. S. or A. B. degree. Students should consult with the pre-law adviser.

E. **Medical Technology and Public Health Laboratory Scientist Curriculum:** Students should fulfill General Requirements for the B. S. degree (p. 116) except the natural sciences. The following courses are to be used to satisfy the natural sciences and major requirements: Chemistry I and II, Chemical Analysis, General Organic Chemistry and Laboratory, General Biochemistry, Physics, College Algebra, Plane Trigonometry, General Geology, Heredity and Evolution, Zoological Technique, Human Parasitology and Laboratory, Human Physiology, Microbiology, Bacterial Human Diseases, Immunology, plus an additional 30 hours credit from an approved medical technology internship.

F. **Physical Therapy Curriculum:** Students should fulfill General Requirements for the A. B. degree (p. 115) or the B. S. degree (p. 116) except the natural sciences. The following courses are to be used to satisfy the natural sciences and major requirements: General Chemistry, Physics, General Zoology, Human Physiology, General Microbiology or Public Health Bacteriology, and two of the following four courses: Psychology of Childhood and Adolescence, Social Psychology, Abnormal Psychology, Psychology of Exceptional Children. An additional 30 hours of course work may be transferred from the off-campus certificate course to complete the degree program.

G. **Pre-Pharmacy Curriculum:** Students wishing to enter a school of pharmacy at the end of the sophomore year should partially fulfill the General Requirements for the B. S. degree (p. 116), making certain to include English Composition I and II, Chemistry I and II, Chemical Analysis, Algebra, Trigonometry, Oral Communication I, General Physics I and II, Economics, General Zoology, and two additional courses in Biology. Adjustments on an individual basis will be made when necessary.

H. **Pre-Nursing Education Program:** For students who wish to enter the Certificate Program in a certified nursing school, 30 hours of course work are required. These must include one course in English or Speech, General Psychology, one course in Child Psychology or Personality Development, Introduction to Sociology, General Chemistry, General Zoology or the equivalent of Cellular Biology, Anatomy and/or Physiology, Microbiology or Public Health Biology, and Basic Nutrition.

For students who wish to enter associate or baccalaureate degree programs in nursing science, two years of course work as prescribed by the university granting the degree are required. The pre-nursing adviser will assist students in selecting appropriate courses.

III. Teacher Certification

Students may qualify for certification to teach in secondary schools by pursuing the Bachelor of Arts or Bachelor of Science degree within the College of Arts and Sciences or the Bachelor of Science degree within the College of Education. For requirements within the College of Education see p. 244. Students who wish to remain in the College of Arts and Sciences and to elect courses in Education necessary for certification have two advisers, one in the College of Arts and Sciences and one in the College of Education. They fulfill all the General Requirements for the Bachelor of Arts or the Bachelor of Science degree and the major requirements within a given department in Arts and Sciences.

INTERDISCIPLINARY PROGRAMS

South Asian Languages and Area Study

The K. S. U. South Asian Program is oriented towards undergraduate study, with present course offerings in Anthropology, Agricultural Economics, Geography, History, Political Science, Philosophy, Languages, Literature, Linguistics, and a special Center-directed course that examines the civilizations of South Asia on an interdisciplinary basis. Urdu is now offered and other South Asian languages will be available. Training is provided undergraduates who wish to specialize in South Asia within their disciplinary framework; for graduate students desiring South Asian training and for the interested, but non-specializing student.

A major emphasis of this program is a fusion of the academic disciplines in the Social Sciences and the Humanities with the long-established technical assistance programs of Kansas State University in Andhra Pradesh, India. The continued interest and participation by the University and its faculty in developing Indian agriculture and education have greatly aided the creation of the Center. The Center adds a new dimension to this involvement.

LINGUISTICS

Graduate study leading to the degree of Master of Arts with concentration in linguistics is offered in the Departments of English, Modern Languages, and Speech. Candidates identify themselves with one or another of the participating departments, but follow individually designed programs of studies with concentration in the area of linguistics, and write the thesis or report on a linguistics topic. Linguistics courses are cross-listed and thus can be designated as for major or minor credit in any of the participating departments, and are available as elective and supporting courses to students from other disciplines. The degree bears the title "Master of Arts in (name of department)/Linguistics."

Major emphasis of the program is on the training of teachers of English to speakers of other languages (TESOL), but selective arrangement of the program of studies enables the individual student to obtain equally appropriate training in the teaching of English to native speakers, standard English as a second dialect, and teaching of foreign languages to speakers of English. A secondary objective of the program is to help those students who want to go on in linguistics to qualify for doctoral programs in the discipline.

Entrance requirements for graduate study in linguistics include the bachelor's degree in English, Modern Languages, or Speech, or equivalent, with course work equivalent to Elements of Phonetics, Language and Communication, 12 semester hours beyond the introductory level in a foreign language (in the case of the foreign student this can be English), and proficiency in the use of spoken and written English. In the case of provisional admission, deficiencies are to be made up during the first possible semesters in residence.

A listing of available courses in linguistics, as well as further information about the program, can be obtained from the participating departments. Minor course work may be conducted in any cognate discipline with the approval of the student's advisory committee.

A wide variety of facilities and technical equipment is available to the program for training and research, from tape recorders and language laboratories, instrumental phonetics and audiology equipment, to video tape facilities and computer services. The continuous presence of hundreds of international students on the campus provides an excellent source of informants from many language and culture backgrounds, and linguistics students have access to the Program in English for international students for supervised practice teaching.

AEROSPACE STUDIES

CHARLES C. ANDERSON, *Head of Department*

Professor Anderson; Associate Professors Clemons, Currin, Given, Passey and Zinnecker; Assistant Professors Boursaw, Poppe, Stewart and Willming; Instructors Hardin, Holeman, McClead, Mears and Porter

The Air Force Reserve Officers Training Corps (AFROTC) provides the best means for undergraduate and graduate students to become officers in the United States Air Force. Upon completion of their University program they are commissioned second lieutenants and will then:

1. Enter into Air Force-sponsored graduate study at full pay while serving as Air Force officers, or

2. Be deferred for graduate study, to enter active service after completion for a specified period, or

3. Enter directly upon normal active service for a specified period, taking flying training or performing managerial, research or development tasks.

Cadets are in competition while in the Cadet Wing. Those who finish among the top ones are designated Distinguished Graduates and may be offered regular commissions in the Air Force.

AFROTC Cadets taking the Professional Officers Course (POC) must apply for the AFROTC Reserve. If accepted they are not subject to selective service as long as they remain in the Reserve. Cadets in the General Military Course (GMC) may apply for and, on a selective basis, receive draft deferment agreements while they continue in AFROTC.

Any male student, graduate or undergraduate, who is a U. S. citizen and can qualify mentally, scholastically, physically and morally may apply to become a cadet, provided he has time remaining at Kansas State University to complete the program. The physical requirements vary, being higher for cadets desiring to fly than for those desiring management, research or development positions in the Air Force. The duration of the program varies between two and four years, depending upon an applicant's previous experience and the availability of different options.

Common to all options is the Professional Officers Course (POC) which consists of four courses of three credit hours each over a period of four semesters. All cadets in this course who are in the AFROTC Reserve receive $50.00 a month, a $134.00 uniform allowance and all necessary AFROTC texts and equipment. Outstanding cadets in the POC and the AFROTC Reserve who are graduates of the GMC may participate in the Financial Assistance Program and receive $50.00 a month for two years, the $134.00 uniform allowance, and free tuition, texts, fees, and equipment for all courses taken at Kansas State University.

POC cadets are permitted to practice their leadership and management skills in a Cadet Wing. All POC cadets who are in a four-year program attend four weeks of Field Training, which is given in the summer at an air force base, usually between the second and third term of POC. During training they are paid approximately $137.00, and receive free travel to and from their training base.

For those cadets who plan to become Air Force pilots, AFROTC offers the Flight Instruction Program (FIP). This is taken within 12 months of graduation, is free, and leads to a private pilot's license. A one-term one-semester-hour course provides ground instruction in flight theory

and practice needed by student pilots. Cadets who have a private pilot's license from another source are not eligible to receive free flight instruction.

Students in the GMC are issued uniforms and all texts and other equipment needed for their ROTC courses. These articles are the property of the United States government and must be returned at the end of the school year or upon withdrawal from the University. The value of articles not returned is chargeable to the student.

GENERAL MILITARY COURSES

205 113. Aerospace Studies 1A. (1) I. An introductory course dealing with aerospace orientation. Organization of the USAF, and the Air Force as a profession. Two hours a week including leadership training.

205 114. Aerospace Studies 1B. (1) II. An introductory course exploring causes of the present world conflict, and the role and relationship of military power to that conflict. The course discusses the means that nations develop to pursue their objectives and how confrontation develops in the use of these means. The course then outlines individual military systems—with emphasis upon the U. S. Department of Defense and the USAF. Two hours a week including leadership training.

205 200. Aerospace Studies 2A. (1) I. A comparative study of world military forces and issues surrounding existence of these forces. This includes a study of the U. S. Army, U. S. Navy, their doctrines, missions and employment concepts; a study of the military forces of NATO CENTO, SEATO, and their role in free world security; and an investigation of the military forces of the USSR, Soviet Satellites and Communist China. An analysis of the trends and implications of world military power. Two hours a week including leadership training.

205 201. Aerospace Studies 2B. (1) II. Cont. of A. S. 200, with emphasis on the role of the USAF. Two hours a week including leadership training.

PROFESSIONAL OFFICERS COURSE

205 300. Aerospace Studies 3A. (3) I. A survey course about the nature of war, development of airpower in the U. S., organization of the Department of Defense, and USAF concepts, doctrine and employment. Three hours of class and one hour of leadership training a week.

205 301. Aerospace Studies 3B. (3) II. Military astronautics and space operations, and the future development of aerospace power. Includes the U. S. space programs, vehicles, systems and problems in space exploration. Three hours of class and one hour of leadership training a week.

205 380. Weather and Navigation 4A. (1) I. Introduction to weather and navigation equivalent to that required for a private pilot license. Required of AFROTC cadets enrolled in the Flight Instruction Program.

205 381. Briefing for Air Force Commissioned Service 4B. (1) II. Ordinarily taken by POC cadets during their last semester of officer training. Provides specific understanding of processes and procedures incident to entering active duty as an officer in the USAF.

205 390. The Professional Officer. (3) I. A study of USAF professionalism, leadership and management. Includes the meaning of professionalism, professional responsibilities, the military justice system, leadership theory, functions and practices, management principles and functions, problem solving, and management tools, practices and controls. Three hours of class and one hour of leadership training a week.

205 391. The Professional Officer. (3) II. Cont. of A. S. 390. Three hours of class and one hour of leadership training a week.

205 399. Problems in Aerospace Studies. Credit arranged. I, II. Work offered in any of the Air Force ROTC general or professional courses for students out of phase for graduation; material covered in a basic or advanced course. Pr.: Consent of department head.

ART

OSCAR V. LARMER,* *Head of Department*

Professor Garzio; Associate Professors Hill,* Larmer* and Tomasch;* Assistant Professors Craigie,* Deibler,* O'Shea and Vogt;* Instructors Decoteau, Newby, Renata J. Replogle, R. W. Replogle, Rizk and Winegardner; Emeritus: Professor Barfoot; Associate Professors Harris and Morris; Assistant Professor Geiger*

UNDERGRADUATE

The B. A. degree in art consists of three parts: (1) the general education as outlined under the humanities curriculum, (2) a core of beginning art courses to provide prerequisites and a broad range of art experience for the art major, (3) 16 hours concentration of related subjects which should provide a minimal basis for establishing professional competence. Some of the concentration possibilities will be predominantly in one of the following mediums: painting, printmaking, ceramics, sculpture, art history, art education, interior design, and various forms of commercial art study. Any student work may be retained at the discretion of the faculty for an indefinite period of time for instructional and exhibition purposes.

GRADUATE

Major work leading to the M. A. degree is offered. The candidate will be encouraged to minor in the study of art history.

The candidate will take an oral examination based in part on the academic thesis, or studio report submitted. The studio project for the thesis or report will consist of a significant creative effort in the candidate's chosen major medium, and must be publicly exhibited.

FOR UNDERGRADUATE CREDIT

209 095. Art Assembly. (0) I, II. Required for all art and art education majors each semester. By appt. not to exceed one meeting per month.

209 100. Design I. (2) I, II, S. Introduction to and laboratory practice in the principles and elements of design. Six hours lab.

209 170. Art for Elementary Schools. (3) I, II, S. Art methods, materials, and philosophy of children's art at different grade levels.

209 190. Drawing I. (2) I, II, S. Fundamentals of drawing as applied to the realistic and expressive representation of objects through the use of a variety of media and approaches. Six hours lab.

209 195. Survey of Art History I. (3) Historical development of art from Pre-History through the Middle Ages.

209 196. Survey of Art History II. (3) Historical development of art from the Renaissance through the nineteenth century.

209 200. Design II. (2) I, II, S. Further work in the principles and elements of design, with emphasis on color, texture, and pictorial composition. Six hours lab. Pr.: Art 100, 190.

209 205. Commercial Art Techniques. (2) I, II, S. Drawing techniques and tools used in various mediums related to commercial art. Six hours lab. Pr.: Art 100, 190.

209 210. Drawing II. (2) I, II, S. Cont. of Drawing I, with strong emphasis on creative expression. Six hours lab. Pr.: Art 100, 190.

209 222. Water Color I. (2) I, II, S. Painting in water color and other water-soluble media; includes both studio and outdoor painting and sketching. Six hours lab. Pr.: Art 100, 190.

209 224. Figure Drawing I. (2) I, II, S. Sustained drawings of the human figure using a variety of media; introduction to human anatomy used by artists. Six hours lab. Pr.: Art 210.

209 230. Sculpture I. (2) I, II, S. An introduction to the problem of sculptural form; fundamental techniques and theory in modeling, casting, assemblage, carving and construction in contemporary and traditional mediums of clay, plaster, metal, wood, stone, plastic. Six hours lab. Pr.: Art 100, 190.

209 235. Printmaking I. (2) I, II, S. Introduction to the intaglio, relief, lithographic and serigraphic printmaking techniques and tools; includes exploratory experience in each medium. Six hours lab. Pr.: Art 100, 190.

209 246. Oil Painting I. (2) I, II, S. Introduction to painting with oil and plastic mediums; stretching and grounding canvas. Problems include both studio and outdoor experiences. Six hours lab. Pr.: Art 200, 210.

209 260. Design in the Crafts. (2) I, II, S. Crafts work in various media, with emphasis on contemporary design. Six hours lab. May be taken for credit two semesters. Pr.: Art 100.

209 265. Ceramics I. (2) I, II, S. Introduction to basic hand building techniques in both earthenware and stoneware clays; decoration of both two- and three-dimensional ceramic forms; student participation in stacking and firing in kilns. Six hours lab. Pr.: Art 100 or equiv.

209 270. Metalcrafts and Jewelry. (2) I, II, S. Design and execution of contemporary jewelry in precious metals, including setting of semi-precious and precious stones. Six hours lab. May be taken for credit three semesters. Pr.: Art 100.

209 290. Lettering. (2) I, II. Study of traditional lettering forms, including Roman, Gothic, Text, Script, and some contemporary adaptations of these. Pr.: Art 100, 190.

209 399. Honors Seminar in Art. (1) I. Selected topics in art. May be taken for credit more than once. Pr.: For students in the Honors Program only.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

209 400. History of South Asian Art. (3) I, II. History of Indian art (including Islamic art) from the twelfth to the nineteenth century A. D. and history of art of Ceylon, Nepal and Indo-China.

209 406. Problems in Art I. (1-3) I, II, S. Work offered in drawing, painting, sculpture, printmaking, ceramics, crafts, and commercial art. Pr.: Full sequence of courses related to subject.

209 420. History of Indian Art. (3) I, II. History of Indian art from c.3000 B. C. to the twelfth century B. C.

209 440. Figure Painting. (2) I, II. Painting from the human figure with oil and plastic media. Six hours lab. Pr.: Art 246.

209 492. Italian Renaissance Art History. (3) Study of the art of the High Renaissance, with some attention to its origins and subsequent influence on Baroque art. Pr.: Art 195 or 196.

209 495. Northern Renaissance Art History. (3) I, II. The art of the international style; Netherlands, France and Germany during the fifteenth, sixteenth and seventeenth centuries. Pr.: Art 195 or 196.

209 496. Twentieth Century Art History. (3) Origins and development of twentieth century art. Pr.: Art 195, 196.

FOR UNDERGRADUATE AND GRADUATE CREDIT

209 600. Design III. (2) I, II. Work in three dimensions in sheet metal, plaster, plastics, paper, wire, etc., using the principles and elements of design. Pr.: Art 200 or consent of instructor.

209 605. Commercial Illustration. (3) I, II, S. Problems in layout and finished illustration for newspapers, magazines and general advertising. Recommended for journalism majors. Nine hours lab. May be taken for four semesters. Pr.: Art 205, 290, or consent of instructor.

209 610. Figure Drawing II. (2) I, II, S. Cont. of Figure Drawing I, with emphasis on individual expression. Six hours lab. May be taken for four semester hours. Pr.: Art 224.

209 622. Water Color II. (2) I, II, S. Cont. of Water Color I. Emphasis on individual expression within limitations of medium. Six hours lab. May be taken for two semesters. Pr.: Art 222.

209 630. Sculpture II. (3) I, II, S. Cont. of Sculpture I. Introduction to metallic casting (bronze, iron, aluminum) and welding (gas and electric). Nine hours lab. May not be taken for more than six semesters. Pr.: Art 224, 230.

209 635. Printmaking II. (3) I, II, S. Advanced work in blockprints, serigraphy, or lithography. Nine hours lab. May be taken for four semesters. Pr.: Art 235.

209 636. Etching and Drypoint. (3) I, II. Individual expression in intaglio techniques of printmaking; includes etching, engraving, aquatint, and drypoint. Nine hours lab. May be taken for four semesters. Pr.: Art 235.

209 646. Oil Painting II. (3) I, II, S. Cont. of Painting I. Emphasis on development of personal attitudes in formal structural relationships of line, color, and shape. Nine hours lab. May be taken for six semesters. Pr.: Art 246.

209 665. Ceramics II. (3) I, II, S. Advanced work on potter's wheel, with consideration to study of clay bodies and glaze calculation; consideration of kiln designs and firing procedures. Nine hours lab. May be taken for credit three semesters. Pr.: Art 265.

209 666. Ceramics III. (2) I, II. Individual exploration of ceramic design and glaze technology; kiln design and construction. Six hours lab. May be taken for three semesters. Pr.: Art 665.

209 667. Ceramics IV. (2) I, II, S. History and development of ceramics; study of the development of pottery and other aspects of ceramics from earliest known records to present day. Use of slides and other visual materials. Pr.: Art 265.

209 680. Drawing III. (2) I, II. Cont. of Drawing II, emphasizing exploration in mixed media. Six hours lab. May be taken for two semesters. Pr.: Art 210.

209 780. Problems in Design. Credit arranged. I, II, S. Advanced work in design-related subjects. Pr.: Full sequence of courses related to problem subject matter.

209 787. Problems in Teaching Art. Credit arranged. II, S. Lectures and class discussion of methods, consideration of suitable laboratory equipment, use of illustrative material, and preparation of courses of study. Pr.: Art 200, Educ. 550 or equiv.; 12 credit hours in art.

209 790. Greek Art History. (3) I, II, S. Study of the art of classical Greece, from its Aegean origins through the Hellenistic period. Pr.: Art 195, 196.

209 799. Problems in Art History. Credit arranged. I, II, S. Independent exploration in selected problems in art history. Pr.: Twelve hours art history.

FOR GRADUATE CREDIT

209 830. Sculpture III. Credit arranged. I, II, S. Advanced creative work involving appropriate sculptural media and related techniques. Emphasis placed on content of work. Pr.: Consent of instructor.

209 845. Oil Painting III. Credit arranged. I, II, S. Advanced study, with emphasis on original investigation leading to professional competence in painting. Pr.: Consent of instructor.

209 865. Ceramics V. (3) I, II. Study of glaze materials; advanced work and experimentation in glaze calculation. One hour lec. and six hours lab. May be taken for two semesters. Pr.: Art 666.

209 885. Problems in Art II. (1-3) I, II, S. Advanced work offered in drawing, printmaking, painting, sculpture, ceramics, and commercial art.

209 980. Research in Art. Credit arranged. I, II, S. Research which may form the basis for the master's thesis or report. Pr.: Graduate standing.

ATHLETICS

HORACE B. LEE, *Head of Department*

Professors Fitzsimmons and Lee; Assistant Athletic Director Barrett; Assistant Professors Dodds and Knorr; Instructors Morgan and Rector; Coaches Brasher and Gibson; Assistant Coaches Branch, Elliott, Frazier, Montgomery, Powell, Pryor, Robertson and Steinberg; Administrative Assistants Head and Wall

Kansas State University is a member of the Big Eight Conference. The other members are the University of Colorado, Iowa State University, the University of Kansas, the University of Missouri, the University of Nebraska, the University of Oklahoma, and Oklahoma State University.

Kansas State University, as a member of the Conference, participates with member schools in football, basketball, baseball, track (indoor and outdoor), tennis, golf, gymnastics, swimming, wrestling, and cross country. Intercollegiate competition is open to all men students and is coached by a staff who are specialists in their respective sports.

BACTERIOLOGY—SEE BIOLOGY

Division of Biology

L. E. ROTH, *Director of the Division*

T. M. BARKLEY, *Associate Director*

Professors Ameel, Eisenstark,* Foltz,* Frazier,* Gier,* Goodrich,* Hansen,* Harris,* K. Lark,* Pady,* Pittenger,* Roth,* Tiemeier* and Wimmer;* Associate Professors Barkley,* Consigli,* Erwin,* Fina,* Fisher,* Friesen,* Goss,* Hulbert,* Kramer,* Marzolf,* McCracken,* McMahon,* Newcomb,* Robel* and Zimmerman;* Assistant Professors Anderson,* Bode,* Elftheriou,* Iandolo,* Klassen, C. Lark,* Lockhart,* Reiter,* Weis* and Wilson;* Emeritus: Professors Ackert,* Bates,* Gainey* and Guhl**

The Division of Biology replaces Bacteriology, Botany, Zoology. The Division of Biology was formed in July, 1967, by an amalgamation of the former departments of Bacteriology, Botany and Zoology, and the Biophysics section of the Physics department. The Division continues the degree-granting programs of the former departments; however, the internal organization has been structured to better reflect the developments of recent years in the science of biology. There are four Subdivisions in the Division: (a) Molecular Biology and Genetics, (b) Cellular and Microbiology, (c) Organismic Biology and (d) Environmental Biology. Scientists are thus grouped according to their approaches and methodologies, regardless of whether their subject organisms are plants, animals or microbes. The course list presented below is basically a compilation of the courses offered by the formerly separate departments. A revision of the course offerings and degree programs is currently in progress.

Beginning the curriculum revision is the introduction of two new elementary courses, Biol. 198 and 201 (described below). These courses have been conceived to emphasize the unity of biological processes and to stress general principles. Taken together they equal the substance of General Botany (Biol. 210) and General Zoology (Biol. 205). Most advanced courses require either Biol. 205 or 210 as prerequisite; however, Biol. 198 and 201 will satisfy this requirement. With the consent of the instructor, Biol. 198 alone may satisfy the requirement. Both Biol. 205 and 210 are also being offered because of their present role in curriculum planning.

UNDERGRADUATE

The Division of Biology offers two programs for undergraduate majors: the General Curriculum leading to a B. A. degree in biology (p. 115) and the Biological Science Curriculum leading to a B. S. degree in bacteriology, botany, zoology, or in several professional options (p. 116).

Considerable latitude exists in planning a program of study, and the details are determined by the student and his faculty adviser. However, the following course requirements are made for students in the B. S. degree programs in biological science:

Bacteriology majors: Biol. 400 (or equivalent), 500, 610, 670, 730 plus three additional hours of bacteriology courses numbered 600 to 799; Chem. 210, 230, 250, 300, 350, 351; Biochem. 420; Phys. 211, 212; A. H. 400 and Math. 100 and 150.

Botany majors: 20 hours of botany (and/or plant pathology, see p. 54) above the introductory level.

Zoology majors: Biol. 205, 512 and 660; two of the following three courses: Biol. 405, 410 and 415 plus five hours chosen from the 400 to 799 group exclusive of Biol. 425.

Students contemplating graduate study are urged to acquire a sound background in the physical sciences and in one or two foreign languages.

GRADUATE

The Division offers both the M. S. and Ph. D. in numerous areas of biology. At present, degrees are specifically offered in bacteriology, botany, and zoology, and in genetics and parasitology through interdepartmental programs. Graduate programs in biology generally relate to one of the four areas of concentration within the Division, i. e., Molecular Biology and Genetics, Cellular and Microbiology, Organismic Biology and Environmental Biology. Advanced studies are also offered in the following fields: behavioral biology, biophysics, cytology, developmental biology, ecology, electron microscopy, embryology, endocrinology, limnology, mycology, ornithology, parasitology, physiology, plant anatomy, plant taxonomy, virology and wildlife conservation. It should be noted that a graduate student's training is determined by the student in consultation with his major professor and advisory committee, thereby allowing great flexibility in designing a graduate program to fit the student's interests and needs.

For further information contact the Chairman of the Graduate Affairs Committee, Division of Biology.

FOR UNDERGRADUATE CREDIT

215 121. Biology I. (4) I, S.

215 122. Biology II. (4) II. In these courses the fundamental relationships between plants and animals are studied, with particular emphasis on structure of representative plants and animals, metabolic processes, principles of classification, heredity, environmental factors, economic aspects, and finally, a detailed study of man himself. Life is interpreted as an integrative process which results in a dynamic whole. Two hours lec. and two hours rec. a week. Not open to students with credit in Biol. 190, 210, or 205. Biol. 121 is prerequisite to Biol. 122.

215 198. Principles of Biology. (5) I, II. An introductory course centered on the unifying principles common to all levels of biological organization, from molecule, to cell, to organism, and to the population, and emphasizing the theory of natural selection, the gene theory of inheritance and physiological regulation, and the concept of the ecosystem. The course is designed to provide a biological frame of reference in a liberal education as well as an understanding that is prerequisite for students selecting additional courses offered in the Division of Biology. This course and Biol. 201, Organismic Biology, are the equivalent of Biology I and II or General Zoology and General Botany. Three hours lec., one hour rec., and three hours lab. a week.

215 200. Public Health Bacteriology. (3) II, S. Application of bacteriology to the control of disease in the community, with emphasis on the means of spread of diseases, the impact of disease outbreaks on the functioning of the communal organization, man's fight to reduce disease in his population, and evaluation of known methods of control of disease.

215 201. Organismic Biology. (3) II. The members of the animal phyla and plant divisions, illustrating their taxonomy, phylogeny, and the structural and functional adaptations that affect their survival. Two hours lec. and three hours lab. a week. Pr.: Biol. 198 or equiv.

215 205. General Zoology. (4) I, II, S. Two hours rec. and six hours lab. a week.

215 210. General Botany. (4) I, II, S. Plant groups and their evolutionary development; physiology, anatomy, ecology, and identification of seed plants; economic application. Two hours rec. and six hours lab. a week. Not open to students with credit in Biol. 121 or 190.

215 215. Human Anatomy. (5) I. General anatomy studies by means of dissectible models, skeletons, and charts. Three hours rec. and six hours lab. a week. Pr.: Biol. 205.

215 220. General Microbiology. (4) I, II. Morphology, physiology, biology, classification, culture and distribution of microorganisms; principles of applied microbiology. A course intended primarily for students not majoring in biological science. Two hours rec. and four hours lab. a week. Pr.: Chem. 110 or 230 and one semester of college biology.

215 240. Human Anatomy and Physiology. (5) S. For students in Home Economics and Nursing. Three hours rec. and six hours lab. a week. Pr.: Biol. 205.

215 320. Introductory Plant Physiology. (3) II. A brief survey of the physiological processes in higher plants. Three hours rec. a week. Required for pre-forestry majors. Pr.: Biol. 122 or 210.

215 398. Junior Honors Colloquium in Biology. Credit arranged. I, II. Open only to juniors in the Arts and Sciences Honors Program.

215 399. Honors Seminar in Biology. (1) I, II. Selected topics. Open to non-majors in the Honors Program.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

215 400. The Biology of Bacteria. (5) I. Introduction to microorganisms as living agents. Three hours rec. and four hours lab. a week. Pr.: Chem. 351 and one year of college biology.

215 405. Comparative Anatomy of Vertebrates. (4) II. Two hours rec. and six hours lab. a week. Pr.: Biol. 205.

215 410. Embryology. (4) II, S. Developmental anatomy and physiology of reproduction of domestic birds and mammals. Three hours rec. and three hours lab. a week. Pr.: Biol. 205.

215 412. Veterinary Bacteriology. (5) II. Morphology, physiology, and classification of bacteria; detailed study of those bacteria which cause infectious diseases of domesticated animals. Three hours rec. and four hours lab. a week. For students in the College of Veterinary Medicine.

215 415. Histology. (4) II. Microscopic anatomy of the organs and tissues of the mammal as a basis for understanding diversity of function and malfunction. Two hours rec. and three hours lab. a week. Pr.: Biol. 205.

215 425. Human Physiology. (4) I, II, S. Functions of various organ systems of the body. Not to be taken by zoology majors. Three hours rec. and two hours lab. a week. Pr.: Biol. 205 or equiv.

215 430. Wildlife Conservation. (3) I. Methods and techniques in the management and propagation of wildlife. Pr.: Biol. 205 or equiv.

215 441. Human Parasitology Recitation. (3) II. Pr.: Zool. 205 or equiv.

215 442. Human Parasitology Laboratory. (1) II. Two hours lab. a week. Pr.: To be taken concurrently with Biol. 441.

215 445. Zoological Microtechnique. (2) I, II, S. Methods and processes in preparation of microscopical slides and whole mounts; principles of photomicrography. Six hours lab. a week. Pr.: Biol. 205.

215 500. Principles of Quantitative Microbiology. (5) II. Examination

of microbial processes by means of quantitative chemical and physical methods. Three hours rec. and six hours lab. a week. Pr.: Biol. 400 or equiv., Biochem. 420 or conc. enrollment recommended.

215 510. Veterinary Immunology and Virology. (5) I. Principles of immunology and virology; serodiagnosis of infectious diseases; host-virus interactions. Three hours rec. and four hours lab. a week. For students in the College of Veterinary Medicine. Pr.: Biol. 412.

215 512. Principles of Zoophysiology. (4) II. Selected topics in physiology of cells, organ systems, and organisms. Three hours rec. and three hours lab. a week. Pr.: Biol. 205; Chem. 230 or equiv., and junior standing or consent of instructor.

215 520. Dairy Bacteriology. (4) II. Bacteriology of milk and milk products. Two hours rec. and four hours lab. a week. Pr.: Biol. 220 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

215 600. Plant Physiology. (4) I, S in even years. A survey of the physiological processes of plants. Three hours rec. and three hours lab. a week. Pr.: Biol. 210 and a course in organic chemistry.

215 602. Comparative Embryology. (3) II in odd years. Comparative vertebrate embryology and histogenesis, with emphasis on the mechanics of development. One hour lec. and six hours lab. a week. Pr.: Biol. 410.

215 604. Avian Microbiology. (3) I. A consideration of the microorganisms encountered in the avian species, with special emphasis on laboratory diagnosis and control of avian diseases. Two hours rec. and three hours lab. a week. Pr.: Biol. 220 or equiv.

215 605. Cytology. (3) I in odd years. Structure and function of cells, with introduction to cytogenetics and modern techniques of cell study. Pr.: Biol. 445 and Chem. 351 or equiv.

215 610. Bacteriology of Human Diseases. (5) I. Pathogenic bacteria and their role in human diseases. Three hours rec. and six hours lab. a week. Pr.: Biol. 220 or equiv.

215 612. Plant Cytology. (3) I. Structure, development, and functions of the plant cell, with special reference to chromosome behavior and its bearing on genetic results. One hour rec. and six hours lab. a week. Pr.: Biol. 205 or 210.

215 614. Ornithology. (3) II, S. Lecture, laboratory, and field studies in identification and adaptation of birds. Two hours rec. and three hours lab. a week. Pr.: Biol. 205 or equiv.

215 615. Physiology of the Sense Organs. (2) I. Offered on sufficient demand. Functions of the special sense organs of man as well as a comparison of the physiology of these organs with those of other animals. One hour rec. and two hours lab. a week. Pr.: Biol. 512 or consent of instructor.

215 621. Endocrinology. (3) I, S. Survey of the glands of internal secretion and of their physiological and biochemical role in growth, development, metabolism, regulation and reproduction of animals. Pr.: Biol. 205 or equiv., course in organic chemistry or biochemistry, or consent of instructor.

215 625. Animal Parasitology. (3) I. Biology, pathology, and prophylaxis of the principal external and internal parasites of domestic animals. Two hours rec. and two hours lab. a week. Pr.: Biol. 205 and junior standing.

215 630. Invertebrate Zoology. (4) I. Structure, function, development, phylogeny and classification of invertebrates. Two hours rec. and six hours lab. a week. Pr.: Biol. 205 and junior standing.

215 632. Paleobotany. (3) II. Fossil plants, their taxonomy and use in the recognition of geological strata. Two hours rec. and two hours lab. a week. Pr.: Biol. 210 and Geol. 430.

215 634. Soil Microbiology. (3) I in odd years. Microbial population of the soil and its role in soil fertility. Pr.: Biol. 220 or equiv.; Chem. 351 or equiv.

215 640. Introductory Mycology. (4) I. Emphasis is placed on the comparative morphology, classification, and life cycles of the fungi. Two hours rec. and six hours lab. a week. Pr.: Biol. 210.

215 642. Protozoology. (3) II. Taxonomy, morphology, and biology of the free-living and parasitic protozoa. Two hours rec. and three hours lab. a week. Pr.: Biol. 205.

215 645. Microbiology of Foods. (4) I. Microbial phenomena involved in the bacteriology and sanitation of foods; microscopic and cultural analysis of foods exclusive of dairy products. Two hours rec. and four hours lab. a week. Pr.: Biol. 220 or equiv.

215 646. Heredity and Evolution. (2) I. A study of human genetics and a survey of the principles of evolution of animals, including man. Pr.: Biol. 205 or equiv.

215 655. Morphology of Nonvascular Plants. (3) I in odd years. Structure and life histories of nonvascular plants, emphasis on algae and bryophytes; studied as a basis of evolution of higher plants. Two hours rec. and three hours lab. a week. Pr.: Biol. 210 or consent of instructor.

215 656. Morphology of Vascular Plants. (3) II in even years. Structure and life histories of vascular plants, emphasizing recent advances in morphological theory. Two hours rec. and three hours lab. a week. Pr.: Biol. 210 or consent of instructor.

215 659. Taxonomy of the Flowering Plants. (3) I. Systems and theory of classification; identification of plants in the field and in the laboratory. Two hours rec. and four hours lab. a week. Pr.: Biol. 210.

215 660. Animal Ecology. (3) II. Structure and dynamics of animal populations in relation to the physical, edaphic, and biotic environment. Two hours rec. and three hours lab. a week. Pr.: Biol. 205 or equiv.

215 661. Special Topics in Animal Ecology. Variable credit. I. Review of ecological research; works of North American and foreign ecologists. Aspects of trophic dynamics, population dynamics, structure, movements, dispersal, behavior, and other factors are presented. Pr.: Biol. 660 and consent of instructor.

215 670. Immunology. (5) II. Principles of immunology; demonstration of antigen, antibody reactions; serodiagnosis of human diseases. Three hours rec. and six hours lab. a week. Pr.: Biol. 610 or equiv.

215 671. Ichthyology. (3) I. Taxonomy, morphology, physiology, behavior, ecology and distribution of fishes. Two hours rec. and three hours lab. a week. Pr.: Biol. 205 and junior standing.

215 673. Plant Ecology. (3) II. Structure and dynamics of vegetation. Two hours rec. and three hours field or lab. work a week. Pr.: Junior standing or consent of instructor.

215 675. Mammalogy. (3) I in odd years. Classification, distribution, and natural history of mammals; collecting of specimens and preparation of study skins. Two hours rec. and three hours lab. a week. Pr.: Biol. 205.

215 685. Wildlife Management Techniques. (3) I in even years. Ecology and management of game birds and mammals, including field studies of research and management techniques. Two hours rec. and three hours lab. a week. Pr.: Biol. 430 and 660 or consent of instructor.

215 690. Biophysics I. (2) Molecular Biology. An introduction to the molecular structure of biological materials and physical techniques for studying biological materials; the molecular basis of biological function. Pr.: Consent of instructor.

215 691. Biophysics II. (2) An introduction to a general theory of regu-

lation: transformations, feedback, system analysis, rhythmic phenomena in cells. Pr.: Consent of instructor.

215 692. Radiation Biophysics. (2) The origin, measurement, and physical, chemical, and biological effects of ionizing radiation and ultraviolet light. Pr.: Phys. 535 or consent of instructor.

215 693. Limnology. (2) I in even years. Studies of fresh-water lakes and streams, with stress on the physical, chemical, and biological factors which determine their biological productivity. Two hours lec. a week. Pr.: One lab. course in science, Chem. 110 or 210, or consent of instructor.

215 694. Limnological Methods. (2) I in even years. Field and laboratory methodology involved in resolving the biological productivity of lakes and streams; emphasis on physical, chemical, and biological factors of fresh-water ecosystems. Six hours lab. a week. Pr.: Biol. 693 or conc. enrollment, two lab. courses in biology, Phys. 112 or equiv., or consent of instructor.

215 695. Social Behavior in Vertebrates. (2) II or S. Animal behavior from the viewpoint of social dominance and group organization; contributions of social behavior in the classes of vertebrates. Pr.: Biol. 205 or equiv. and junior standing.

215 696. Fisheries Management. (4) II in odd years. Methods of fishery biology; populations, aging and growth rates, productivity, survey methods, planning and improvement, physiochemical conditions of fresh-water and fish-pond management. Three hours rec. and three hours lab. a week. Pr.: Biol. 671 or consent of instructor.

215 700. Plant Growth and Development. (2) II in even years. Current concepts of growth-regulating substances and their effects on growth, differentiation, and reproduction in higher plants. Pr.: Biol. 600 or consent of instructor.

215 705. Advanced Mycology. (3) II in even years. Study of fungi, with emphasis on structure identification, classification, phylogeny, and economic importance. One hour rec. and six hours lab. a week. Pr.: Biol. 640.

215 715. Light and Temperature Relations of Plants. (2) II in odd years. Current concepts of light-energy relations involved in photosynthesis, respiration, growth form, and photoperiodism, and of temperature relations, including thermoperiodism. Pr.: Biol. 600 or consent of instructor.

215 720. Botanical Microtechnic. (3) II in odd years. Preparation of plant materials for histological or cytological study. One hour rec. and six hours lab. a week. Pr.: Biol. 210 or consent of instructor.

215 730. General Virology. (3) II. The theoretical and experimental bases of virology, with special emphasis on the role of the virus as a controlling force in cellular biology; principles of host-virus interactions; introduction to use of mammalian cell cultures as the host for virus propagation. Pr.: Twelve hours of biological sciences, including Biol. 220 or equiv. and Biochem. 420 or equiv.; consent of instructor.

215 740. Anatomy of Higher Plants. (3) II. Structure and development of the various tissues and organs of seed plants. One hour rec. and six hours lab. a week. Pr.: Biol. 210.

215 760. Genetics of Microorganisms. (2) I. The structure and function of genes, as revealed by genetic studies with microoorganisms; the role of genes in the control of cellular activities. Pr.: Knowledge of genetics and consent of instructor.

215 770. Microorganisms of the Natural Environment. (3) I in even years. A study of representatives of the major groups of bacteria isolated by enrichment methods from natural environments. Six hours lab. a week. Pr.: Biol. 500, Biochem. 420.

215 790. Bacteriology Seminar. (1) I, II. Pr.: Consent of instructor.

215 791. Cellular Physiology. (4) I. An experimentally oriented course

emphasizing the mechanisms by which cells maintain a steady state, exchange materials across cell membranes, transform energy, and generate bioelectric potentials. Three hours rec. and three hours lab. a week. Pr.: Biol. 512 or equiv., a course in physics, Chem. 351 or consent of instructor.

215 794. Topics in Developmental Biology. Credit arranged. I, II, S.

215 795. Topics in Environmental Biology. Credit arranged. I, II, S.

215 796. Topics in Molecular Biology and Genetics. Credit arranged. I, II, S.

215 797. Problems in Zoology. Credit arranged. I, II, S.

215 798. Problems in Botany. Credit arranged. I, II, S.

215 799. Problems in Bacteriology. Credit arranged. I, II, S.

FOR GRADUATE CREDIT

215 800. Mineral Nutrition of Plants. (2) I. Current interpretations of mineral nutrition of plants, with emphasis on the absorption and transport of the macro and minor elements. Pr.: Biol. 600 or consent of instructor.

215 801. Advanced Topics in Microbiology. Variable credit. Offered on sufficient demand. A treatment of special topics of current interest. May be repeated. Pr.: Consent of instructor.

215 802. Advanced Parasitology. (2) II in even years. Taxonomy of helminths; review of classical and current works of North American and foreign parasitologists; analysis of bibliography, format and drawings relative to manuscripts. Four hours combined rec. and lab. a week. Pr.: Biol. 625 and consent of instructor.

215 806. Experimental Endocrinology. (3) II. Experimental approach to endocrine research; isolation, quantitative determination and characterization of hormones by means of chemical techniques such as chromatography, fluorimetry, spectrophotometry; interrelationships of hormones and enzymes **in vivo** and **in vitro** systems. One hour rec. and six hours lab. a week. Pr.: Biol. 621 or consent of instructor.

215 810. Comparative Physiology of Animals. (3) II. Offered on sufficient demand. A resume of function in the entire animal kingdom, with emphasis on a detailed comparison between phyla of body fluids, nutrition, respiration and respiratory pigments and excretion. Five hours combined rec. and lab. a week. Pr.: Biol. 425 or 512 or equiv.

215 815. Advanced Endocrinology. (2) I in even years. Biochemical and physiological effects of hormones; hormones influencing behavior, neuroendocrine principles and interrelationships; brain stimulation and hormonal secretion. Pr.: Biol. 621 or consent of instructor.

215 820. Plant Physiological Technique. (2) II. Methods and techniques used in physiological research. Six hours lab. a week. Pr.: Biol. 600 and a course in biochemistry.

215 825. Microbial Metabolism. (3) II in even years. An advanced treatment in metabolic activities of microorganisms. Pr.: Biol. 500.

215 826. Microbial Metabolism Laboratory. (2) II in even years. Selected laboratory exercises demonstrating the fundamental principles and practices of physiology. One hour rec. and six hours lab. a week. Pr.: Biol. 825 or conc. enrollment.

215 830. Advanced Virology. (4) I. Application of current biochemical, biophysical and biological techniques to the study of viruses. To include bacterial viruses (bacteriophage), animal viruses and plant viruses. Pr.: Biol. 730 and consent of instructor.

215 835. Recent Advances in Cytogenetics. (3) II. Chromosome structure, mechanics, and behavior; their significance for problems of genetics, evolution, and the origin of species. Two hours rec. and three hours lab. a week. Pr.: Agron. 610 or Biol. 610 or 605.

215 840. Advanced Immunology. (3) S. Recent advances in theoretical

and practical antigen and antibody relationships and the application of this knowledge to human and veterinary immunology. Pr.: Biol. 670 or equiv.

215 845. Plant Cell Physiology. (3) II. A study of the living activities of pollen and other plant cells, excluding bacteria. Two hours rec. and three hours lab. a week. Pr.: Biol. 600.

215 860. Microbial Genetic Techniques. (4) II. Experiments in multiplication, recombination, and mutation in bacteria and bacteriophage. Pr.: Biol. 760, Biochem. 420, or equiv. Consent of instructor.

215 865. Advanced Plant Ecology. (4) II in even years. Advanced study of vegetation change and of the relationships of plants and environment at various developmental stages. Eight hours combined rec. and lab. a week. Pr.: Biol. 600 and 670.

215 870. Advanced Systematic Botany. (4) II in odd years. Advanced studies in classification, nomenclature, and taxonomic theory of vascular plants. Two hours rec. and six hours lab. a week. Pr.: Biol. 659.

215 960. Current Literature in Microbial Genetics. (1) I. May be repeated to a maximum of three hours credit. Oral presentation by students of research described in current issues of Genetics, Journal of Molecular Biology, Virology, Journal of Bacteriology, Proceedings of National Academy of Science, and other pertinent journals.

215 980. Graduate Seminar in Botany. (1) I, II. Reports of investigational work or other matters of interest in the various branches of botany. Pr.: Consent of instructor.

215 994. Research in Developmental Biology. Credit arranged. I, II, S.

215 995. Research in Environmental Biology. Credit arranged. I, II, S.

215 996. Research in Molecular Biology and Genetics. Credit arranged. I, II, S.

215 997. Research in Zoology. Credit arranged. I, II, S.

215 998. Research in Botany. Credit arranged. I, II, S.

215 999. Research in Bacteriology. Credit arranged. I, II, S.

Table of Equivalents

Botany	*Zoology*	*Bacteriology*	*Physics*
217-121,122 = 215-121,122	293-205 = 215-205	213-200 = 215-200	265-690 = 215-690
217-190 = 215-190	293-210 = 215-215	213-220 = 215-220	265-691 = 215-691
217-210 = 215-210	293-240 = 215-240	213-398 = 215-398	265-692 = 215-692
217-600 = 215-600	293-405 = 215-405	213-399 = 215-399	
217-610 = 215-610	293-410 = 215-410	213-400 = 215-400	
217-630 = 215-632	293-415 = 215-415	213-410 = 215-412	
217-640 = 215-640	293-425 = 215-425	213-500 = 215-500	
217-655 = 215-655	293-430 = 215-430	213-510 = 215-510	
217-656 = 215-656	293-441,442 = 215-441,442		
217-690 = 215-659	293-445 = 215-445	213-520 = 215-520	
217-670 = 215-673	293-510 = 215-512	213-600 = 215-604	
217-700 = 215-700	293-600 = 215-602	213-610 = 215-610	
217-705 = 215-705	293-605 = 215-605	213-630 = 215-634	
217-715 = 215-715	293-610 = 215-614	213-645 = 215-645	
217-720 = 215-720	293-615 = 215-615	213-670 = 215-670	
217-740 = 215-740	293-621 = 215-621	213-730 = 215-730	
217-799 = 215-798	293-625 = 215-625	213-760 = 215-760	
217-800 =215-800	293-630 = 215-630	213-770 = 215-770	
217-820 = 215-820	293-640 = 215-642	213-790 = 215-790	
217-830 = 215-835	293-646 = 215-646	213-799 = 215-799	
217-840 = 215-845	293-660 = 215-660	213-801 = 215-801	
217-860 = 215-865	293-661 = 215-661	213-825 = 215-825	
217-870 = 215-870	293-671 = 215-671	213-826 = 215-826	
217-980 = 215-980	293-675 = 215-675	213-830 = 215-830	
217-999 = 215-998	293-685 = 215-685	213-840 = 215-840	
	293-693 = 215-693	213-860 = 215-860	
	293-694 = 215-694	213-960 = 215-960	
	293-695 = 215-695	213-999 = 215-999	
	293-691 = 215-696		
	293-796 = 215-791		
	293-799 = 215-797		
	293-802 = 215-802		
	293-806 = 215-806		
	293-810 = 215-810		
	293-815 = 215-815		
	293-999 = 215-997		

BIOPHYSICS—SEE BIOLOGY

BOTANY—SEE BIOLOGY

CHEMISTRY

ADRIAN H. DAANE,* *Head of Department*

Professors Andrews, Daane,* Lambert,* McDonald, Meloan,* Moser,* Schrenk* and Silker;* Associate Professors Conrow,* Copeland, Hammaker,* Johnson,* Lanning,* McDowell* and Setser;* Assistant Professors Danen,* Hawley,* Kotz,* Paukstelis,* Purcell,* Seitz* and van Swaay;* Emeritus: Professor Lash;* Assistant Professor Harriss; Instructor Crawford*

UNDERGRADUATE

For a major in chemistry, the student may enroll for the Bachelor of Arts or Bachelor of Science degree. See pp. 115-116 for the general requirements for this curriculum. In addition to these courses, the Department of Chemistry requires completion of the following courses in order to fulfill the requirements for the Bachelor of Science degree: Math. 222, Engl. 200 or 416; Chem. general 271, 599; analytical 445, 666; inorganic 606; organic 431, 432, 450, 451; physical 585, 595, 598. Each candidate

for a degree must also demonstrate a proficiency (reading knowledge) of German. Completion of this curriculum provides certification by the American Chemical Society. Listed prerequisites can be waived upon consent of the instructor.

GRADUATE

Major work leading to the degrees Master of Science and Doctor of Philosophy is offered in the fields of analytical chemistry, inorganic chemistry, organic chemistry, and physical chemistry.

Prerequisite to major graduate work in any of these fields is the completion of a four-year curriculum that includes suitable preparatory work in chemistry, mathematics, and physics. The student must show credit in or demonstrate competence in a reading knowledge of scientific German.

COURSES IN GENERAL CHEMISTRY

FOR UNDERGRADUATE CREDIT

221 095. Chemistry Seminar. (0) I, II.

221 110. General Chemistry. (5) I, II. Principal laws and theories of chemistry; important metallic and non-metallic substances. Three hours lec., one hour rec. and three hours lab. a week. Not open to students having credit in any college course in chemistry.

221 210. Chemistry I.[1] (5) I, II, S. First course of a two-semester program which is designed to serve both as a foundation for more advanced chemistry courses and as a terminal, 8-10 hour chemistry study for curriculums which require no further chemistry courses. Three hours lec., one hour rec., and three hours lab. a week. Not open to students who have credit in Chem. 110. Those without high school chemistry should not enroll in this course until the second semester.

221 230. Chemistry II. (3) I, II, S. Completion of the study of general chemistry. Three hours lec. a week. Pr.: Chem. 210.

221 250. Chemistry II Laboratory. (2) I, II, S. Elementary qualitative analysis and additional experimental study of chemical principles. Six hours lab. a week. Pr.: Chem. 230 or conc. enrollment.

221 399. Honors Seminar in Chemistry. (1) I or II.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

221 599. Undergraduate Research. (1, 2, 3) I, II, S. Analytical, Inorganic, Organic or Physical Chemistry.

FOR UNDERGRADUATE AND GRADUATE CREDIT

221 799. Problems in Chemistry. Credit arranged. I, II, S. Problems may include classroom or laboratory work, and are offered in inorganic, analytical, organic, and physical. Not for thesis research. Pr.: Background of courses needed for the problem undertaken.

FOR GRADUATE CREDIT

221 999. Research in Chemistry. Credit arranged. I, II, S. Work is offered in analytical chemistry, inorganic chemistry, organic chemistry, and physical chemistry. Pr.: Sufficient training to carry on the line of research undertaken.

COURSES IN ANALYTICAL CHEMISTRY

FOR UNDERGRADUATE CREDIT

221 271. Chemical Analysis. (4) I, II, S. Principles of chemical equilibria and qualitative, gravimetric, and titrimetric analyses. Two hours lec. and six hours lab. a week. Pr.: Chem. 230 or conc. enrollment.

1. In the fall semester, the Chemistry Department conducts an accelerated program which provides the opportunity for students with good preparation in high school chemistry to earn credit in both Chemistry I (Chem. 210) and Chemistry II (Chem. 230). Credit in Chemistry I is earned through satisfactory performance on a review examination given the second week of the semester and completion of a special laboratory of three hours per week. Students taking Chemistry I in this way are placed in a special section of Chemistry II, thus allowing completion of both Chemistry I and Chemistry II during the first semester.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

221 440. Research Techniques. (3) II. Principles and applications of techniques in research; to include chromatography, spectroscopy, electrochemistry, dialysis, electrophoresis, and distillation. Two hours lec. and three hours lab. a week. Pr.: Chem. 250 and 350.

221 442. Chemical Microscopy. (2) On sufficient demand. Use of the microscope in qualitative and quantitative analyses as applied to inorganic substances and to vegetable and animal products. One hour lec. and three hours lab. a week. Pr.: Chem. 271, 350, and 351.

221 444. Quantitative Analysis. (4) S. Offered on sufficient demand. Basic principles of gravimetric and titrimetric analyses plus modern separation techniques. Two hours lec. and six hours lab. a week. Pr.: Chem. 250.

221 445. Chemical Separations. (2) II. Principles of modern separation techniques. One hour lec. and three hours lab. a week. Pr.: Chem. 271 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

221 666. Instrumental Analysis. (4) I, II, S. Theory and application of modern instruments in the field of chemistry. Two hours rec. and six hours lab. a week. Pr.: Chem.[2]

221 667. Instrumentation in Chemistry. (3) I, II. Theory and practice of instrument design for use in chemical research. Study of the flow of energy and information in systems for measurement and control. Two hours rec. and three hours lab. a week. Pr.: Chem. 666 or consent of instructor.

221 750. Systematic Analytical Chemistry. (3) II, S. Theoretical aspects of modern analytical methods, with emphasis on the chemical reactions involved. Three hours lec. a week. Pr.: Chem.[2]

FOR GRADUATE CREDIT

221 801. Graduate Seminar in Analytical Chemistry. (0-1) I, II.

221 842. Advanced Analytical Chemistry I. (3) I in odd years. Organic functional group and elemental analysis. Non-aqueous titrations, gas analysis, manometric and vacuum technics. Three hours lec. a week. Pr.: Chem.[2]

221 843. Advanced Analytical Chemistry II. (3) II in even years. Theory of ion exchange, extraction, precipitation, distillation and electrochemical separations. Lesser known analytical technics. Three hours lec. a week. Pr.: Chem.[2]

221 844. Advanced Analytical Chemistry III. (3) I in even years. Theory and application of electrochemical methods; chronoamperometry, linear potential sweep chronoamperometry, chronopotentiometry, cyclic chronopotentiometry, controlled-potential and constant-current coulometry, electrochemical thin layer techniques, rotating disk, and electrochemical instrumentation. Three lectures a week. Pr.: Chem.[2]

221 845. Selected Topics in Analytical Chemistry. (1-3) Offered on sufficient demand. A lecture course in analytical chemistry in areas of specialization of the faculty, with emphasis on current developments. Specific topics will be changed from semester to semester, so a student may take the course for credit more than once. Pr.: Chem.[2]

COURSES IN INORGANIC CHEMISTRY

FOR UNDERGRADUATE AND GRADUATE CREDIT

221 606. Inorganic Chemistry. (3) I and alt. S. Facts of chemistry and their present theoretical interpretations; properties of the elements as a basis for methods of classification. Three hours lec. a week. Pr.: Chem.[2]

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2. All chemistry courses numbered 600 or above require the following as minimum prerequisties: Organic Chemistry II (Chem. 450), Organic Chemistry II Lab. (Chem. 451), Physical Chemistry II (Chem. 595), and Physical Chemistry II Lab. (Chem. 598).

221 755. Inorganic Techniques. (2, 3) S. A graduate level course in the preparation of inorganic compounds which are of unusual interest and which present challenges to the student of advanced inorganic laboratory techniques. Six to nine hours lab. a week. Pr.: Chem.[2]

221 776. Transition Metal Chemistry. (3) II. The chemistry of the high and low valence states of the transition metals and the electronic and magnetic properties of their complexes. Three hours lec. a week. Pr.: Chem.[2] and Chem. 606.

FOR GRADUATE CREDIT

221 802. Graduate Seminar in Inorganic Chemistry. (0-1) I, II, S.

221 826. Chemistry of Non-Metals. (3) II and alt. S. Theory and properties of the non-metallic elements, with emphasis on their individual and group characteristics. Three hours lec. a week. Pr.: Chem.[2]

221 829. Physical Methods in Inorganic Chemistry. (3) I. Theory and application of infrared, Raman, visible, ultraviolet, NMR, ESR, NQR, Mossbauer, and mass spectrometry to inorganic chemistry. Three hours lec. a week. Pr.: Chem.[2] and Chem. 606.

221 831. Theoretical Inorganic Chemistry. (3) II. A discussion of the crystal field and LCAO-MO theories of inorganic compounds and their application in interpreting the vibration, electronic and magnetic properties of inorganic compounds. Three hours lec. a week. Pr.: Chem. 606, 754, and 829.

221 835. Selected Topics in Inorganic Chemistry. (1-3) Offered on sufficient demand. A lecture course in inorganic chemistry in areas of specialization of the faculty, with emphasis on current developments. Specific topics will be changed from semester to semester, so a student may take the course for credit more than once. Pr.: Chem.[2] and Chem. 606.

COURSES IN ORGANIC CHEMISTRY

FOR UNDERGRADUATE CREDIT

221 190. Elementary Organic Chemistry. (3) I, II, S. A brief introduction to the principles of organic chemistry for students in certain agriculture and home economics curriculums. Conc. enrollment in Chem. 191 is recommended. Three hours lec. a week. Pr.: Chem. 110.

221 191. Elementary Organic Chemistry Laboratory. (2) I, II, S. Six hours lab. a week. Pr.: Chem. 190 or conc. enrollment.

221 350. General Organic Chemistry. (3) I, II, S. A survey of types of organic reactions and compounds for students in technical curriculums, particularly in biological science, including pre-veterinary, pre-medical, and certain agriculture and home economics programs. Conc. enrollment in Chem. 351 is urged. Three hours lec. a week. Pr.: Chem. 230.

221 351. General Organic Chemistry Laboratory. (2) I, II, S. Six hours lab. a week. Pr.: Chem. 350 or conc. enrollment.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

221 431. Organic Chemistry I. (3) I. General principles of organic chemistry; study of the main types of aliphatic compounds, with an introduction to fats, carbohydrates, amino acids, proteins, and aromatic compounds. Required for the chemistry curriculum and for entrance to some medical schools. Recommended for others who desire a more thorough course than the preceding ones. Three hours lec. a week. Pr.: Chem. 250 or 271. Conc. enrollment in Chem. 432 is recommended.

221 432. Organic Chemistry I Laboratory. (2) I. Six hours lab. a week. Pr.: Chem. 431 or conc. enrollment.

221 450. Organic Chemistry II. (3) I, II. Cont. of Chem. 431, including additional aromatic chemistry, condensation reactions and introduction to some advanced topics, such as dyes, polymers and heterocyclic chem-

2. All chemistry courses numbered 600 or above require the following as minimum prerequisties: Organic Chemistry II (Chem. 450), Organic Chemistry II Lab. (Chem. 451), Physical Chemistry II (Chem. 595), and Physical Chemistry II Lab. (Chem. 598).

istry. Three hours lec. a week. Pr.: Chem. 431 and 432. Conc. enrollment in Chem. 451 is recommended.

221 451. Organic Chemistry II Laboratory. (2) I, II. Six hours lab. a week. Pr.: Chem. 450 or conc. enrollment.

FOR UNDERGRADUATE AND GRADUATE CREDIT

221 651. Qualitative Organic Analysis. (3) S. Characterization of organic compounds and mixtures. One hour lec. and six hours lab. a week. Pr.: Chem.[2]

221 700. Advanced Organic Chemistry Laboratory. (3) II. Modern techniques employing specialized equipment and apparatus, such as high pressure reactions, heterogeneous catalysis, vacuum distillation, pyrolysis, etc. One hour lec. and six hours lab. a week. Pr.: Chem.[2]

221 752. Systematic Organic Chemistry. (3) II. Advanced study of organic compounds and fundamental types of reactions. Three hours lec. a week. Pr.: Chem.[2]

221 760. Advanced Organic Chemistry. (3) I. Conditions, scope, and applications of reactions useful in synthetic organic chemistry. Three hours lec. a week. Pr.: Chem.[2]

FOR GRADUATE CREDIT

221 803. Graduate Seminar in Organic Chemistry. (0-1) I, II.

221 865. Theoretical Organic Chemistry I. (3) II. Bond structure, stereochemistry, relation of constitution to physical properties, solvents, and other general topics of a theoretical nature. Three hours lec. a week. Pr.: Chem.[2]

221 867. Theoretical Organic Chemistry II. (3) I. The principal mechanisms of organic reactions and various types of evidence for them. Recent developments are followed in the current literature. Three hours lec. a week. Pr.: Chem. 865.

221 870. Selected Topics in Organic Chemistry. (1-3) Offered on sufficient demand. A lecture course in organic chemistry in areas of specialization of the faculty, with emphasis on current developments. Specific topics will be changed from semester to semester, so a student may take the course for credit more than once. Pr.: Chem.[2]

COURSES IN PHYSICAL CHEMISTRY

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

221 400. Descriptive Physical Chemistry. (3) Elementary principles of physical chemistry without higher mathematical applications. Not open to students majoring in chemistry. Three hours lec. a week. Pr.: Chem. 271, Math. 100.

221 535. Radioactive Tracer Techniques. (3) II. (See Phys. 535.) Chemistry and physics of radioactive substances in field of biological and physical science. Two hours lec. and three hours lab. a week. Taught in cooperation with the Department of Physics. Pr.: Consent of instructors.

221 585. Physical Chemistry I. (3) I, S. Properties of matter in the gaseous state; kinetic and statistical theory; elementary quantum chemistry; elementary thermodynamics, including the statistical interpretation. Three hours lec. a week. Pr.: Chem. 250 or 271, Math. 222, Phys. 311.

221 586. Physical Chemistry I Laboratory. (2) I. Six hours lab. a week. Pr.: Chem. 585 or conc. enrollment.

221 595. Physical Chemistry II. (3) II, S. Thermodynamics and chemical equilibrium; reaction kinetics and mechanisms elementary quantum theory of molecular structure and chemical bonding; properties of the solid state. Three hours lec. a week. Pr.: Chem. 585.

2. All chemistry courses numbered 600 or above require the following as minimum prerequisties: Organic Chemistry II (Chem. 450), Organic Chemistry II Lab. (Chem. 451), Physical Chemistry II (Chem. 595), and Physical Chemistry II Lab. (Chem. 598).

221 598. Physical Chemistry II Laboratory. (2) II. Six hours lab. a week. Pr.: Chem. 595 or conc. enrollment.

FOR UNDERGRADUATE AND GRADUATE CREDIT

221 620. Electrochemistry. (3) II in even years. Fundamentals of electrochemistry and their applications. Two hours rec. and three hours lab. a week. Pr.: Chem.[2]

221 625. Colloid Chemistry. (3) I. Three hours lec. a week. Pr.: Chem.[2]

221 701. Chemical Thermodynamics. (3) I, S. Three hours lec. a week. Pr.: Chem.[2]

221 702. Chemical Kinetics. (3) II, S. Three hours lec. a week. Pr.: Chem.[2]

221 754. Molecular Structure. (3) I. Three hours lec. a week. Pr.: Chem.[2]

FOR GRADUATE CREDIT

221 804. Graduate Seminar in Physical Chemistry. (0-1) I, II.

221 850. Chemical Statistical Thermodynamics. (3) II. Three hours lec. a week. Pr.: Chem. 701, Math. 621.

221 855. Selected Topics in Physical Chemistry. (1-3) Offered on sufficient demand. A lecture course in physical chemistry in areas of specialization of the faculty, with emphasis on current developments. Specific topics will be changed from semester to semester, so a student may take the course for credit more than once. Pr.: Chem.[2]

221 895. Theoretical Chemistry I. (3) II. Three hours lec. a week. Pr.: Chem. 754 and Phys. 640.

221 896. Theoretical Chemistry II. (3) I. Three hours lec. a week. Pr.: Chem. 895.

ECONOMICS

(The College of Arts and Sciences section of the Department of Economics; see also College of Agriculture.)

PAUL L. KELLEY,* *Head of Department*

Professors Bagley, Chalmers* and Nordin;* Associate Professors DeCou,* Delehanty and Emerson;* Assistant Professors Fan,* Gormely, Greenwood, Ladin, Nafziger and Narasimham;* Instructors Bradley, Lichty and Werner*

ECONOMICS

(Courses in Agricultural Economics are offered by the College of Agriculture; courses in Accounting and Business Administration are offered by the College of Commerce.)

Economics is concerned with the principles governing the production and distribution of goods and services, the principles guiding the best use of resources—land, labor, capital—and factors causing business prosperity and depression, economic growth, inflation and deflation. Students may pursue specialized study in the fields of economic theory, history of economic thought, money and banking, public finance, labor relations, international trade, economic development, business fluctuations, transportation, econometrics, mathematical economics, and economic systems.

A major in economics will help prepare a student for a career in business, in government, or in education. The study of economics will also be useful to a student in acquiring the background needed as a citizen for understanding problems of our society and appraising policies of governments.

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2. All chemistry courses numbered 600 or above require the following as minimum prerequisties: Organic Chemistry II (Chem. 450), Organic Chemistry II Lab. (Chem. 451), Physical Chemistry II (Chem. 595), and Physical Chemistry II Lab. (Chem. 598).

A student majoring in economics may be enrolled for either the Bachelor of Arts or the Bachelor of Science degree (see pages 115, 116).

Students preparing for positions in business, labor, government, research organizations, college teaching, and others with a special interest in economics should enroll for the Bachelor of Arts degree.

Requirements for an economics major in this curriculum (see page 115) are (1) Econ. 110, 120, 410, 710. (2) 12 additional hours of courses numbered 400 or above in the Department of Economics. Not more than three semester hours in any one branch of economics can be counted toward the fulfillment of this requirement. (3) Stat. 320, B. A. 273, Math. 100.

Secondary Education Certification. A student majoring in economics may also prepare for teacher certification at the secondary level (see page 123). This program leads to the Bachelor of Science degree (see page 116). The sequence of courses should be planned in cooperation with the student's advisers in both economics and education so that the requirements of secondary education are met (see page 246).

Labor and Industrial Relations Options. An economics or sociology major planning to work in the industrial relations field (holding a government, industrial, or trade union position) will become acquainted with the economic, political, psychological, and social aspect of labor-management relations by taking the following courses as parts of either a terminal university program or a foundation for graduate study: Soc. 541, 643; Econ. 620, 627; Psych. 440, 515, 625; B. A. 400, 431, 630.

Graduate Study. Graduate study leading to the degrees Master of Arts and Doctor of Philosophy is offered in economics. Fields of study are economic theory, history of economic thought, econometrics, location economics, labor economics, monetary and fiscal policy, economic development, international trade, economic systems, public finance, and transportation.

Graduate degrees are essential for careers as professional economists in higher education, business, or government. Graduate study also is valuable training for certain executive and research positions in business and government and for teaching social science in secondary schools.

Prerequisite to major graduate study in economics is completion of an undergraduate curriculum equivalent to that required of undergraduate majors in economics at Kansas State University. Ph. D. students must demonstrate a reading proficiency in one foreign language and reasonable proficiency in mathematics.

Research facilities available to graduate students include modern electronic computers.

Opportunities for advanced study are enhanced by close contacts with the Agricultural Economics section of the department, with the College of Commerce, with the Agricultural and Engineering Experiment Stations, and with various state agencies.

COURSES IN ECONOMICS

FOR UNDERGRADUATE CREDIT

225 110. Economics I. (3) I, II, S. Basic facts, principles and problems of economics; introductory principles of resource allocation; determination of the level of employment, output, price level; the monetary and banking system; institutions of the American economy; problems of labor, economic instability, depressions, inflation, economic growth; international economic relations.

225 111. Economics I Honors. (3) I, II. Course description same as Econ. 110 (3) I, II, S. Basic facts, principles and problems of economics; introductory principles of resource allocation; determination of the level of employment; output, price level; the monetary and banking system; institutions of the American economy; problems of labor,

economic instability, depressions, inflation, economic growth; international economic relations. Pr.: Open to students in Honors Program.

225 120. Economics II. (3) I, II, S. Cont. of Economics I. Basic facts, principles and problems of economics including study of the determination of prices by supply and demand; the determination of wages, rent, interest, and profit; theory of the firm; problems of monopoly, agriculture, taxation; principles of economic development; other economic systems.

225 399. Honors Seminar Economics. (1) Readings and discussions. Open to students in the Honors Program not majoring in economics.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

225 410. Intermediate Macro-Economics. (3) II. An examination of the behavior of the economy as a whole, including an analysis of the national income account, consumption, investment, money, interest, the price level, the level of employment, monetary and fiscal policy, and economic growth. Pr.: Econ. 110.

225 430. Money and Banking. (3) I, II, S. Nature, principles and functions of money; development and operation of financial institutions in the American monetary system, with emphasis on processes, problems, and policies of commercial banks in the United States. Pr.: Econ. 110.

FOR UNDERGRADUATE AND GRADUATE CREDIT

225 610. Public Finance. (3) I, II, S. An analysis of federal, state, and local tax structures, with a consideration of the principles and problems underlying specific revenue sources. Attention is given to problems of social security, intergovernmental fiscal relations, and tax shifting. Pr.: Econ. 110.

225 620. Labor Economics. (3) I, II, S. History and philosophy underlying trade union organization and collective bargaining; analysis of selected major issues in the field of industrial relations, including wages, unemployment and inflation, and the concentration of economic and political power in unions and management. Pr.: Econ. 110.

225 627. Contemporary Manpower Problems. (3) II. Impact of automation and technological change on the labor force; employment, unemployment, and manpower trends; labor-management relations and policies; training, retraining and education; case studies of labor-management adjustment to technological change. Pr.: Econ. 620 or consent of instructor.

225 631. Principles of Transportation. (3) II, some S. The historical development and economic importance of rail, motor, air, water, and pipeline transportation in the United States—routes, services, rates, public regulation. Pr.: Econ. 110.

225 636. Economic Systems. (2) I, II, some S. A survey of economic systems, Marxian socialism and modern socialism, giving attention to English socialism, communism, and to the essential characteristics of the free enterprise capitalistic system. Pr.: Econ. 110.

225 640. Industrial Organization and Public Policy. (3) I. An examination of measures and determinants of industrial concentration, and an analysis of market structure, conduct, and performance, and policies related to performance. Pr.: Econ. 120.

225 681. International Trade. (3) I, some S. Economic principles underlying international trade and finance; governmental policies toward international trade; procedures in exporting and importing. Pr.: Econ. 110.

225 682. Strategy of Economic Development. (3) II, some S. An analytical study of the nature of, the obstacles to, and the future possibilities for the economic growth of nations. Special emphasis will be placed upon the "underdeveloped" nations and will include various theories of economic growth in relation to economic, political and sociological

factors. Case studies of particular nations will be utilized. Pr.: Econ. 120 or 430.

225 686. Business Fluctuations and Forecasting. (2) I, some S. Types of business fluctuations; measurement of business cycles; theories of the causes of business cycles; proposals for stabilizing business activity, techniques of forecasting business activity. Pr.: Econ. 110.

225 690. Monetary, Credit, and Fiscal Policies. (2) II. Monetary, central bank, tax, public expenditure, and public debt policies; their influences on business activity and the price level. Utilization of such policies to maintain economic stability and progress. Pr.: Econ. 430.

225 710. Intermediate Economic Analysis. (3) I, II, S. The nature and scope of economic analysis including the function of the price system; determination of price and output of commodities and factor services in different market structures, with emphasis on the business firm as a decision maker. Pr.: Econ. 120 or consent of instructor.

225 730. Introduction to Econometrics. (3) II. Analytical and quantitative methods used in economics. Applications to specific problems. Pr.: Math. 220 or 340 or equiv.

225 735. Mathematical Economics. (3) I. Application of mathematical tools of concrete problems in micro- and macro-economics; mathematical treatment of models of consumption, production, market equilibrium, and aggregate growth. Pr.: Econ. 710, Math. 221 or 340, or consent of instructor.

225 740. Managerial Economics. (3) Offered on sufficient demand. A study of maximizing an individual business firm's profits under conditions of (a) fixed supply and (b) variable supply for (1) a fixed time period and (2) multiple time periods. A critical appraisal will be made of efforts of business firms to increase profits by effecting the position and slope of the demand schedule for their products by different patterns of expenditure or advertising and selling. Pr.: Econ. 710.

225 795. Problems in Economics. Credit arranged. I, II, S. Advanced study on an individual basis is offered in money and banking, public finance, general economics, international trade, labor relations, transportation. Pr.: Background of courses needed for problem undertaken.

FOR GRADUATE CREDIT

225 805. Income and Employment Theory I. (3) I, S in even years. Determination of national income, employment, and the price level. The theories of J. M. Keynes are emphasized along with selected post-Keynesian developments in theories of consumption, investment, money, the interest rate, and the price level. Pr.: Econ. 120 and 410 or consent of instructor.

225 806. Income and Employment Theory II. (3) II. Aggregative econometric models; dynamic analysis—growth models, the stability of macro-economic systems. Other current developments in macro-economic theory. Pr.: Econ. 805 or consent of instructor.

225 810. History of Economic Thought. (3) I, some S. Development of economic ideas and doctrines and the relation of these two conditions existing when they were formulated. Pr.: Econ. 110.

225 815. Value and Distribution Theory. (3) I, S in odd years. Neoclassical value and distribution theory; theories of imperfect competition; introduction to general equilibrium theory and dynamic analysis. Pr.: Econ. 710 or consent of instructor.

225 820. Labor Economics Seminar. (3) I. A critical analysis of wage theories, collective bargaining and unemployment problems. Pr.: Econ. 620 or consent of instructor.

225 823. Advanced International Economics. (3) II. Theoretical and policy issues related to the international monetary system, capital movements, exchange rate systems, the U. S. balance of payments, and trade of underdeveloped countries. Pr.: Econ. 681.

225 825. Location of Economic Activities. (3) II. Integration of effects of factors affecting location of economic activities; selection of strategies the people of an economic area can use to optimize their responses to expected technological and political changes, and changes in consumer demand. Pr.: Econ. 815.

225 835. Econometric Methods. (3) Offered on sufficient demand. Quantitative methods of research used in economics. Pr.: Econ. 730 or consent of instructor.

225 840. Economic Welfare and Public Policy. (3) I. Theory of welfare economics, with applications to current economic problems and policy. Pr.: Econ. 815 or consent of instructor.

225 845. Advanced Economic Theory. (3) II. A study of traditional theories of a firm and competitive market in the light of contemporary thought. General equilibrium theory. Modern micro-economic theories, with attention given to risk and uncertainty. Pr.: Econ. 815.

225 855. Theory and Methods of Regional Economic Analysis. (3) I. A consideration of differences in regional and urban growth; comparison of alternative growth theories; methods of analyzing regional economics such as input-output analysis, linear programming, industrial complex, and spatial interaction models. Pr.: Econ. 825 or consent of instructor.

225 860. Growth and Development Theories. (3) II. Advanced theories of economic growth; growth and development models. Topics include optimum savings, allocations of investment, investment criteria, technical change, programming models, and alternative designs for development policies. Pr.: Econ. 686, 710, 805, Math. 340, or consent of instructor.

225 880. Seminar in Economics. (3) I, II. Special topics in economic theory. Pr.: Graduate standing.

225 995. Research in Economics. Credit arranged. I, II, S. Research for thesis or master's report.

ENGLISH

EARLE R. DAVIS,* *Head of Department*

Professors Davis, Higginson,* Hummel,* Miller,* Moses,* Rogerson* and Woolf; Associate Professors Adams,* Ansdell,* Eitner,* Jones,* McCarthy,* Noonan,* Pennel* and White;* Assistant Professors Brondell,* Gillespie, Glenn,* Johnston,* Koch,* Laman,* McGhee,* Nichols,* Nyberg,* Petrullo, Rees* and M. Schneider; Instructors Cohen, Conover, Epstein, Geissler, Pelischek and H. Schneider; Emeritus: Professors Aberle, Faulkner and Sturmer; Visiting Professor Robert Speaight*

UNDERGRADUATE

Students may elect under a Bachelor of Arts degree a major program in either English or American Literature and Language. The general requirement in each is 30 semester hours subsequent to Engl. 120. All majors must take the English Comprehensive examination (including Secondary Education majors in English) in their sixth semester (Engl. 599). For the English emphasis the following courses are required: 380, 381, either 385 or 386, one Shakespeare course, from six to 12 hours of English Literature electives, from six to nine hours of American Literature electives, and from none to six hours of other departmental electives. For the American emphasis the following courses are required: 385, 386, either 380 or 381, one Shakespeare course, from six to 12 hours of American Literature electives, from six to nine hours of English Literature electives, and from none to six hours of other departmental electives. At least nine hours must be in courses numbered above 600.

Students preparing to teach English in high school may adopt either of two programs: (1) the major in English, leading to the B. A. Degree, or (2) the major in Secondary Education, leading to the B. S. Degree in Secondary Education. Under the first option, students qualify for certification by means of specified courses in the College of Education. Un-

der the second, they satisfy the requirements of the English Department by means of the following courses: 350 or 651, 406, 451, 475, 599; three of the surveys (380, 381, 385, 386); and nine hours in elective courses, six of which must be in courses numbered above 600. The Comprehensive Examination (599) is required under either program.

The department offers general education courses aiming at introductory appreciation of literature for non-major students: Engl. 143, 144, 146, 147, 230, 240, 251, 256, 270, 275, 370, and 375. Many programs require the Humanities, or the basic courses in English or American Literature, or Books and Men. In general it is proper to substitute in any curriculum or program an advanced course for an elementary one, if the student so elects and the teacher gives consent.

A minor program should include 15 hours beyond the freshman level, nine of which must be selected from courses numbered 400 or above.

GRADUATE

Work leading to the degrees Master of Arts and Doctor of Philosophy is offered in the Department of English. In addition to the field of English Literature special emphasis on one of the following may be indicated by the student's committee: American Literature, linguistic study, and, for the Master's Degree, Creative Writing.

Candidates for graduate work should have completed an undergraduate curriculum with a broad background in language and literature. Students lacking preparation in certain representative areas may be asked to do additional work. Those who have not previously taken the graduate record examination must do so in their first semester.

Other requirements for the degree Master of Arts include a minimum of 30 semester hours, approximately two-thirds of which will be in the major field. Candidates must demonstrate competence in reading knowledge of a foreign language, usually French or German. They must also write an acceptable thesis or report and pass written and oral examinations covering the field.

Other requirements for the degree Doctor of Philosophy include about 90 semester hours beyond the baccalaureate, approximately two-thirds of which will be in the major field. Candidates must demonstrate a proficiency in two languages, generally French and German. They must also pass a preliminary examination in English and American literature and language, write an acceptable dissertation, and defend it orally.

COURSES IN ENGLISH

FOR UNDERGRADUATE CREDIT

229 030. Writing Laboratory. (0) I, II, S. Laboratory practice in writing for all students who need review in fundamentals of composition. Especially designed to meet the needs of students who have difficulty in meeting standards in Written Communications or English Proficiency.

229 050. Developmental Reading Laboratory. (2)[1] I, II. Designed to improve reading skills, speed, vocabulary, comprehension, and ability to analyze articles for basic consumption, propaganda techniques, and general construction. Fee for reading materials. Pr.: Evidence that candidate is in upper two-thirds of his class in grade average.

229 075. English for Foreign Students. (3)[1] I, II, S. Review of English usage for students where English is not the first language, designed to improve understanding and usage in practice. Pr.: Recommendation of student's adviser.

229 090. English Proficiency. (0) I, II, S. An examination to test the ability of the prospective graduate to write an expository essay logical in form and acceptable in grammar and diction. Required for graduation in all colleges. Pr.: Junior standing.

229 100. English Composition I. (3) I, II, S. Reading and composition

1. Two or three hours academic credit, not applicable toward degree requirements. Student in curriculum requiring 120 hours must therefore accumulate 122 hours or 123 hours when taking this course. Hours will apply toward grade-point average.

for freshmen. Students may be assigned two additional hours a week of writing laboratory upon recommendation of the instructor. Pr.: Satisfactory entrance test.

229 105. English Composition IA. (5)[2] I, II, S. Reading and composition for students whose reading comprehension falls materially below their linguistic capacity. Five hours rec. a week.

229 110. English Composition IH. (3) I, II, S. Reading and composition for freshmen who score high on their entrance examination in English and who are interested in pursuing a more sophisticated and challenging program than is possible in Engl. 100. Not open to students with credit in Engl. 100.

229 111. English Composition IS. (3) I. Same as Engl. 110. For students in the Arts and Sciences Honors Program only.

229 115. English Composition IIA. (5)[2] I, II, S. Reading and composition for students whose reading comprehension falls materially below their linguistic capacity. Five hours rec. a week.

229 120. English Composition II. (3) I, II, S. Cont. of Engl. 100, with emphasis on critical reading and evaluation. Students may be assigned to two hours a week of Writing Laboratory upon recommendation of the instructor. Pr.: Engl. 100 or 105.

229 125. English Composition IIH. (3) II. Cont. of Engl. 110, with the emphasis on literary forms and themes. Pr.: Engl. 100 or 110.

229 126. English Composition IIS. (3) II. Same as Engl. 125. Cont. of Engl. 111. For students in the Arts and Sciences Honors Program only.

229 143. Humanities: Classical Cultures. (3) I, S.

229 144. Humanities: Medieval and Renaissance. (3) II, S.

229 146. Humanities: Baroque and Enlightenment. (3) I, S.

229 147. Humanities: Modern. (3) II, S.

These courses seek to develop a greater understanding, appreciation, and enjoyment of the humanistic resources of Western culture. The student is introduced to the great works in literature, philosophy, art, music and religion in each major period. The courses may be taken in any order.

229 200. English Composition III. (3) I, II, S. Composition and argumentation. Pr.: Engl. Comp. II.

229 230. Introduction to Fiction. (2) I, II. Selected novels from world literature, with emphasis on the present.

229 240. Introduction to the Short Story. (3) I, S. An introductory study, using American, British, Continental titles. Pr.: Engl. Comp. II.

229 251. English Literature I. (3) I, II, S. Pr.: Engl. Comp. II.

229 256. English Literature II. (3) I, II, S. Pr.: Engl. Comp. II.

229 270. American Literature I. (3) I, II, S. Pr.: Engl. Comp. II.

229 275. American Literature II. (3) I, II, S. Pr.: Engl. Comp. II.

229 345. Introduction to Drama. (3) I, II. Study of classical, medieval, French neoclassical, and nineteenth century continental drama. Pr.: Engl. Comp. II.

229 350. Introduction to Shakespeare. (3) I, II, S. An introductory study of representative comedies, tragedies, and histories. Pr.: Engl. Comp. II.

229 360. Modern American Novel. (3) I, II, S. An introductory study of selected American novels. Pr.: Engl. Comp. II.

229 370. Books and Men I. (3) I, II, S. Introduction to great world classics from present to past. Pr.: Engl. Comp. II.

229 375. Books and Men II. (3) I, II, S. Cont. of Engl. 370: Huxley,

2. Three hours apply toward fulfillment of requirement in English Composition I and II. Additional two hours not applicable toward degree requirements. Students enrolled in this course must take two additional hours beyond requirement for degree. Hours will apply toward grade-point average.

Swift, and Plato; Dostoevsky; The Bible, Dante, T. S. Eliot, and other classics. Pr.: Engl. Comp. II.

229 380. English Survey I. (3) I, II, S. History of English literature from Anglo-Saxon times down to the close of the Elizabethan period. Required of majors with English emphasis program. Pr.: Engl. Comp. II.

229 381. English Survey II. (3) I, II, S. Rise of Puritanism and its influence on English literature; classical movement; Romanticism and its development. Required of majors with English emphasis program. Pr.: Engl. Comp. II.

229 385. American Survey I. (3) I, II, S. The colonials to the Civil War. Required of majors with American emphasis program. Pr.: Engl. Comp. II.

229 386. American Survey II. (3) I, II, S. Whitman to the present. Required of majors with American emphasis program. Pr.: Engl. Comp. II.

229 390. Humanities Abroad. (6) S. A concentrated study tour of selected European cultural centers. Preliminary attendance for one class study session a week in preceding spring semester required of on-campus undergraduates enrolled in the course. Pr.: Three hours of appropriate humanities courses if credit is applied toward a degree.

229 397. Honors Seminar in Humanities. (1) I, II. Colloquium on the interrelationships of the humanities fields, including art, literature, music, and philosophy. Pr.: Honors students only.

229 398. Junior Honors Colloquium. (Variable credit) I, II. Open only to juniors in the Arts and Sciences Honors Program.

229 399. Honors Seminar in English. (1) I, II. Readings and colloquia in selected masterpieces. For non-English majors in the Honors Program. Pr.: Honors students only.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

229 406. Advanced Composition. (3) I, II, S. Expository writing, primarily for candidates for the teaching certificate in Secondary Education. Pr.: Engl. Comp. II.

229 416. Scientific Report Writing. (2) I. Preparation of scientific reports in engineering, chemistry, physics, geology, agronomy, and other technical fields. Letters of authorization and submittal. Adaptation of written reports for oral presentation or for publication in technical journals. Pr.: Engl. Comp. II.

229 430. Narrative Writing I. (3) I. Subjects selected from the student's particular field of work; exposition of mechanisms, processes, and general expository writing. Pr.: Consent of instructor only.

229 436. Narrative Writing II. (3) I. Narrative writing, both in its relation to the other forms of composition and as an independent form. Direction and criticism of thesis work are offered to graduate students. Pr.: Consent of instructor only.

229 451. Modern English Grammar. (3) I, II, S. English etymology, parts of speech, inflection, syntax, and modern usage. For graduate credit reports on problems in modern grammar and usage. Pr.: Engl. Comp. II.

229 470. Literature for Children. (3) I, II, S. Selecting, reading, and evaluating books for children; training in story-telling and oral reading; selection of records correlated with literature. For teachers of elementary grades and students of child guidance. Pr.: Engl. Comp. II.

229 475. Literature for Adolescents. (3) I, II, S. Selecting, reading, and evaluating books for adolescents; training in oral reading and selection of records correlated with literature. For teachers in the junior and senior high schools and students of guidance for adolescents. Pr.: Junior standing.

229 520. English Bible. (3) II. The Bible as literature along with emphasis on the cultural and historical backgrounds of the Old Testament. Pr.: Engl. Comp. II.

229 560. American Folklore and Folk Literature. (3) I, II, S. Folk tales, heroes, ballads, with the literature developed from folk beginnings; Mark Twain, Bret Harte, Carl Sandburg, Stephen Vincent Benet, Mark Connelly. Pr.: Engl. Comp. II.

229 599. English Comprehensive. (0) I, II, S. An examination required of all majors, based on departmental reading list and the scope of literature covered in the English and American Survey courses. To be taken in sixth semester of academic program.

FOR UNDERGRADUATE AND GRADUATE CREDIT

229 620. The Epic Tradition. (3) II. Greek and Roman masterpieces in translation as a background for the study of English literature. Pr.: Junior standing.

229 625. Medieval Narrative. (3) II. A survey of non-Chaucerian medieval literature, with emphasis on the Arthurian romance cycle. Pr.: Engl. Comp. II.

229 630. Chaucer. (3) I, II, S. Pr.: Engl. Comp. II.

229 641. Elizabethan Non-dramatic Literature. (3) I in alt. years. An introduction to the literature of the English Renaissance, with some emphasis on its Continental affiliation. Pr.: Engl. Comp. II.

229 645. English Drama to 1642. (3) I, S in alt. years. A survey of the dramatic literature of Elizabethan and Jacobean times, exclusive of Shakespeare. Pr.: Junior standing.

229 646. Restoration and Eighteenth Century Drama. (3) I, S in alt. years. A survey of English dramatic literature from 1660 to 1800. Pr.: Junior standing.

229 651. Shakespearean Drama. (3) I, II, S. A study of Shakespearean drama, with special attention to the criticism and bibliography. Pr.: Junior standing.

229 655. The Folk Tale. (3) II. Study of development of oral tradition in the folklore of basic cultures, with literary analogues. Pr.: Engl. 560.

229 665. Seventeenth Century Literature. (3) II, S. A survey of the principal non-dramatic writers, apart from Milton, 1600-1660, with emphasis on Donne and the Metaphysicals. Pr.: Engl. Comp. II.

229 671. Milton. (3) II, S. Pr.: Engl. Comp. II.

229 681. Eighteenth Century I. (3) I, S. English literature from the Restoration to the death of Swift, with emphasis upon Dryden, Swift, and Pope. Pr.: Engl. Comp. II.

229 686. Eighteenth Century II. (3) II, S. The age of Dr. Johnson and the beginnings of Romanticism. Pr.: Engl. Comp. II.

229 688. Early American Literature. (3) I. American literature to 1800. Pr.: Junior standing.

229 691. English Novel I. (3) I, S. Survey of British fiction from Defoe and Fielding to the Brontes. Pr.: Engl. Comp. II.

229 696. English Novel II. (3) II, S. Survey of British fiction from Dickens and Thackeray to Galsworthy and Bennett. Pr.: Engl. Comp. II.

229 699. English Seminar. (3) II. Intensive study of the writings of a single major author, English or American. Pr.: Senior or graduate standing and consent of instructor.

229 705. The Romantic Movement. (3) I. Pr.: Engl. Comp. II.

229 709. The New England Transcendentalists. (3) II in alt. years, S. A study of the Transcendental Movement, with emphasis on Emerson and Thoreau. Pr.: Engl. Comp. II.

229 711. Nineteenth Century American Poetry. (3) II in alt. years, S.

Bryant, Poe, the Brahmins, Whitman, Dickinson and others. Pr.: Engl. Comp. II.

229 715. Nineteenth Century American Fiction I. (3) I, S. Emphasis on Brown, Irving, Cooper, Poe, Hawthorne and Melville. Pr.: Engl. 385.

229 718. Nineteenth Century American Fiction II. (3) II, S. Emphasis on Twain, James, Howells, Crane, Norris. Pr.: Engl. 386.

229 720. The Victorian Era. (3) II. Pr.: Engl. Comp. II.

229 725. Nineteenth Century British Prose. (3) I, S. Significant prose writings of the period from Wordsworth to Shaw. Pr.: Junior standing.

229 730. American Humor and Satire. (3) II, S. Emphasis on works produced in the nineteenth and twentieth centuries. Pr.: Junior standing.

229 740. Twentieth Century English Novel. (3) II in alt. years. British fiction from Conrad and Joyce to Greene and Waugh. Pr.: Engl. Comp. II.

229 744. Twentieth Century American Novel. (3) I, S. The American novel from Dreiser to contemporary figures. Pr.: Engl. Comp. II.

229 745. Twentieth Century American Short Story. (3) II, S. The development of the form since 1900. Pr.: Engl. Comp. II.

229 750. Twentieth Century English Poetry. (3) I. Development of English poetry from Hardy and Yeats to the present time. Pr.: Engl. Comp. II.

229 755. Twentieth Century American Poetry. (3) I, S. Development of American poetry from Robinson and Frost to Eliot and the present time. Pr.: Engl. Comp. II.

229 760. Twentieth Century English Drama. (3) I, S. Special emphasis on Shaw. Pr.: Junior standing.

229 765. Twentieth Century American Drama. (3) II, S. American drama from O'Neill and Anderson to Miller and Williams. Pr.: Junior standing.

229 775. Creative Writing. (3) I, II. Imaginative writing, with particular emphasis on the short story. Pr.: Engl. 430 or consent of instructor.

229 780. Literary Criticism. (3) I. Major points of view in modern literary theory, with background in earlier criticism; practice in the critical analysis and judgment of literary examples. Pr.: Senior standing.

229 790. History of the English Language. (3) I. Nature of language and its development; English language and its use in the United States. Pr.: Senior standing or consent of instructor.

229 799. Problems in English. Credit arranged. I, II, S. Work offered in major authors, types, and periods of English and American literature; linguistics; scientific report writing. Pr.: Background of courses needed for problem undertaken.

FOR GRADUATE CREDIT

229 802. Bibliography and Methods of Research. (3) II, S. Pr.: Graduate standing.

229 810. Old English. (3) II in alt. years. The elements of Old English grammar, with concurrent readings in prose and poetry. Pr.: Consent of instructor.

229 811. Old English Poetry. (3) I in alt. years. Pr.: Engl. 810 or consent of instructor.

229 812. Middle English Poetry. (3) II in alt. years. Pr.: Engl. 790 or consent of instructor.

229 820. Selected Topics in the Study of Language. (3) II in alt. years. Pr.: Engl. 790 or consent of instructor.

229 830. Chaucer Seminar. (3) I in alt. years. Pr.: Engl. 630.

229 845. Studies in Sixteenth Century Literature. (3) I, II, S in alt. years. Bibliographic and critical research in the works of selected major authors. Pr.: Consent of instructor.

229 850. Shakespeare Seminar. (3) II in alt. years. Pr.: Engl. 651.

229 855. Studies in Seventeenth Century Literature. (3) I, II, S in alt. years. Bibliographic and critical research in the works of selected major authors. Pr.: Consent of instructor.

229 870. Milton Seminar. (3) II in alt. years. Pr.: Engl. 671 or consent of instructor.

229 875. Studies in Eighteenth Century Literature. (3) I, II, S in alt. years. Bibliographic and critical research in the works of selected major authors. Pr.: Consent of instructor.

229 885. Studies in Nineteenth Century Literature. (3) I, II, S in alt. years. Bibliographic and critical research in the works of selected major authors. Pr.: Consent of instructor.

229 895. Studies in Twentieth Century Literature. (3) I, II, S in alt. years. Bibliographic and critical research in the works of selected major authors. Pr.: Consent of instructor.

229 920. Topics in Poetry. (3) I in alt. years. Intensive study of a poet or group of poets, either English or American. Pr.: Consent of instructor.

229 930. Topics in Drama. (3) II in alt. years. Intensive study of a dramatist or group of dramatists, either English or American. Pr.: Consent of instructor.

229 940. Topics in Fiction. (3) I in alt. years. Intensive study of a novelist or group of novelists, either English or American. Pr.: Consent of instructor.

229 999. Research in English. Credit arranged. I, II, S. Pr.: Registration in the Graduate School, with sufficient training to carry on the line of research undertaken.

COURSES OFFERED JOINTLY WITH THE DEPARTMENTS OF SPEECH AND MODERN LANGUAGES:

229 455. General Phonetics. (3) Pr.: Normal rating in standard audiometry test. (Same as Spch. 455.)

229 610. Dante. (3) I. An in-depth study of the **Divine Comedy** in translation, using Dante as an exponent of medieval thought. (Same as Mod. L. 610.)

229 652. Introduction to Linguistics. (3) I, II, S. Study of the basic concepts of modern descriptive linguistics. Pr.: Junior standing. (Same as Spch. 652 and Mod. L. 652.)

229 664. Topics in Applied Linguistics. (3) II. Principles of contrastive structural analysis, especially English/French, English/Spanish, English/German. Course on another topic may be repeated for credit. Pr.: Spch. 652, Mod. L. 652 or Engl. 652. (Same as Mod. L. 664 and Spch. 664.)

229 669. Language Typology. (3) Presentation and discussion of the languages of the world and the variant methods of their classification. Pr.: Engl. 652, Mod. L. 652, Spch. 652 or consent of instructor and junior standing. (Same as Mod. L. 669 and Spch. 669.)

229 672. Transformational Grammar. (3) A close examination of the state of current transformational-generative theories of grammar; a survey of the varying schools of thought and extant transformational descriptions of languages. Practical work in the writing of transformational statements. Pr.: 652 Intro. Ling. or consent of the instructor. (Same as Spch. 672.)

229 673. Introduction to Historical Linguistics. (3) Methods of historical linguistics as used in the reconstruction of earlier forms and stages of a language. Pr.: Junior standing. (Same as Mod. L. 673 and Spch. 673.)

229 674. Methods and Techniques of Learning a Second Language. (3) Linguistics applied to the learning of foreign language, especially English as a foreign language. Pr.: Twelve hours of a modern language, including English, and Spch. 652, Mod. L. 652 or Engl. 652. (Same as Spch. 674 and Mod. L. 674.)

229 676. Phonetics and Phonemics of English. (3) Detailed study of the speech sounds of English, their production, functions as signals, and realizations in the stream of speech in English. Pr.: Spch. 210 and Engl. 652, Mod. L. 652, Spch. 652 or consent of instructor and junior standing. (Same as Mod. L. 676 and Spch. 676.)

229 667. Morphology and Syntax of English. (3) I, II, S. Consideration of current theories of grammar, with emphasis on morphemics and tagmemics. Pr.: Engl. 451. Same as Mod. L. 677 and Spch. 677.)

GEOLOGY AND GEOGRAPHY

PAGE C. TWISS,* *Head of Department*

GEOLOGY

Professors Beck, Chelikowsky* and Shenkel;* Associate Professors Brookins,* Twiss* and Walters;* Assistant Professors Chaudhuri,* Riseman* and Vian;* Instructor Clark; Emeritus: Professor Sperry**

UNDERGRADUATE

Geology offers optional programs of study in Geology, Geochemistry, Geophysics, and cooperates with the College of Education in an Earth Science program for high school teachers. For detailed plans of study and for information regarding Engineering Geology, consult the head of the department.

Geology Option

In addition to the requirements for a geology major in the A. B. or B. S. degree program (pp. 115, 116), the following must be completed: Geol. 110, 300, 420, 430, 460, 470, 480, 530, 600, 603, and 640. Hard rock majors must take Geol. 602; soft rock majors, paleobotany or advanced paleontology. The biology requirement must be satisfied with Zool. 205 and Bot. 210.

Geochemistry Option

In addition to the requirements on pp. 115, 116, the following must be completed: Geol. 110, 430, 460, 470, 530, 600, 603, 612, 614, and 640; Math. 222 and 240; Phys. 535; Chem. 300, 350, 351, 585, 586, 595, and 598. The biology requirement must be satisfied with Zool. 205 and Bot. 210.

Geophysics Option

In addition to the requirements on pp. 115, 116, the following must be completed: Geol. 110, 430, 460, 470, 530, 603, and 640; Math. 222 and 240; Phys. 211, 212, and 407 may be substituted for Phys. 310 and 311. Other physics courses required are Phys. 421, 408, 560 and 473.

Earth Science Options for High School Teachers

In addition to the requirements for a geology major in the A. B. or B. S. degree program (pp. 115, 116), the Teacher Certification requirements (pp. 123, 245) and the following must be completed: Geol. 100, 110, 420, 430, and 460; Geog. 207; Math. 100 and 150; Chem. 210, 230, and 250; Zool. 205; Bot. 210; Phys. 131, 135, 211, and 212, also five hours of social science electives.

GRADUATE

The prerequisite to graduate work for the M. S. degree in Geology and the Ph. D. degree in Geochemistry is the completion of a four-year un-

dergraduate program including suitable preparatory work in geology, chemistry, physics, mathematics, and the biological sciences.

Research facilities include a 6-inch, 60-degree solid source mass spectrometer, emission spectrograph, an X-ray diffractometer, an X-ray spectrograph, a fully equipped geochemistry laboratory for isotopic work, complete petrographic, paleontological and general geology laboratories. Geophysical facilities include a seismological observatory, seismic and magnetic exploration equipment.

The University area abounds in excellent outcrops and is unusually well situated for field work involving studies in sedimentary petrology, stratigraphy, groundwater geology, soil mineralogy, petroleum geology, plains-type structures and invertebrate paleontology.

COURSES IN GEOLOGY

FOR UNDERGRADUATE CREDIT

234 100. General Geology. (3) I, II, S. Structural and dynamic features of the earth; the rock-forming minerals; the rocks and their decay; a short history of the earth. One or two field trips during the semester.

234 110. General Geology Laboratory. (1) I, II, S. Minerals, rocks; topographic and geologic maps; field trips. Three hours lab. a week. Pr.: Geol. 100 or conc. enrollment.

234 300. Introductory Geochemistry. (2) I, II. Introduction to the distribution of the elements in the lithosphere, hydrosphere, biosphere and atmosphere as related to the evolution of the earth and the formation of igneous, metamorphic and sedimentary rocks. Two hours rec. a week. Pr.: Geol. 100, 460; Chem. 230, 250.

234 399. Honors Seminar in Geology. (1) Selected topics. Open to nonmajors in the Honors Program.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

234 412. Earth Science. (4) S. A critical study of the atmosphere, weather, climate, composition and processes of the earth; also the interaction of these in producing the pattern of landforms and human activity. Three hours rec. and three hours lab. a week. Pr.: Geol. 100 or Geog. 207 or junior standing.

234 420. Geomorphology. (4) I, II, S. Various landforms and their evolution; geologic interpretation of landscapes, especially of features in the United States; interpretation of topographic maps. Three hours rec. and three hours lab. a week. Pr.: Geol. 100.

234 430. Historical Geology. (4) I, II, S. Physical and biological events through which the earth has gone. Three hours rec. and three hours lab. a week. Pr.: Geol. 100.

234 440. Petroleum Geology. (3) I or II. Origin, migration, and accumulation of petroleum. Stratigraphy and structure of important fields. Three hours rec. a week. Pr.: Geol. 430.

234 460. Mineralogy. (5) I or II. Crystallography, physical and chemical mineralogy, and classification of common minerals. Three hours rec. and six hours lab. a week. Pr.: Chem. 210.

234 470. Field Methods in Geology. (2) I or II. Construction of geologic maps; application of field methods to the problems of geology. One hour rec. and three hours lab. a week. Pr.: Geol. 430.

234 480. Invertebrate Paleontology. (4) I or II. Evolution and geologic history of the invertebrate animals. Three hours rec. and three hours lab. a week. Pr.: Geol. 430.

234 530. Structural Geology. (4) I or II. Mechanics of the earth's crust, interrelation of structures found in the earth. Three hours rec. and three hours lab. a week. Pr.: Geol. 470.

FOR UNDERGRADUATE AND GRADUATE CREDIT

234 600. Optical Mineralogy. (3) I, II. The fundamentals of optical crystallography; polarizing microscope study of the optional properties

of rock-forming minerals. Two hours rec. and three hours lab. a week. Pr.: Geol. 460.

234 601. Geologic Reports and Illustrations. (2) I, II. Preparation and representation of geologic reports and illustrations. Two hours rec. a week. Pr.: Geology majors with senior or graduate standing.

234 602. Economic Geology. (3) I or II. Origin and mode of occurrence of non-metallic minerals, including coal and petroleum, and of metallic mineral deposits. Two hours rec. and three hours lab. a week. Pr.: Geol. 430, 460.

234 603. Stratigraphic Geology. (4) I, II. Description, classification, and correlation of stratigraphic units, with emphasis on those of Kansas. Three hours rec. and three hours lab. a week. Pr.: Geol. 480.

234 610. Applied Geology. (3) I, II. Geology applied to the science of engineering in urban and regional planning. Two hours rec. and three hours lab. a week. Pr.: Consent of instructor.

234 612. Geochemistry I. (3) I or II. Application of chemical principles to geologic systems, emphasis on low-temperature aqueous equilibrium, oxidation reduction, crystal chemistry, thermodynamics, high temperature phase equilibria. Three hours rec. a week. Pr.: Chem. 585 or equiv., Geol. 600 or consent of instructor.

234 614. Geochemistry II. (3) I or II. Distribution of elements in the earth's crust, geochemistry of meteorites, igneous, metamorphic, sedimentary rocks, weathering, the hydrosphere, biosphere, atmosphere, ore deposits. Geothermometry, geochemical prospecting. Three hours rec. a week. Pr.: Geol. 612 or equiv.

234 616. Geochemistry Laboratory Techniques. (2) I or II. Application of X-ray diffractometry, ion exchange, mineral separation, petrographic modal analysis, and flame photometry to specific geologic problems. Two three-hour labs. a week. Pr.: Geol. 612 or conc. enrollment.

234 620. Geology of Subsurface Water. (3) I or II. Three hours rec. a week. Pr.: Geol. 510, 530.

234 640. Field Geology. Credit arranged. S. Opportunity is offered students to do field work in the Rocky Mountains. Students interested should consult the head of the department.

234 660. Micropaleontology. (3) I or II. Preparation, identification, and use of microscopic fossils. One hour rec. and six hours lab. a week. Pr.: Geol. 480 and junior standing.

234 670. Subsurface Methods. (3) I, II. Study of well cuttings, electric logs, and radioactive logs as applied to subsurface mapping of rocks and their fluid content. One hour rec. and six hours lab. a week. Pr.: Geol. 440, 460.

234 680. Vertebrate Paleontology. (3) I or II. Evolution, geologic history, and classification of the vertebrates. Pr.: Geol. 430 or 10 hours of zoology.

234 690. Petrography. (3) I or II. The mineralogy, texture, occurrence, and association of igneous and metamorphic rocks; hand specimens and thin-section examination of representative rock types. Two hours rec. and three hours lab. a week. Pr.: Geol. 600.

234 700. Index Fossils. (2) I or II. Identification of those fossil plants and animals of value in the age of correlation of the sedimentary rocks of North America. Six hours lab. a week. Pr.: Geol. 480.

234 710. Igneous Petrology. (3) I or II. The origin of igneous rocks; phase relations in silicate systems. Three lectures a week. Pr.: Geol. 690.

234 720. Pleistocene Geology. (2) I or II. Pleistocene stratigraphy and its development in North America; correlation of European and North American Pleistocene rocks. Two hours rec. a week and one field trip a semester. Pr.: Geol. 420, 510.

234 730. Metamorphic Petrology. (3) I or II. Metamorphic processes

and the origin of metamorphic rocks. Three lectures a week. Pr.: Geol. 690.

234 740. Regional Geology. (3) I or II. Structure and the stratigraphy of the major tectonic units of North America. Pr.: Geol. 510, 530.

234 750. Aerial Photogeology. (3) I or II. Interpretation and use of aerial photographs; characteristics of photographs; adjustment of geologic, cultural, and topographic detail. One hour rec. and six hours lab. a week. Pr.: Geol. 470.

234 760. Sedimentary Petrology. (3) I or II. Petrography, classification and origin of soils, sediments and sedimentary rocks. Two hours rec. and three hours lab. a week. Pr.: Geol. 690.

234 790. Problems in Geology. Credit arranged. I, II, S. Work is offered in mineralogy, paleontology, stratigraphy, structural geology, sedimentary petrology. Pr.: Background of courses needed for problem undertaken.

FOR GRADUATE CREDIT

234 800. Graduate Seminar in Geology. Variable credit. I, II. Topics in geology, geochemistry and geophysics.

234 810. Isotope Geology I. (3) I or II. Radioactive decay in geologically important systems, rigorous treatment of Pb, Sr, and Ar isotope variations, radiation damage and diffusion in minerals, instrumentation. Three hours rec. a week. Pr.: Phys. 535 or equiv., Geol. 690 or consent of instructor.

234 820. Isotope Geology II. (3) I or II. Stable isotope variation, rigorous treatment of S, O, C, and H isotope systems, cosmogenic nuclides, application of isotope variations to problems of petrogenesis and continental growth. Three hours rec. a week. Pr.: Geol. 810 or equiv.

234 860. Goniometry and Crystal Drawing. (2) I or II. Measurements, calculations, projections, and drawings of crystals. Measurements will be made with contact and optical goniometers and the universal stage microscope. Six hours lab. a week. Pr.: Geol. 600 and senior standing.

234 920. Clay Mineralogy. (3) Geologic occurrrences, physical properties, atomic structures and the identification of clay minerals, including thermal analytical methods and the study of X-ray diffraction patterns. Two hours rec. and three hours lab. a week. Pr.: Consent of instructor.

234 990. Research in Geology. Credit arranged. I, II, S. Work is offered in mineralogy, paleontology, stratigraphy, structural geology, igneous, metamorphic and sedimentary petrology, geochemistry and isotope geology. Pr.: Registration in the Graduate School, with sufficient training to carry on the line of research undertaken.

GEOGRAPHY DIVISION

W. R. Siddall,* *Chairman*

Professor Stacey; Associate Professor Siddall;* Assistant Professors Bussing, Kromm,* Self* and Stover;* Emerita: Instructor Larson*

Geographers, in studying the differences in human activities from one place to another, deal with vital questions about current national and international situations. Why are the people of some areas wealthy and those of other regions poor, some well fed and others starving, some industrialized and some agricultural, some free and others enslaved? In their attempts to answer such questions geographers draw upon other disciplines, especially in the social sciences, in order to discern the various interrelated factors which combine to bring about particular conditions in specific areas. Geography is, therefore, a very broad inquiry into the state of the world today, advanced by bringing together the ideas and concepts of many disciplines to obtain some measure of understanding about specific areas. Professional opportunities for students trained in

geography exist especially in government service, teaching, planning, and business; and for the non-professionally oriented student it is a study characterized by a broad and liberalizing approach to worldwide political, social, and economic conditions.

UNDERGRADUATE

Requirements for a major in geography under the curriculum leading to the Bachelor of Arts degree (see page 115) consist of a minimum of 28 hours in geography. Included in this total must be Geog. 150, 151, 215, 216, and 325, plus a minimum of 11 additional hours of geography courses numbered 500 or above.

The student also has the option of majoring in geography under a curriculum leading to a Bachelor of Science degree. The geography requirements are the same, although the University requirements differ as described elsewhere (see page 116).

A third curriculum is available leading to the Bachelor of Science degree in Secondary Education. For information concerning this program see the College of Education section of this catalog.

GRADUATE

Graduate work in geography is offered in the human and regional aspects of the discipline. Closely related courses in the fields of history, economics, regional planning, and agriculture may be made an integral part of the student's program. Candidates for the Master of Arts degree are required to take Geog. 801 and 900. The Geography Division is equipped with a small reference library, a good collection of research maps, a cartography laboratory, and a seminar room, and the University Library contains a large collection of geographical journals.

COURSES IN GEOGRAPHY

FOR UNDERGRADUATE CREDIT

235 115. World Regional Geography. (3) I, II, S. Introduction to geography structured on a framework of major world regions and countries. With the regional approach is an explicit discussion of the essential concepts of certain systematic specialties, such as political, social, economic and urban geography.

235 125. Geography of Kansas. (2) I, II, S. A regional geographical analysis of Kansas including discussion of climate, landforms, soil, water, and minerals as well as patterns of settlement, population, agriculture, industry, transportation and urban development.

235 150. Physical Geography I. (4) I, II. A geographic study of the natural environment. Climatic elements and types, natural vegetation, and soils; their major characteristics, areal distribution, and relevance to man. Three hours lec. and two hours lab. a week.

235 151. Physical Geography II. (4) I, II. Cont. of Physical Geography I. Mapping, surface forms of the land, occurrence of minerals, and oceanography, together with an analysis of the interrelationships of the various elements of landscape, including the human impact. Three hours lec. and two hours lab. a week. Pr.: Physical Geography I.

235 215. Economic Geography I. The Extractive Industries. (3) I, II. A study of the spatial variations and world distribution of agriculture, forestry, mining, and fishing, together with discussion of the various economic, social, and political principles giving rise to these distributions.

235 216. Economic Geography II. Manufacturing and Trade. (3) I, II. An inquiry into the location of the more important manufacturing industries and the patterns of spatial interaction, together with an examination of these distributions in terms of current concepts of industrial location and trade. Pr.: Geog. 215.

235 325. Cartography. (3) I. Theory, interpretation, and design and drafting of maps, with emphasis on presenting quantitative data.

235 399. Honors Seminar in Geography. (1) Selected topics. Open to non-majors in the Honors Program.

FOR UNDERGRADUATE AND GRADUATE CREDIT

235 405. Introduction to the Civilizations of South Asia I. (3) I. An interdisciplinary survey of the development of civilization in South Asia, geographical and demographic context, philosophical and social concepts, social and political institutions, literature, and historical movements. (Same as Hist. 405, P. Sci. 405, Soc. 405, Anthro. 405.)

235 406. Introduction to the Civilizations of South Asia II. (3) II. Interdisciplinary survey of recent and contemporary civilization in India, Pakistan, Ceylon, Nepal, and Afghanistan, including recent history, current economy, religion, culture, languages, literature, geography, social and political structure, ideas. (Same as Hist. 406, P. Sci. 406, Soc. 406, Anthro. 406.)

235 525. Geography of Anglo-America. (3) II. A regional analysis of the United States and Canada, giving special attention to the historical, political, and economic factors which contribute to areal differentiation within the area. Pr.: Three hours of geography or junior standing.

235 645. Political Geography. (3) The interrelationship between large political units and geography; location, size, boundaries, and resources as they affect the strength of nations. Pr.: Three hours of geography or junior standing.

235 647. Geography of World Agriculture. (3) Distribution, variations, and significance of the major types of agriculture. Pr.: Junior standing or consent of instructor.

235 695. Geography of Latin America. (3) A broad survey of the physical and human patterns of the Latin American culture area, past and present, with emphasis on the changing landscape features in the successive patterns of human occupancy. Pr.: Six hours of geography or junior standing.

235 705. Geography of Europe. (3) The nations and regions of Europe west of the U. S. S. R.; the people and their economies; trends of development as affected by changing political and economic factors. Pr.: Six hours of geography or junior standing.

235 715. Geography of the Soviet Union. (3) Geographic regions of the U. S. S. R.; the agriculture, minerals, manufacturing, and settlement in each, particularly as affected by climatic and locational factors. Pr.: Six hours of geography or junior standing.

235 717. Historical Geography of the United States and Canada. (3) The geography, during selected past periods, of the area now occupied by these countries; description, explanation, and evaluation of changing distributional patterns, with emphasis on settlement and land use. Pr.: Junior standing or consent of instructor.

235 735. Geography of Eastern Asia. (3) Relationships between oriental land resources, agriculture, industry, and population; trends in economic and political development in Eastern and Southern Asia, with concentration in India, China, and Japan. Pr.: Six hours of geography or junior standing.

235 740. Geography of Australia and New Zealand. (2) Present conditions and prospects, with special attention to regional structure, economic development, and roles of these countries in world trade. Pr.: Six hours of geography or junior standing.

235 750. Resource Utilization and Economic Development. (3) An examination of the role of resource utilization in developing the structural arrangement of economic activity, considered in different political and cultural contexts. Pr.: Six hours of geography or junior standing.

235 775. Urban Geography. (3) A study of geographic principles relating to the distribution, function, and structure of cities; a geographic

analysis and classification of urban settlements. Pr.: Six hours of geography or consent of instructor.

235 776. Geography of Transportation. (3) I in odd years. A consideration of the nature of spatial interaction, the various kinds of transport media, and the relationship between transportation and economic and social patterns. Pr.: Six hours of geography and/or economics, or consent of instructor.

235 786. Seminar in Regional Geography. (1 to 3) Pr.: Consent of instructor.

235 787. Seminar in Cultural-Economic Geography. (1 to 3) Pr.: Consent of instructor.

235 795. Problems in Geography. Credit arranged. I, II, S. Pr.: Nine hours of geography and consent of instructor.

FOR GRADUATE CREDIT

235 801. Graduate Colloquium. (1) I. The nature, aims, methods, and evaluation of geographical research. Required of all graduate students majoring in geography.

235 805. Advanced Economic Geography. (3) Economic and place factors in the shifting locations of major production: agricultural, mineral, manufacturing and other world industries. Lecture and seminar.

235 840. Cultural Geography. (3) A study of the forms of human occupancy of landscapes, with consideration of innovations in the use of the landscape, the origins and dispersals of these innovations, and human attitudes toward the natural environment.

235 900. History and Philosophy of Geography. (2) I in even years. A critical examination of the aims and methods of geography, especially in terms of its historical development and its logical structure. Pr.: Open to all graduate students in social sciences.

235 995. Research in Geography. Credit arranged. I, II, S. Pr.: Registration in Graduate School, with sufficient training to carry on the line of research undertaken.

HISTORY

ROBERT P. BROWDER,* *Head of Department*

Professors Brooks, Browder,* Carey,* Higham,* Sageser,* Socolofsky,* Sweedlun* and Wilcoxon;* Associate Professors Briggs,* Crawford,* Kren,* Linder,* Riggs* and Sinclair;* Assistant Professors Donovan,* Ferguson,* Golin,* Greene,* Jones,* Turner* and Weiss;* Emeritus: Professors Correll* and Parrish;* Associate Professor Alsop**

UNDERGRADUATE

Requirements for a major in history consist of a minimum of 27 hours in history, including Hist. 101 and 102 (or Hist. 103 or 104, or Hist. 105 and 106), a minimum of 15 hours in courses numbered 400 and above, Hist. 597, in the junior year, and Hist. 599 (comprehensive examination). Students must distribute their upper division courses over at least three of the following fields:

I. Ancient, medieval and early modern Europe

II. Modern Europe (including Britain)

III. Non-Western history

IV. The Americas (including Latin America)

V. History of Science, History of Technology, Military history.

GRADUATE

Graduate study leading to the Master of Arts and Doctor of Philosophy degrees is offered in most fields, including the history of science and technology, intellectual history, military history and economic and agricultural history. General requirements for these degrees are set forth in the Graduate School section of the Catalog.

Candidates for the Master of Arts must offer two seminars, one to be taken the first semester, and the year's course in historiography and demonstrate reading proficiency in an approved foreign language. In addition to a written thesis or report, they must pass a written and oral examination covering their fields of concentration.

For the Doctor of Philosophy degree, candidates must present four fields in history and one outside minor field. The preliminary examinations are both written and oral. Reading proficiency in two acceptable foreign languages is required.

A detailed description of the graduate programs and information regarding financial support may be obtained by writing the Head of the Department.

FACILITIES FOR GRADUATE STUDY

The University's Farrell Library has a number of large specialized collections. In addition, nearby are several excellent research facilities: the Eisenhower Presidential Library, with outstanding holdings relating to the Eisenhower Administration and recent military history; the Truman Presidential Library, with valuable collections on the Truman Administration, the history of the American Presidency, and foreign policy; the Linda Hall Library, emphasizing materials pertaining to the history of science; the library of the United States Army and General Staff College at Fort Leavenworth and the regional Federal Records Center at Kansas City, the latter presently rich in military and civil records and eventually to have a microfilm duplication of the main holdings of the National Archives in Washington.

FOR UNDERGRADUATE CREDIT

241 101. History of Western Civilization I, Honors. (4) I, II. Major trends in Western Civilization to the end of the seventeenth century. Pr.: For freshmen and sophomores in the Honors Program.

241 102. History of Western Civilization II, Honors. (4) I, II. Principal developments in Western Civilization from the eighteenth century to the present. Pr.: For freshmen and sophomores in the Honors Program.

241 103. History of Western Civilization I. (3) I, II, S. Major trends in Western Civilization to the end of the seventeenth century. Required of all majors in history. Pr.: Not open to juniors and seniors except with consent of instructor.

241 104. History of Western Civilization II. (3) I, II, S. Principal developments in Western Civilization from the eighteenth century to the present. Required of all majors in history. Pr.: Not open to juniors and seniors except with consent of instructor.

241 105. Freshman Interdisciplinary Honors I. (4) I. A freshman honors course focusing on selected historical problems, conducted by faculty from several departments. Pr.: Conc. enrollment in P. Sci. 111.

241 106. Freshman Interdisciplinary Honors II. (4) II. A freshman honors course focusing on selected historical problems, conducted by faculty from several departments. Pr.: Conc. enrollment in Soc. 104.

241 201. Ancient Mediterranean Civilizations. (3) I and alt. S. Civilizations of the ancient Near East, Greece, and Rome to the fall of the Roman Empire.

241 202. Civilization of the Middle Ages. (3) II and alt. S. European and Near Eastern civilizations from the fall of the Roman Empire to the end of the thirteenth century.

241 211. Asian Civilization I. (3) I and alt. S. A survey of Asian Civilization to 1650, emphasizing cultural and political developments.

241 212. Asian Civilization II. (3) II and alt. S. A survey of Asian Civilization from 1650 to the present. Emphasis is placed on cultural and political developments including European imperialism and the new nationalism.

241 221. History of England to 1660. (3) I. A survey of English history from Roman and Teutonic Britain to the Restoration. Pr.: Not open to juniors and seniors except with consent of instructor.

241 222. History of England from 1660. (3) II. Political, constitutional, economic, and cultural history of modern England. Pr.: Not open to juniors and seniors except with consent of instructor.

241 251. History of the United States to 1877. (3) I, II, S. Colonial and Revolutionary America, the federal union, Civil War, and Reconstruction. Pr.: Not open to juniors and seniors except with consent of instructor.

241 252. History of the United States since 1877. (3) I, II, S. The American nation from Reconstruction to the present. Pr.: Not open to juniors and seniors except with consent of instructor.

241 253. History of the United States to 1877, Honors. (4) I, II, S. Colonial and Revolutionary America, the Federal Union, Civil War, and Reconstruction. Pr.: Open only to freshmen and sophomores in the Honors Program.

241 254. History of the United States Since 1877, Honors. (4) I, II, S. The American nation from Reconstruction to the present. Pr.: Open only to freshmen and sophomores in the Honors Program.

241 257. American Social History. (3) I or II. Social customs and institutions from colonial times to the late nineteenth century. Pr.: Sophomore standing.

241 258. History of Kansas. (2) II, S. Land, people, problems, and cultural development of Kansas. Pr.: Sophomore standing.

241 309. Latin American Nations. (3) II and alt. S. Economic, social, and political progress of the Latin American nations from independence to the present. Emphasis is placed on Argentina, Brazil, Chile, and Mexico.

241 399. Honors Seminar in History. Variable credit. I, II.

241 405. Introduction to the Civilization of South Asia I. (3) I. Interdisciplinary survey of the development of civilization in South Asia, geographical and demographic context, philosophical and social concepts, social and political institutions, literature and historical movements. (Same as Geog. 405, P. Sci. 405, Soc. 405, Anthro. 405.)

241 406. Introduction to the Civilization of South Asia II. (3) II. Interdisciplinary survey of recent and contemporary civilization in India, Pakistan, Ceylon, Nepal, and Afghanistan, including recent history, current economy, religion, culture, languages and literature, geography, social and political structure and ideas. (Same as Geog. 406, P. Sci. 406, Soc. 406, Anthro. 406.)

241 598. Senior Honors Seminar. (3) Advanced pro-seminar in history. Pr.: Senior standing, recommendation of departmental committee.

241 599. History Comprehensive. (0) An examination required of all seniors majoring in history.

FOR UNDERGRADUATE AND GRADUATE CREDIT

241 600. Pro-Seminar in Historiography. (3) Pro-seminar in historical method and historiography. Required for graduation of all majors in history. To be taken in the junior year, preferably in the first semester.

241 603. History and Culture of Greece. (3) I and alt. S. The political evolution of ancient Greece, its social and economic structure, the development of Hellenic culture and its diffusion throughout the Mediterranean world and Near East. Pr.: Hist. 201 or consent of instructor.

241 606. History and Culture of Rome. (3) II and alt. S. Constitutional development of Rome, agrarian and social problems, fall of the republic and growth of the empire. Rome's contribution to classical culture and its influence on the modern world. Pr.: Hist. 201 or consent of instructor.

241 609. Medieval Institutions. (3) I, II. A study of the important institutions of Europe during the Middle Ages, with special attention to the Christian Church, manorialism, feudalism and the rise of the universities. Pr.: Junior standing.

241 610. Medieval Intellectual History. (3) I, II. The main trends of medieval thought from St. Augustine to William of Ockham in their historical setting. Pr.: Junior or senior standing.

241 615. The Renaissance. (3) II and alt. S. The Italian Renaissance as a major phase in the history of Western Civilization and its spread to Northern Europe. Pr.: Junior or senior standing, or consent of instructor.

241 618. Renaissance Intellectual History. (3) The history of ideas in Western Europe during the Renaissance, 1300-1600.

241 621. The Reformation. (3) I, II. Religious developments and their impact on political, economic, social and intellectual history, 1500-1648. Pr.: Junior or senior standing.

241 624. Europe in the Seventeenth Century. (3) I in alt. years. The intellectual history of Europe from the Wars of Religion through the Age of Louis XIV. Pr.: Junior or senior standing, or consent of instructor.

241 625. Europe in the Eighteenth Century. (3) II in alt. years and S. Intellectual history of Europe from the death of Louis XIV through the Congress of Vienna. Pr.: Junior or senior standing, or consent of instructor.

241 626. Revolutionary Europe, 1760-1815. (3) I in alt. years and S. Ideological and social revolution of Europe from the Enlightenment to the downfall of Napoleon. Pr.: Junior or senior standing, or consent of instructor.

241 630. Europe, 1815-1870. (3) I, II. The history of Europe from 1815-1870; major emphasis on intellectual history and the relationship between ideas and their political, economic and social context. Pr.: Junior or senior standing, or consent of instructor.

241 631. Europe, 1870-1914. (3) I, II. The history of Europe from 1870 to 1914; major emphasis on intellectual history and the relationship between ideas and their political, economic and social context. Pr.: Junior or senior standing, or consent of instructor.

241 632. Europe, 1914-1945. (3) I, S. History of Europe from World War I through World War II; emphasis will be placed on the crisis of democracy and the significance of totalitarian movements. Pr.: Junior or senior standing, or consent of instructor.

241 640. Twentieth Century European Thought. (3) I, II. Pr.: Junior or senior standing, or consent of instructor.

241 643. Topics in European History. (3) I, II, S. Intensive study of a particular phase of European history. Topics will vary. May be repeated for credit.

241 647. Tudor England. (3) I in alt. years. Pr.: Junior or senior standing, or consent of instructor.

241 648. Stuart England. (3) II in alt. years. Pr.: Junior or senior standing, or consent of instructor.

241 650. England in the Eighteenth Century. (3) I in alt. years. Pr.: Junior or senior standing, or consent of instructor.

241 651. Victorian Britain. (3) I. Pr.: Junior or senior standing, or consent of instructor.

241 652. Modern Britain. (3) II in alt. years. Pr.: Junior or senior standing, or consent of instructor.

241 655. Modern France. (3) II in alt. years and S. Pr.: Junior or senior standing, or consent of instructor.

241 660. Modern Germany to 1914. (3) I, II. Major developments in

German history in the nineteenth century. Pr.: Junior or senior standing, or consent of instructor.

241 661. Modern Germany, 1914-1945. (3) I, II. German history in the twentieth century; major emphasis on the failure of German democracy and on an analysis of the nature of national socialism. Pr.: Junior or senior standing, or consent of instructor.

241 667. History of Russia from the Beginnings to 1801. (3) I, II, and alt. S. Rise and fall of Kievan Russia, the Mongol occupation, the ascendancy of Moscow and the beginnings of the Russian Empire. Pr.: Junior or senior standing, or consent of instructor.

241 668. Nineteenth Century Russia. (3) I, II, and alt. S. Political, social, economic and intellectual developments in Russia and her conduct of foreign policy from Alexander I to the Russian Revolution of 1917. Pr.: Junior or senior standing, or consent of instructor.

241 671. The Russian Revolution and the Soviet Regime. (3) I, II, and alt S. The Revolution of 1917 and the subsequent development of the Soviet State in society. Pr.: Junior or senior standing, or consent of instructor.

241 674. Russian Intellectual History. (2) II. A study of intellectual developments in Russia from 1762. Pr.: Hist. 684 or consent of instructor.

241 677. Far Eastern History I. (3) I, II. The traditional civilization and cultures of the Far East. Focus on China and Japan prior to the advent of European power. Pr.: Junior or senior standing.

241 678. Far Eastern History II. (3) I, II. From the rise of European and American power in the Far East to the present. Focus on the crises within traditional Chinese and Japanese cultures, the rise of nationalism, World War II, and the post-war period of resurgence of Chinese power. Pr.: Junior or senior standing.

241 680. South Asia I. (3) I, II. The traditions and civilization of South Asia—Pakistan, India, and Ceylon—prior to the intrusion of Europeans. Examination of social, intellectual, religious and political history. Pr.: Junior or senior standing.

241 681. South Asia II. (3) I, II. The rise of European powers in South Asia, creation of the British Empire in India, growth of nationalism and the creation of India, Pakistan and Ceylon to the present. Pr.: Junior or senior standing.

241 685. Nationalist Leaders of South Asia. (3) I, II, S. Using a biographical approach, this course will examine the social and religious movements of the nineteenth century and the nationalist movements of the twentieth century that led to the creation of the modern states of India and Pakistan. Pr.: Junior or senior standing.

241 688. The History of Christianity. (3) I, II, alt. S. A history of the Christian religion from the time of Christ to the present. Pr.: Junior or senior standing, or consent of instructor.

241 690. Topics in Non-Western History. (3) I, II, S. Intensive study of a particular phase of non-Western history. Topics will vary. May be repeated for credit.

241 701. History of Science I. (3) I and alt. S. The growth of scientific thought from ancient times to about 1700. Pr.: Junior or senior standing, or consent of instructor.

241 702. History of Science II. (3) II and alt. S. The development of scientific thought from about 1700 to the recent past. Pr.: Junior or senior standing, or consent of instructor.

241 708. Science and Thought in the Eighteenth Century. (3) I, II. Scientific development in the eighteenth century from Newton to Laplace. Pr.: Junior or senior standing.

241 709. Science and Thought in the Nineteenth Century. (3) I, II. Scientific development in the nineteenth century. Pr.: Junior or senior standing.

241 719. Science in America. (3) I, II, and alt. S. Survey of American science from the colonial era to the present, with special attention given to the historical context and the role of institutions and government. Pr.: Junior or senior standing, or consent of instructor.

241 722. History of American Technology, 1607-1960. (3) I, II, and alt. S. The interaction of technology with agriculture, transportation, communications, and transmission of European techniques and the concept of American ingenuity. Pr.: Junior or senior standing, or consent of instructor.

241 725. Science and Government in America. (3) I, II, S. History of the recent rise of federally supported and sponsored science, the political institutions which emerged as a result, and the politics of science.

241 728. History of American Engineering. (3) I, II, S. Examination of the men and institutions of American engineering, the rise of professionalism, and the relation of engineering to industry, science, and society.

241 733. European Economic History. (3) I, S. Major economic developments, institutions, and ideas since the seventeenth century. Pr.: Junior or senior standing, or consent of instructor.

241 737. American Economic History I. (3) I, II, and alt. S. Development of the American economy to 1825. An examination of colonial agriculture and mercantilism to the emergence of the factory system and a national economy. Pr.: Junior or senior standing, or consent of instructor.

241 738. American Economic History II. (3) I, II, and alt. S. From 1825 to the present; industrial capitalism, laissez-faire, and large-scale business and agricultural enterprises will be studied, along with government and private reactions to these developments. Pr.: Junior or senior standing, or consent of instructor.

241 743. American Ethnic History. (3) I and alt. S. Cultural factors based on race and nationality in American history, emphasizing the white minorities. Pr.: Hist. 252 or consent of instructor.

241 744. History of the American Negro. (3) The role of slavery, Jim Crow, twentieth century reform movements and the relationship of the Negro to the totality of American culture.

241 749. American Urban History. (3) II and alt. S. The history of urbanism in America, its beginnings, its position in American life and its complexity. Pr.: Hist. 252 or consent of instructor.

241 753. History of American Foreign Policy. (3) I, S. The development of American foreign policy and the role of the United States in world affairs since 1898. Pr.: Junior or senior standing, or consent of instructor.

241 761. Technology and War I. (3) I. The history of military technology, 1000 to 1900. Pr.: Junior or senior standing, or consent of instructor.

241 762. Technology and War II. (3) II. The history of military technology, 1900 to 1960. Pr.: Junior or senior standing, or consent of instructor.

241 763. The History of Peacekeeping Forces. (3) I, II. A historical survey of the problems of military work in peacetime, with particular emphasis upon colonial wars, guerrilla activities and civic action. Pr.: Junior or senior standing.

241 764. The History of Military Thought. (3) I, II. An examination of the evolution of military thinking from Vauban to Liddell Hart and the atomic age. Pr.: Junior or senior standing.

241 771. American Thought to 1860. (3) I, II, and alt. S. American thought from the Puritans through New England domination. Pr.: Junior or senior standing, or consent of instructor.

241 772. American Thought since 1860. (3) I, II, and alt. S. Emphasis

upon the impact of industrialism, populism, science, technology, and politics. Pr.: Junior or senior standing, or consent of instructor.

241 775. Colonial America. (3) I, II, and alt. S. Discovery, foundation and development of the North American colonies; the European rivalry for the American empire. Pr.: Junior or senior standing, or consent of instructor.

241 776. The American Revolution. (3) I, II, and alt. S. The foundations of the American republic, 1763-1789. Pr.: Junior or senior standing, or consent of instructor.

241 777. The Early National Period. (3) I, II, and alt. S. Contest between Federalists and Jeffersonian Republicans for national leadership; the War of 1812 and the growth of American nationality. Pr.: Junior or senior standing, or consent of instructor.

241 778. The Age of Jackson. (3) I, II, and alt. S. Growth of democracy, Westward expansion and divisive sectionalism; the flowering of the American mind; the perfectable society. Pr.: Junior or senior standing, or consent of instructor.

241 779. Civil War and Reconstruction. (3) II and alt. S. The sectional conflict in the United States from 1850-1880. Pr.: Junior or senior standing, or consent of instructor.

241 780. Foundations of Modern America. (3) II, S. Growth of the industrial economy, role of the entrepreneur, and the new forces in American life from the Civil War to World War I. Pr.: Junior or senior standing, or consent of instructor.

241 782. The Great Plains. (3) II and alt. S. The historical development of the region comprising the Great Plains, and its impact on American history. Pr.: Junior or senior standing, or consent of instructor.

241 789. The United States in the Twentieth Century. (3) I, S. Major developments in recent American history. Pr.: Junior or senior standing, or consent of instructor.

241 791. Colonial Hispanic America. (3) I and alt. S. Exploration, settlement, and development of Central and South America and the Caribbean in the colonial period. Pr.: Junior or senior standing, or consent of instructor.

241 794. Modern Mexico. (3) I, II. The last decade of Porfiria Diaz, 1900-1910. The principal developments of the political and social revolution, 1910-1938. Recent changes in Mexico. Pr.: Junior or senior standing.

241 797. Topics in the History of the Americas. (3) I, II, S. Intensive study of a particular phase of the history of the Americas. Topics will vary. May be repeated for credit.

241 798. Readings in History. (1 to 3) I, II, S. Students will read on a central theme, attend weekly discussions, and write a final report. Open to majors and graduate students with the consent of instructor.

241 799. Problems in History. Credit arranged. I, II, S. Intensive study of a particular phase of history. Students will attend weekly discussions and write a major research paper on their findings.

FOR GRADUATE CREDIT

241 801. Historiography I. (2) I and alt. S. Main currents in historical research, the writing of history, and the influence of the great historians from Herodotus to the present. Required of all graduate students in history.

241 802. Historiography II. (2) II and alt. S. Cont. of Hist. 801. Required of all graduate students in history.

241 820. Seminar in American Social History. (3) I, II, S. Usually emphasizing problems of immigration and urbanization. Pr.: Consent of instructor.

241 821. Seminar in Latin American History. (3) I, II, S. Pr.: Consent of instructor.

241 822. Seminar in American Diplomatic History. (3) I, II, S. Pr.: Consent of instructor.

241 823. Seminar in the History of the American West. (3) I, II, S. Pr.: Consent of instructor.

241 824. Seminar in Colonial America. (3) I, II, S. Pr.: Consent of instructor.

241 825. Seminar in American Intellectual History. (3) I, II, S. Pr.: Consent of instructor.

241 826. Seminar in American Economic History. (3) I, II, S. Pr.: Consent of instructor.

241 827. Seminar in American Science and Technology. (3) I, II, S. Pr.: Consent of instructor.

241 830. Seminar in Modern European History. (3) I, II, S. Pr.: Consent of instructor.

241 831. Seminar in German History. (3) I, II, S. Pr.: Consent of instructor.

241 832. Seminar in French History. (3) I, II, S. Pr.: Consent of instructor.

241 835. Seminar in Modern Russian History. (3) I, II, S. Pr.: Consent of instructor.

241 836. Seminar in Renaissance and Reformation. (3) I, II, S. Pr.: Consent of instructor.

241 837. Seminar in English History. (3) I, II, S. Pr.: Consent of instructor.

241 840. Seminar in Military History. (3) I, II, S. Pr.: Consent of instructor.

241 850. Seminar in South Asian History. (3) I, II, S. Pr.: Consent of instructor.

241 879. Studies in the History of Science. (3) I or II. An intensive examination of problems in the history of science. Emphasis will be placed upon the relationship between scientific changes and intellectual-institutional developments. Pr.: Consent of instructor.

241 887. European Intellectual History. (3) I or II. An examination of the methodology of intellectual history and its relationship to other methodologies and disciplines; the application of this methodology to intellectual developments and to the non-intellectual factors which explain them. Pr.: Consent of instructor.

241 995. Research in History. Credit arranged. I, II, S. Work offered in European, American, Latin American, English, Russian, and Asiatic History, and in the history of science and technology, the history of ideas, intellectual history, military history and economic and agricultural history. Pr.: Consent of instructor.

MATHEMATICS

JOHN E. MAXFIELD,* *Head of Department*

Professors Cohen, Fuller,* Hsu,* Marr,* Maxfield,* Parker* and Stamey;* Associate Professors Dixon,* Lee,* Sloat and Yee;* Assistant Professors Bastida,* Greechie,* Grillet,* Jung,* Miller and Williams;* Instructors Cammack, Chatelain, Herzmann, Ratcliffe, Sitz and Woldt; Emeritus: Professors Babcock* and White;* Associate Professors Janes and Mossman**

UNDERGRADUATE

For credit by examination in College Algebra, Trigonometry and Calculus, see page 13.

All Mathematics majors are expected to take a course in Symbolic Logic in the Philosophy Department: Stat. 410 in the Statistics Department and Math. 200, 221, 222, and 240.

The Pre-Graduate Program

This degree will prepare students who intend to enter graduate school to work toward an advanced degree either in pure or applied mathematics.

(1) Major requirement of 21 hours in mathematics numbered 400 and above. The recommended courses to be included in these 21 hours are:

Math. 512, 513	Intro. to Modern Algebra I, II	6
Math. 577, 578	Elem. Topology I, II	6
Math. 603	Intro. to Linear Algebra	3
Math. 621, 622	Analysis I, II	6
		21

(2) In addition to the above at least 12 more hours numbered 600 and above are strongly recommended: Math. 608, 609, Set Theory I, II; and Math. 604, Introduction to the Theory of Groups, should be included if at all possible.

(3) The student should include Chemistry I and II and General or Engineering Physics I and II if he is interested in applied mathematics. He should study at least one foreign language as a research tool for graduate work. These languages should be chosen from French, German, and Russian.

The Mathematics Education Program

This degree program is designed for students who want to become secondary school teachers and includes the requirements for the teaching certificate.

(1) Major requirement of 21 hours of courses in mathematics numbered 400 and above. The recommended courses to be included in these 21 hours are:

Math. 417	The Real Number System	3
Math. 512	Modern Algebra I	3
Math. 570	Modern Geometry	3
Math. 420	Intro. to Analysis	3
Math. 691	Topics in High School Mathematics	3
		15

In addition, six hours of electives should be selected from

Math. 513	Modern Algebra II	3
Math. 573	Foundations of Geometry	3
Math. 470	History of Mathematics	3

For a student who expects to enter a graduate school the following courses are appropriate to his program:

Math. 577, 578 Elementary Topology I, II
Math. 603 Intro. to Linear Algebra
Math. 604 Intro. to Theory of Groups
Math. 621, 622 Analysis I, II

(2) Each student should elect at least one course in physics as a part of the general education science requirement.

(3) The Professional Educational requirements to be certified to teach in the State of Kansas are to be completed as a part of this degree program. These are:

(a) Make application to and be accepted as part of the Teacher Training Curriculum. (See College of Education for requirements.)

(b)

Psych. 110 General Psychology
Educ. 202, 302 Educational Psychology I, II
Educ. 451 Principles of Secondary Education
Educ. 476 Methods of Teaching in Secondary Schools
Educ. 477 Teaching Participation in Secondary Schools
Educ. 616 Educational Sociology

Bachelor's Degree Program for Industry

Students who wish to enter industry upon earning a bachelor's degree in mathematics should take this program.

(1) Math. 240, 301 and 350

(2) Major requirement of 21 hours of courses in mathematics num-

bered 400 and above. The recommended courses to be included in these 21 hours are:

Math. 550, 551, 552	Applied Mathematics I, II, III	9
Math. 761, 762	Numerical Analysis I, II	6
Math. 512	Intro. to Modern Algebra I	3
or		
Math. 621	Analysis I	
		21

(3) It is strongly recommended that the student take at least nine hours of work beyond the basic courses of Chemistry I and II and General or Engineering Physics I and II in Computer Science, Statistics, Physics, Chemistry or Business Administration.

GRADUATE

The Department of Mathematics offers work in mathematics which may lead to a master's or a doctor's degree. Admission as a graduate student does not imply admission to candidacy for an advanced degree. For admission to graduate work in mathematics, a person should have completed work in mathematics equivalent to what is required for a B. S. or B. A. degree here with a better than B average. The general requirements for advanced degrees are given on p. 37. Information on special requirements for an advanced degree may be obtained by writing to the Department of Mathematics.

Any course will be offered any term on the request of a sufficient number of students. Information concerning courses offered during the summer term may be had on writing to the department.

FOR UNDERGRADUATE CREDIT

245 010. Intermediate Algebra. (3) I, II, S. Review of elementary algebra; topics preparatory to Math. 100. Three hours rec. a week. Pr.: One unit of high school algebra.

245 100. College Algebra. (3) I, II, S. Pr.: Plane geometry and satisfactory placement test score in algebra. Students with 1½ entrance units of algebra should normally be eligible for this course.

245 110. Mathematics, Its Form and Impact. (3) I, II, S. This course requires no mathematical background. It includes the development and analysis of mathematical structures; applications of these structures are used to exemplify the linguistic use of mathematics and its impact on society.

245 150. Plane Trigonometry. (3) I, II, S. Pr.: Plane geometry and 1½ units of high school algebra.

245 220. Analytic Geometry and Calculus I. (4) I, II, S. Analytic geometry, differential and integral calculus of polynomials. Pr.: Math. 100, 150, or two years of high school algebra and one semester of trigonometry.

245 221. Analytic Geometry and Calculus II. (4) I, II, S. Cont. of Math. 220 to include transcendental functions. Pr.: Math. 220.

245 222. Analytic Geometry and Calculus II. (4) I, II, S. Cont. of Math. 221 to include functions of more than one variable. Pr.: Math. 221.

245 240. Series and Differential Equations. (4) I, II, S. Convergence of series, expansions in series, solutions of elementary differential equations, with applications. Pr.: Math. 222.

245 301. Concepts of Mathematics. (3) Intuitive logic to include negation of statements, introduction to connectives, quantifiers, implication and truth tables, set algebra, mappings, definitions, axioms, theorems and methods of proof. Pr.: Math. 220.

245 340. Introduction to Analytic Processes. (3) II. Some topics in differentiation, integration, linear algebra, matrices and linear programming, with applications. Pr.: Two years high school or college algebra, elements of statistics. Not open to students having credit in Math. 220.

245 350. Elementary Digital Computing Techniques. (2) I. Introduction to punched card equipment, digital computers, fixed and floating-point arithmetic, programming for high-speed computers. Pr.: Math. 100.

245 399. Seminar in Mathematics. Credit arranged. On sufficient demand. Primarily for Honors Students. Pr.: Consent of instructor.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

245 408. Topics in Mathematics for Elementary School Teachers. (4) I, S. Systems of numeration, sets and numbers, properties of the number system, relations, real numbers, elementary logic, concept of proof, elements of algebra and statistics. Pr.: Consent of instructor.

245 409. Intuitive Geometry. (2) S. Measurement, triangles, quadrilaterals, nonmetric geometry, similarity, volumes, elementary coordinate geometry. Pr.: Consent of instructor.

245 417. The Real Number System. (3) An extensive development of number systems, with emphasis upon structure. Includes systems of natural numbers, integers, rational numbers and real numbers. Pr.: Math. 221.

245 420. Introduction to Analysis. (3) Theory of limits, continuity, emphasis on proofs. Pr.: Math. 222, 301.

245 470. History of Mathematics. (3) II in alt. years. Cannot be used as part of the advanced mathematics needed by mathematics majors. Pr.: Math. 220.

245 475. Modern Geometry. (3) Concepts of Euclidean geometry including distance and congruence, separation, geometric inequalities, congruence with distance, similarity, area, consistency of Euclidean geometry; brief treatment of Lobachevskian and Riemannian geometries. Pr.: Math. 221.

245 501. Set Theory and Logic. (2-3) Basic set theory, cardinal and ordinal numbers, axiom of choice, transfinite induction, symbolic logic, tautologies, universal and existential quantifiers, propositional and predicate calculus, arguments, deductive systems. Pr.: Math. 301.

245 505. Determinants and Matrices. (3) I, II. Applications of determinants and matrices to genetics, economics, electronics, and other fields. Pr.: Math. 100 and junior standing.

245 512. Introduction to Modern Algebra I. (3) I, II. Basic concepts in the theory of numbers, groups, rings, integral domains, and fields. Pr.: Math. 220 and 301 or graduate standing.

245 513. Introduction to Modern Algebra II. (3) II. Cont. of Math. 512. Pr.: Math. 512.

245 550. Introduction to Applied Mathematics I. (3) I, II. Complex analytic functions and power series, complex integrals, Taylor and Laurent expansions, residues, Laplace transformation and the inversion integral. Pr.: Math. 240.

245 551. Introduction to Applied Mathematics II. (3) I, II. Vector calculus; line and surface integrals; formulas of Gauss, Green and Stokes; matrix algebra; systems of linear equations; matrix eigenvalue problems. Pr.: Math. 240. No credit to those with credit in Math. 505.

245 552. Introduction to Applied Mathematics III. (3) II in alt. years. Bessel and Legendre functions, basic concepts and techniques in Fourier Series, boundary value problems in partial differential equations. Pr.: Math. 550.

245 573. Foundations of Geometry. (3) Euclid's parallel postulate, non-Euclidean geometries, incidence, affine geometries, order, congruence, continuity. Pr.: Math. 475.

245 575. Advanced Analytic Geometry. (3) On sufficient demand. Properties of conic sections; poles and polars; selected topics in Solid Analytic Geometry. Pr.: Math. 240.

245 577. Elementary Topology I. (3) I. Introduction to general topological spaces and invariants under continuous mappings and under homeomorphisms. Pr.: Math. 240, 301.

245 578. Elementary Topology II. (3) II. Cont. of Math. 577. Pr.: Math. 577.

FOR UNDERGRADUATE AND GRADUATE CREDIT

245 603. Introduction to Linear Algebra. (3) I. Finite dimensional vector spaces; linear transformations and their matrix representations; dual spaces, invariant subspaces; Euclidean and unitary spaces; solution spaces for systems of linear equation. Pr.: Math. 513.

245 604. Introduction to the Theory of Groups. (3) II. Introduction to abstract group theory; to include permutation groups, homeomorphosis, direct products, Abelian groups, Jordan-Holder and Sylow theorem. Pr.: Math. 513.

245 606. Theory of Numbers. (3) II in alt. years. Pr.: Math. 221.

245 608. Set Theory I. (3) I. Set theory; functions, relations and orderings; ordinal and cardinal numbers; transfinite induction; axiom of choice. Pr.: Math. 301 or equiv.

245 609. Set Theory II. (3) II. Cont. of Set Theory I. Pr.: Math. 608.

245 621. Analysis I. (3) I, II, S. Partial differentiation, with applications to the geometry of three dimensions; envelopes, maxima and minima of functions of several variables, series. Pr.: Math. 240 and 301 or graduate standing.

245 622. Analysis II. (3) I, II, S. Line integrals, improper integrals, beta and gamma functions; integrals dependent on a parameter, elliptic integrals, uniform convergence of series and integrals. Pr.: Math. 621.

245 651. Partial Differential Equations. (3) II in alt. years. Solutions of partial differential equations. Pr.: Math. 475.

245 671. Projective Geometry. (3) I. Affine spaces, Euclidean spaces, projective spaces, coordinizations, duality principle, geometric lattices, classifications, subgeometries of projective geometry (especially non-Euclidean geometries). Pr.: Math. 513.

245 672. Differential Geometry I. (3) I. Curve theory via moving frames, ruled surfaces, curvatures of surfaces, special curves on a surface, integration theory, mappings and deformations, intrinsic properties of surfaces, geodesics, surfaces of constant curvature. Pr.: Math. 240 and consent of instructor.

245 673. Differential Geometry II. (3) II in alt. years. Differentiable manifolds; differential geometry in Euclidean n-space; global properties of curves, ovals and ovaloids; Gauss-Bonnet theorem and rigidity; Clifford-Klein's space form problems; minimal surfaces (varieties). Pr.: Math. 672.

245 691. Topics in Mathematics for High School Teachers. (3) Topics of importance in the preparation of high school teachers to teach modern mathematics. May be repeated for credit.

245 701. Theory of Matrices I. (3) I. Pr.: Math. 240, 513.

245 702. Theory of Matrices II. (3) II. Cont. of Math. 701. Pr.: Math. 701.

245 706. Algebraic Theory of Numbers I. (3) I in alt. years. Algebraic number fields, Dedekind ideal theory, divisors, structure of the multiplicative group, finiteness of the class group, density of ideals in classes. Pr.: Math. 603 and 604.

245 707. Algebraic Theory of Numbers II. (3) II in alt. years. Development of one or more of the following topics: primes in residue classes, ramifications of Galoisian extensions, Diophantine equations, Gaussian sums and class number formulas, Abelian extensions and class fields. Pr.: Math. 706.

245 710. Higher Algebra I. (3) I. Theory of groups, theory of rings and

ideals, polynomial domains, theory of fields and their extensions. Pr.: Math. 513.

245 711. Higher Algebra II. (3) II. Cont. of Math. 710. Pr.: Math. 710.

245 721. Real and Complex Analysis I. (3) I. Measurability, integration theory, regular Borel measures, the Riesz representation theorem, and Lebesque measure in Euclidean spaces. Pr.: Math. 622.

245 722. Real and Complex Analysis II. (3) II. The L^p-spaces, Banach spaces and Hilbert spaces, complex measures and the Radon-Nikodym theorem, the Fubini theorem on double integration, and differentiation. Pr.: Math. 721.

245 725. Real and Complex Analysis III. (3) I. Holomorphic functions, harmonic functions, the Cauchy integral theorem, normal families and the Riemann mapping theorem, and the Mittag-Leffler theorem. Pr.: Math. 722 or consent of department.

245 726. Real and Complex Analysis IV. (3) II. Analytic continuation, the Picard theorem, H^p-spaces, elementary theory of Banach algebra, the theory of Fourier transforms, and the Paley-Wiener theorems. Pr.: Math. 725.

245 740. Calculus of Variations. (3) On sufficient demand. Necessary and sufficient conditions for an extreme value; applications to geometry and mechanics. Pr.: Math. 622.

245 747. Advanced Differential Equations. (3) II in alt. years on sufficient demand. Selected topics in differential equations. Pr.: Math. 601, 622.

245 750. Fourier Series. (3) On sufficient demand. Trigonometric Fourier Series, general orthogonal expansions, convergence and summability, multiple Fourier series, Fourier integrals and transforms. Pr.: Math. 621, 622.

245 752. Tensor Analysis. (3) I every third year. Multilinear algebra, differentiable manifolds, differential forms nad tensor fields, exterior differentiation, integration of forms and Stokes' theorem, Frobenius theorem, covariant differentiation, Riemannian connections. Pr.: Math. 513, 622.

245 753. Applied Real and Complex Analysis I. (3) I. Elementary set theory; limits and continuity; series; sequences of functions; uniform convergence of sequences of functions; Riemann integration, mean value theorems; Weierstrass approximation theorem. Pr.: Math. 505, 551, 552.

245 754. Applied Real and Complex Analysis II. (3) II. Introduction to matric spaces, normed spaces and Hilbert spaces, with applications; naive Lebesque integration; contour integrals; branch cut integration, conformal mapping; asymptotic expansion; unified treatment of special functions. Pr.: Math. 753.

245 761. Numerical Analysis I. (3) I. Solution of algebraic and transcendental equations, with emphasis on linear algebraic systems; applications of finite differences to interpolation, numerical differentiation, and integration; introduction to desk calculator, I. B. M. equipment, analog computer. Pr.: One of Math. 550, 551, 621, 622.

245 762. Numerical Analysis II. (3) II. Numerical methods for solving ordinary and partial differential equations; matrix inversion, with applications; method of least squares; use of orthogonal polynomials. Pr.: Math. 761.

245 763. Numerical Analysis III. (3) On sufficient demand. Cont. of Math. 762. Approximation by polynomials and orthogonal functions; matrices and eigenvalue problems; large-scale linear systems; harmonic analysis; data analysis. Pr.: Math. 762.

245 771. General Topology I. (3) I. Topological spaces and topological invariants; continuous mappings and their invariants; perfect mappings; topological constructs (product, quotient, direct and inverse limit spaces). Pr.: Math. 578.

245 772. General Topology II. (3) II. Compact spaces and compactification uniform and proximity spaces, metric spaces and metrization, topology of E^n, function spaces, complete spaces, introduction to homotopy theory. Pr.: Math. 771.

245 790. Hilbert Space. (3) I in alt. years. Geometry of Hilbert space, bounded and unbounded operators, Riesz representation theorem, spectral theorem, the lattice of closed subspaces of Hilbert space and generalizations to projection lattices. Pr.: Math. 726.

245 799. Topics in Mathematics. Credit arranged. I, II, S. Background of courses needed for topic undertaken and consent of instructor.

FOR GRADUATE CREDIT

245 800. Journal Seminar. (1) I, II. Students will present research papers from the current literature. All graduate students are required to enroll for four semesters. May be repeated for credit. Pr.: Graduate standing.

245 802. Homological Algebra I. (3) I in alt. years. Categories and functors, Abelian categories, extension and torsion functors, homological dimensions, and spectral sequences and some of their applications. Pr.: Math. 711.

245 803. Homological Algebra II. (3) II in alt. years. Cont. of Math. 802. Pr.: Math. 802.

245 806. Analytic Theory of Numbers I. (3) I in alt. years. The distribution of primes, geometric number theory, additive theory of numbers, Diophantine approximation, arithmetic of quadratic forms. Pr.: Math. 722.

245 807. Analytic Theory of Numbers II. (3) II in alt. years. Cont. of Math. 806. Pr.: Math. 806.

245 810. Commutative Algebra I. (3) I in alt. years. Prime ideals and localization, primary decompositions, Noetherian rings and modules, integral dependence, and local rings. Pr.: Math. 711.

245 811. Commutative Algebra II. (3) II in alt. years. Valuations and absolute values, valuation rings, places, divisors, Dedekind rings and factorial rings. Pr.: Math. 810.

245 812. Group Theory I. (3) I in alt. years. Abelian groups, p-groups and supersolvable groups, free groups and free products. Pr.: Math. 711.

245 813. Group Theory II. (3) II in alt. years. Group extensions, cohomology of groups, representations of groups, and finite groups. Pr.: Math. 812.

245 814. Lattice Theory I. (3) I in alt. years. Posets, quantum logics, orthocomplemented, orthomodular, and Booleon lattices; the concepts of atomicity, completeness, reducibility, modularity, M-symmetry, O-symmetry, distributivity, algebraic coordination, and specific realizations. Pr.: Consent of instructor.

245 815. Lattice Theory II. (3) II in alt. years. Cont. of Math. 814. Pr.: Math. 814.

245 852. Functional Analysis I. (3) I in alt. years. Topics to be selected from linear topological spaces, semi-normed linear spaces, Banach spaces, Banach algebras, harmonic analysis, and others. May be repeated for credit. Pr.: Math. 722.

245 853. Functional Analysis II. (3) II in alt. years. Cont. of Functional Analysis I. May be repeated for credit. Pr.: Math. 852.

245 871. Algebraic Topology I. (3) I. Homotopy groups, covering spaces, fibrations, homology, general cohomology theory and duality, homotopy theory. Pr.: Math. 711, 772.

245 872. Algebraic Topology II. (3) II. Cont. of Algebraic Topology I. Pr.: Math. 871.

245 890. Combinatorial Analysis. (3) II in alt. years. Permutations,

combinations, inversion formulae, generating functions, partitions, finite geometries, difference sets, and other topics. Pr.: Consent of instructor.

245 900. Practicum in Mathematics. (3) I, II. Techniques of presentation of mathematical material at the university level. May be repeated for credit. Pr.: Consent of department.

245 901. Topics in Algebra. (3) On sufficient demand. Selected topics in modern algebra. May be taken more than once for credit. Pr.: Consent of instructor.

245 910. Ring Theory I. (3) I in alt. years. Structure of rings and algebras including density theorems, chain conditions, reducibility, Kronecker products. Pr.: Math. 711 and one of Math. 701 and 603.

245 911. Ring Theory II. (3) II in alt. years. Cont. of Ring Theory I, with emphasis on special rings. Pr.: Math. 910.

245 912. Theory of Sheaves I. (3) I every third year. Inductive systems and limits, complexes and double complexes, differential filtered graded modules, presheaves and sheaves, the Grothendieck cohomology theory for sheaves. Pr.: Consent of instructor.

245 913. Theory of Sheaves II. (3) II every third year. The Cech-Serre cohomology theory for presheaves; applications such as the duality theorems for topological manifolds, the theorem of de Rham for differentiable manifolds and the theorem of Dolbeault for complex manifolds. Pr.: Math. 911.

245 915. Semigroup Theory I. (3) I every third year. Main properties of regular semigroups, inverse semigroups; completely 0-simple semigroups. Rees-Sushkevitsch theorem; semisimple semigroups; ideal extension. Pr.: Math. 711.

245 916. Semigroup Theory II. (3) II every third year. Cont. of Semigroup Theory I. Pr.: Math. 915.

245 921. Topics in Analysis. (3) On sufficient demand. Selected topics in modern analysis. May be taken more than once for credit. Pr.: Consent of instructor.

245 951. Differential Topology I. (3) I in alt. years. Differential calculus, imbedding and immersion of manifolds; vector space bundles; Thom's cobordism theory. Pr.: Math. 672 and 872.

245 952. Differential Topology II. (3) II in alt. years. Cont. of Differential Topology I. Pr.: Math. 951.

245 953. Topological Groups I. (3) I in alt. years. General theory of topological groups, linear representations of compact topological groups, locally compact Abelian groups, introduction to Lie groups and Lie algebra. Pr.: Math. 711, 772.

245 954. Topological Groups II. (3) II in alt. years. Cont. of Topological Groups I. Pr.: Math. 953.

245 955. Fibre Bundles I. (3) I every third year. General theory of bundles, homotopy theory of bundles, cohomology of bundles. Pr.: Math. 871.

245 956. Fibre Bundles II. (3) II every third year. Cont. of Fibre Bundles I. Pr.: Math. 955.

245 957. Lie Groups. (3) II in alt. years. Analytic manifolds, differential forms, topological and Lie groups, the Lie algebra of Lie groups, Lie's fundamental theorems, exponential mapping, subgroups and subalgebras. Pr.: Math. 954.

245 961. Topics in Applied Mathematics. (3) On sufficient demand. Selected topics in applied mathematics. May be taken more than once for credit. Pr.: Consent of instructor.

245 971. Topics in Geometry. (3) On sufficient demand. Selected topics in geometry, such as convex sets or distance geometry. May be taken more than once for credit. Pr.: Consent of instructor.

245 973. Theory of Linear Connections and Riemannian Manifolds. (3)

II in alt. years. Differentiable manifolds, connections in fibre bundles, linear connections, Riemannian manifolds and submanifolds, completeness, sectional curvature, curvature and homology, conjugate and cut loci. Pr.: Math. 672, 772.

245 981. Topics in Topology. (3) On sufficient demand. Selected topics in topology, such as homotopy, topological groups, topological dynamics, or algebraic topology. May be taken more than once for credit. Pr.: Consent of instructor.

245 999. Research in Mathematics. Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken and consent of instructor.

MILITARY SCIENCE

COL. RALPH WRIGHT, *Head of Department*

Professor Wright; Associate Professors Catrell, Eddy, Edwards, Heuschkel and Rouse; Assistant Professors Hollis and Tomihiro; Instructors Baker, Neal, Reed and Wilkins

Kansas State University offers the General Military Science curriculum to undergraduates. This curriculum is designed to give all students who complete the four-year program the basic knowledge of skills necessary to all officers in the U. S. Army as well as the historical background requisite for a proper understanding of the Army and its relation to the nation. Specialization in a particular branch will come after graduation and commissioning.

The first two years constitute the Basic Course. All students enrolled in the Basic Course are furnished free of charge complete uniforms, texts, and other necessary equipment. These articles are the property of the United States and must be returned at the end of each school year or upon withdrawal from the University. The value of any article not returned is chargeable to the student.

In the Basic Course, students receive one credit hour per semester. The third and fourth years constitute the Advanced Course, in which enrollment is selective and voluntary. Students should consult the Department of Military Science for conditions which govern selection for the Advanced Course. In the Advanced Course, students receive a total of eight semester hours credit.

As part of the Freshman ROTC curriculum, students will be required to take and satisfactorily complete an academic class presented by another department. The elective course must be selected from one of the following general academic areas: (1) Effective Communication; (2) Science Comprehension; (3) General Psychology; and (4) Political Development and Political Institutions. Enrollment in English Composition I, IA or II satisfies this requirement. Since English Composition I and II are required of all students at Kansas State University, transfer students receiving credit for English Composition I and II will be required to substitute another course in lieu thereof.

Under present regulations, freshmen in the first-year Basic ROTC are subject to screening by a board of officers after conclusion of the first semester, with a view to selection for Deferment Agreement within established quotas. Those who show the greatest promise as potential officer material may be granted a Deferment Agreement, provided they agree to apply for enrollment in the Advanced Course at the appropriate time.

A student can earn an Army Commission by completing the Advanced ROTC program (junior and senior years). He can become eligible to enter the Advanced program in either of two ways: (1) complete the Basic Course (freshman and sophomore years); or (2) complete a Summer Camp prior to enrolling as a junior. Students in the Advanced Course must complete a Summer Camp between junior and senior years or at the end of senior year.

As part of the Advanced ROTC Course, in the first semester of the

junior year and the second semester of the senior year, students will take an elective course presented by another department. The elective subject must be for three semester hours credit and must be from one of the following general academic areas: (1) Effective Communications; (2) Science Comprehension; (3) General Psychology; and (4) Political Development and Political Institutions. The Department of Military Science in conjunction with the student's faculty adviser will evaluate and approve the elective subject selected. Consideration will be given in the value of the subject in furthering the professional qualification of the student as a prospective commissioned officer in the United States Army. In the event that a particular 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 an advanced subject in the same area.

Students enrolled in the Advanced Course must sign a Deferment Agreement. The Deferment Agreement exempts the student from selective service induction in return for a promise to accept a reserve commission, if tendered, upon completion of the course of instruction and to serve on active duty for a period of either two years or six months, as determined by the Secretary of the Army.

Senior Advanced Course cadets are eligible to participate in the Army ROTC Flight Training Program on a volunteer and selective basis. This training consists of 35 hours of ground school and 36½ hours of dual and solo flight instruction. Successful completion of this training will qualify students for Civil Aeronautics Administration Pilot's Certificate. Students enrolling in flight training must agree to serve at least three years on active duty with the Army following graduation.

The ROTC program offers to selected students both two-year and four-year scholarships. These scholarships pay tuition and fees, up to $100.00 per year for books and special fees, and pay the student a subsistence of $50.00 per month. A student must apply for and be approved for a four-year scholarship prior to coming to the University. The two-year scholarships for the Advanced Course are available only to students who have completed the Basic ROTC Course. Applications for the two-year scholarships are made in the second semester of the sophomore year.

Any male student may apply at least four hours of ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues in the same curriculum.

BASIC COURSE

FOR UNDERGRADUATE CREDIT

249 113. Military 1A. (1) I. Organization of the Army and ROTC; United States Army and National Security. Conc. enrollment in English Composition I, IA or II, or an approved substitute. Two hours a week including leadership training.

249 114. Military 1B. (1) II. Individual weapons and marksmanship; leadership laboratory (drill and command). Conc. enrollment in English Composition I, IA or II, or an approved substitute. One hour rec. and one hour leadership lab. a week.

249 125. Military 2A. (1) I. American military history; leadership laboratory (drill and command). Two hours rec. and one hour leadership lab. a week.

249 126. Military 2B. (1) II. Map and aerial photograph reading; introduction to basic tactics and techniques; leadership laboratory (drill and command). Two hours rec. and one hour leadership lab. a week.

ADVANCED COURSE

FOR UNDERGRADUATE CREDIT

249 233. Military 3A. (1) I. Principles of leadership; leadership laboratory (drill and command). Conc. enrollment in an approved course. One hour rec. and one hour leadership lab. a week.

249 234. Military 3B. (3) II. Branches of the Army; military teaching principles; small unit tactics and communications; countersurgency; leadership laboratory (drill and command). Four hours rec. and one hour leadership lab. a week.

249 243. Military 4A. (3) I. Operations; Logistics; Army administration; Military law; leadership laboratory (drill and command). Four hours rec. and one hour leadership lab. a week.

249 244. Military 4B. (1) II. Map reading; the role of the United States in world affairs; service orientation; leadership laboratory (drill and command). Conc. enrollment in an approved course. One hour rec. and one hour leadership lab. a week.

MODERN LANGUAGES

FRITZ MOORE,* *Acting Head of Department*

Professor Moore; Associate Professors Beeson* and Coates; Assistant Professors Bennett and Vazquez; Instructors Alexander, Driss, McCain, McGraw, Meadows, Miller, Reiling, Shopmaker and Terrill; Emeritus: Professor Limper;* Associate Professors Munro* and Pettis**

UNDERGRADUATE

Students majoring in language should enroll for the Bachelor of Arts degree (see page 115).

For a minor, 18 hours in a single language are to be taken at K. S. U.

For a language major, 30 hours at K. S. U. in a single language should be completed, which includes the 12-hour curricular requirement. The attention of the student preparing for graduate school (as well as for high school teaching) is directed to the corollary courses: Spch. 210, Mod. L. 652 and 664. Six hours of history in the country and period related to the student's major language interest are desirable.

Students who have had two years or more of French, German, or Spanish in high school may not duplicate that work for college credit. Students who have had less than two years of high school language study may begin again with French, German, Russian, or Spanish I. The student who has had two years or more of high school language study is placed in the proper section by the adviser on the equivalence, one year high school is equal to one semester at Kansas State. See Department Head for additional information when necessary.

GRADUATE

Prerequisite to graduate work in German, French, and Spanish is completion of a four-year undergraduate curriculum substantially equivalent to that required of general arts and science students, but including sufficient work in the languages to prepare the student for advanced work in the language he has chosen. Major work leading to the Master of Arts degree is offered in French, German and Spanish. The candidate must demonstrate a reading knowledge in an additional foreign language.

The first group of courses cuts across all languages; the second concerns the specific languages.

FOR UNDERGRADUATE CREDIT

253 399. Honors Seminar in Modern Languages. Credit arranged. I, II. Selected topics. Open to non-majors in the Honors Program.

FOR UNDERGRADUATE AND GRADUATE CREDIT

253 652. Introduction to Linguistics. (3) I. Study of the basic concepts of modern descriptive linguistics. Pr.: Junior standing. (Same as Engl. 652 and Spch. 652.)

253 664. Topics in Applied Linguistics. (3) II. Principles of contrastive structural analysis, especially English/French, English/Spanish, English/German. Course on another topic may be repeated for credit. Pr.:

Spch. 652, Mod. L. 652 or Engl. 652. (Same as Engl. 664 and Spch. 664.)

253 669. Language Typology. (3) Presentation and discussion of the languages of the world and the variant methods of their classification. Pr.: Engl. 652, Mod. L. 652 or Spch. 652 or consent of instructor and junior standing. (Same as Engl. 669 and Spch. 669.)

253 673. Introduction to Historical Linguistics. (3) I. Methods of historical linguistics as used in the reconstruction of earlier forms and stages of a language. Pr.: Junior standing. (Same as Engl. 673 and Spch. 673.)

253 674. Methods and Techniques of Learning a Second Language. (3) II. Linguistics applied to the learning of a foreign language, especially English as a foreign language. Pr.: Twelve hours of a modern language, including English, and Spch. 652, Mod. L. 652 or Engl. 652. (Same as Engl. 674 and Spch. 674.)

253 676. Phonetics and Phonemics of English. (3) Detailed study of the speech sounds of English, their production, functions as signals, and realizations in the stream of speech in English. Pr.: Spch. 210 and Engl. 652, Mod. L. 652, Spch. 652, or consent of instructor and junior standing. (Same as Engl. 676 and Spch. 676.)

253 677. Morphology and Syntax of English. (3) I, II, S. Consideration of current theories of grammar, with emphasis on morphemics and tagmemics. Pr.: Engl. 451. (Same of Engl. 677 and Spch. 677.)

253 799. Problems in Modern Languages. Credit arranged. I, II, S. Pr.: Consent of department head and instructor involved.

FOR GRADUATE CREDIT

253 999. Research in Modern Languages. Credit arranged. Pr.: Thirty hours in one modern language or equiv.

FRENCH

FOR UNDERGRADUATE CREDIT

253 131. French I. (5) I, II, S. Introduction to the grammar of Modern French, with the use of the language laboratory's facilities.

253 135. French II. (4) I, II, S. Completion of the grammar of Modern French with the use of the language laboratory's facilities. Pr.: Mod. L. 131 or equiv.

253 230. French III. (3) I, II, S. Reading of selections from modern prose and review of the structure of the language as needed. Pr.: Mod. L. 135 or equiv.

253 235. French IV. (3) I, II. Selections from nineteenth and twentieth century French prose. Pr.: Mod. L. 230 or equiv.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

253 422. Contemporary French Civilization. (3) II. To present to students the broad sweep of French culture from the medieval period to the present and to give a basis upon which students may continue study of French culture in France. The presentation of factual information, as well as the classroom discussions, to be in French. Pr.: Fifteen hours of college French or consent of instructor.

253 429. Survey of French Literature I. (3) I or II. The reading and discussion of French literature from the Middle Ages to the end of the eighteenth century. Pr.: Fifteen hours of college French or equiv.

253 430. Survey of French Literature II. (3) I or II. The reading and discussion of French literature from the early nineteenth century to the mid-twentieth century. Pr.: Fifteen hours of college French or equiv.

253 431. French Composition and Conversation I. (3) I. Review in depth of the structure of Modern French on the basis of themes and conversations in French. Pr.: Mod. L. 235 or equiv.

253 432. French Composition and Conversation II. (3) II. Cont. of the study of the grammar and syntax of Modern French and its phonetic basis. Pr.: Mod. L. 431 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

253 623. Survey of French Literature I. (3) I or II. The reading and discussion of French literature from the Middle Ages to the end of the eighteenth century. Pr.: Eighteen hours of college French or equiv.

253 624. Survey of French Literature II. (3) I or II. The reading and discussion of French literature from the early nineteenth century to the mid-twentieth century. Pr.: Eighteen hours of college French or equiv.

253 626. French Poetry. (2) I or II. Reading and discussion of a representative anthology of French poems from Villon to Baudelaire. Pr.: Eighteen hours of college French or equiv.

253 630. French Novel I. (3) I or II. Reading, explication and discussion of several novels of the seventeenth and eighteenth centuries. Pr.: Eighteen hours of college French or equiv.

253 631. French Novel II. (3) I or II. Reading, explication and discussion of several novels of the nineteenth century, e. g., those by Flaubert and Stendhal. Pr.: Eighteen hours of college French or equiv.

253 632. French Drama I. (3) I or II. Reading and discussion of a selection of French plays of the nineteenth century. Pr.: Eighteen hours of college French or equiv.

253 633. French Drama II. (3) I or II. Reading and discussion of a selection of modern twentieth century French plays. Pr.: Eighteen hours of college French or equiv.

253 635. Contemporary French Literature. (3) I or II. Reading and explication of a selection of twentieth century poetry and prose. Pr.: Twenty-one hours of college French or equiv.

253 636. Nineteenth Century French Literature I. (3) I, II. A study of Pre-romanticism and Romanticism. Pr.: Eighteen hours of college French or equiv.

253 637. Nineteenth Century French Literature II. (3) I, II. A study of Naturalism and Symbolism. Pr.: Eighteen hours of college French or equiv.

253 700. History of the French Language. (3) II. A brief survey of the evolution of the French language from a genetic, sociological, descriptive, and literary point of view. Pr.: Eighteen hours of French.

GERMAN

FOR UNDERGRADUATE CREDIT

253 105. Technical German I. (3) I. Introduction to the grammar and syntax of German and the reading of basic material selected from modern German scientific writing.

253 111. Technical German II. (3) II. Continued study of the grammar and syntax of the German written by the present-day German research scientist. Pr.: Mod. L. 105 or equiv.

253 121. German I. (5) I, II, S. Introduction to the structure of modern German, reading of selected prose texts, and practice of the spoken language in the language laboratory.

253 126. German II. (4) I, II, S. Cont. and conclusion of the introduction to the syntax and grammar of modern German, reading of selected prose texts. Pr.: Mod. L. 121 or equiv.

253 221. German III. (3) I, II, S. Reading and discussion of a selection of modern German prose and review of the structure of German. Pr.: Mod. L. 126 or equiv.

253 225. German IV. (3) I, II. Reading and discussion of modern German prose and review of the more difficult points of German grammar. Pr.: Mod. L. 221 or equiv.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

253 421. German V. (3) I or II. Reading of selected prose and drama from the nineteenth and twentieth centuries. Pr.: Mod. L. 225 or equiv.

253 423. German Culture. (3) II. To acquaint students (particularly those contemplating study in Germany) with contemporary German culture. Lectures and discussions in German. Pr.: Fifteen hours of college German or equiv.

253 426. German Composition and Conversation. (3) I or II. Study of the basic structure of spoken German, with practice in the writing and speaking of German. Pr.: Mod. L. 225 or equiv.

253 427. Advanced German Composition and Conversation. (3) I or II. Continued study in depth of spoken and written German using audio-visual and audio-lingual aids where applicable. Pr.: Mod. L. 426 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

253 720. German Drama I. (3) I or II. Reading and discussion of selected plays from the late eighteenth and nineteenth centuries. Pr.: Eighteen hours of college German or equiv.

253 721. German Drama II. (3) I or II. Reading and discussion of selected plays from the twentieth century. Pr.: Twenty-four hours of college German or equiv.

253 722. Schiller. (3) I or II. Reading and discussion of selected plays and poems from the work of Schiller. Pr.: Fifteen hours of college German or equiv.

253 723. Goethe. (3) I or II. Reading and discussion of selected dramas, poetry, and prose from the work of Goethe. Pr.: Eighteen hours of college German or equiv.

253 724. German Lyric Poetry. (2) I or II. Reading and explication of selected poems from the Middle Ages to the twentieth century. Pr.: Fifteen hours of college German or equiv.

253 725. Survey of German Literature I. (3) I or II. Introduction to German literature from Ulfilas to German Classicism. Pr.: Eighteen hours of college German or equiv.

253 726. Survey of German Literature II. (3) I or II. German literature in survey from German Classicism to the twentieth century. Pr.: Eighteen hours of college German or equiv.

253 727. The German Novelle. (3) I or II. A selection of the outstanding German Novelle of the nineteenth and twentieth centuries. Pr.: Eighteen hours of college German or equiv.

GREEK

FOR UNDERGRADUATE CREDIT

253 171. Greek I. (3) I. Introduction to the grammar of classical Greek and reading of elementary prose.

253 172. Greek II. (3) II. Completion of the grammar of classical Greek and continuation of the reading of elementary prose. Pr.: Mod. L. 171 or equiv.

ITALIAN

FOR UNDERGRADUATE CREDIT

253 151. Italian I. (3) I. Introduction to the structure of modern Italian.

253 155. Italian II. (3) II. Cont. and completion of the study of modern Italian grammar, using the facilities of the language laboratory for audio-lingual practice. Pr: Mod. L. 151 or equiv.

253 251. Italian III. (3) I. Grammar review and reading selections from Italian literature. Pr.: Mod. L. 155 or equiv.

253 253. Italian IV. (3) II. Selective review of grammar and reading of examples of modern Italian literature. Pr.: Mod. L. 251 or equiv.

253 610. Dante. (3) I. An in-depth study of the **Divine Comedy** in translation, using Dante as an exponent of medieval thought. (Same as Engl. 610.)

LATIN

FOR UNDERGRADUATE CREDIT

253 115. Latin I. (3) I. An introductory study of the structure of Latin.

253 116. Latin II. (3) II. Cont. and completion of the study of the structure of Latin. Pr.: Mod. L. 115 or equiv.

253 270. Latin III. (3) I. Review of Latin grammar and reading of an anthology of Roman prose and poetry. Pr.: Mod. L. 116. or equiv.

253 271. Latin IV. (3) II. Cont. of the study of Latin syntax and grammar, based upon the reading of Roman prose and poetry.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

253 450. Cicero. (3) II. A study of the versatility of Cicero as evidenced in various works. Pr.: Mod. L. 271 or equiv.

253 451. Vergil. (3) I. A study of the Latin epic as exemplified by Vergil's **Aeneid.** Pr.: Mod. L. 450 or equiv.

253 501. Horace. (3) II. A critical study of the major works of Horace. Pr.: Mod. L. 451 or equiv.

253 502. Roman Comedy. (3) I. A study of the techniques of Roman comedy. Pr.: Mod. L. 501 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

253 641. Juvenal. (3) I. A study of the satires of Juvenal. Pr.: Mod. L. 502 or equiv.

253 642. Survey of Latin Literature. (3) II. Primarily a study of authors not stressed in other courses. Pr.: Mod. L. 641 or equiv.

RUSSIAN

FOR UNDERGRADUATE CREDIT

253 161. Russian I. (5) I. Introduction to the structure of modern Russian and reading of elementary prose. Pr.: Six hours of another foreign language.

253 165. Russian II. (4) II. Cont. and completion of the study of the grammar and syntax of modern Russian. Pr.: Mod. L. 161 or equiv.

253 261. Russian III. (3) I. Reading of selected prose on the intermediate level. Pr.: Mod. L. 165 or equiv.

253 265. Russian IV. (3) II. Reading and discussion of selected nineteenth and twentieth century poetry and prose. Pr.: Mod. L. 261 or equiv.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

253 460. Russian Conversation and Composition. (3) Discussion, writing of compositions, study of current events. Pr.: Mod. L. 265 or equiv.

253 500. Russian Literature in Translation. (3) I, II. Development of Soviet literature since the revolution, stressing the prose works.

253 530. Introduction to Russian Literature. (3) Russian literary and intellectual trends to the Revolution of 1917. Pr.: Mod. L. 265 or equiv.

253 531. Russian Drama. (3) Development of the Russian theater, with special emphasis on dramatists of the period from 1850 to 1920. Reading of plays by Griboedov, Gogol, Turgenev, Ostrovsky, and Gorky. Pr.: Mod. L. 530 or equiv.

253 532. Russian Novelists of the Nineteenth Century. (3) Major masters of the fiction of the nineteenth century, excluding Pushkin, Dostoevsky, and Tolstoy; emphasis on Lermontov, Gogol, Turgenev, Leskov, and Saltykov-Shchedrin. Pr.: Mod. L. 530 or equiv.

SPANISH

FOR UNDERGRADUATE CREDIT

253 141. Spanish I. (5) I, II, S. Basic introduction to the structure of the Spanish language, emphasizing oral and written drills, as well as practice in the language laboratory.

253 145. Spanish II. (4) I, II, S. Cont. of Spanish I, completion of basic presentation of structural and linguistic principles of the Spanish language, and practice in the language laboratory. Pr.: Mod. L. 141 or equiv.

253 241. Spanish III. (3) I, II, S. An intensive review of syntax and a comprehensive structural review of Spanish, with emphasis on composition and conversation. Pr.: Mod. L. 145 or equiv.

253 245. Spanish IV. (3) I, II. Reading and discussion of selections from contemporary prose, and review of grammatical structures as needed. Pr.: Mod. L. 241 or equiv.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

253 440. Spanish V. (3) I or II. An introduction to the prose of Spain, with a review of difficult grammatical points as they arise. Pr.: Mod. L. 245 or equiv.

253 445. Spanish Composition and Conversation. (3) I. Review in depth of the structure of modern Spanish on the basis of classroom discussion and assigned topics. Pr.: Mod. L. 245 or equiv.

253 446. Advanced Spanish Composition and Conversation. (3) II. Cont. of the study of the grammar and syntax of modern Spanish and its phonetic basis. Pr.: Mod. L. 445 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

253 600. Spanish Civilization. (3) Survey of Spanish culture and civilization from its beginnings to the present; emphasis on Spanish contributions over the centuries in the humanistic fields. Pr.: Fifteen hours of Spanish or equiv.

253 601. Hispanic-American Civilization. (3) Cultural development of Latin American countries. Pr.: Fifteen hours of Spanish or equiv.

253 678. Survey of Spanish Literature I. (3) I or II. Introduction to the verse, prose, and drama of Spain from the Middle Ages to Calderon. Pr.: Eighteen hours of college Spanish or equiv.

253 679. Survey of Spanish Literature II. (3) I or II. Verse, prose, and drama of Spain from 1700 to the present. Pr.: Eighteen hours of college Spanish or equiv.

253 680. Spanish Novel I. (3) I or II. Reading and discussion of several nineteenth century novels, their form and content. Pr.: Eighteen hours of college Spanish or equiv.

253 681. Spanish Novel II. (3) I or II. Reading and discussion of Golden Age novels including the picaresque novel, the novel of costume, and Don Quixote. Pr.: Eighteen hours of college Spanish or equiv.

253 682. Spanish Drama I. (3) I or II. Reading of a selection of dramas from the Golden Age. Pr.: Fifteen hours of college Spanish or equiv.

253 683. Spanish Drama II. (3) I or II. The reading of selected plays from the nineteenth century Spanish stage. Pr.: Fifteen hours of college Spanish or equiv.

253 684. Spanish-American Literature. (3) I or II. Reading and discussion of a broad selection of the prose and verse of Spanish America. Pr.: Eighteen hours of college Spanish or equiv.

253 685. Cervantes. (3) I or II. Reading of the great classics of Spanish literature and discussion of the literary and cultural background of the period. Pr.: Twenty-one hours of college Spanish or equiv.

253 686. Contemporary Spanish Literature. (3) I or II. Reading and discussion of prose and poetry from Spanish literature of the twentieth

century, particularly the work of Garcia Lorca. Pr.: Twenty-one hours of college Spanish or equiv.

253 687. Spanish-American Novel. (3) I or II. The reading of representative novels from Latin America. Pr.: Eighteen hours of college Spanish or equiv.

253 688. The Works of Federico Garcia Lorca. (3) Study of drama and poetry. Pr.: Eighteen hours of Spanish or equiv.

SOUTH ASIAN LANGUAGES

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

253 470. Indian and Pakistan Literature in Translation. (2) Translated short stories and folk literature from Pakistan and India; introduction to the cultural background of the sub-Continent.

253 471. Languages in South Asia. (3) Survey of South Asian languages from genetic, sociological, descriptive, and comparative points of view. Pr.: Introduction to linguistics desirable, not necessary.

FOR UNDERGRADUATE AND GRADUATE CREDIT

253 690. Panjabi I. (3) The script, structure and grammar of the language of 35 million people in India and Pakistan. Pr.: None; some knowledge of another language desirable.

253 691. Panjabi II. (3) Cont. and completion of the study of the script, structure, and grammar of the language of 35 million people in India and Pakistan. Pr.: Mod. L. 690.

253 790. Urdu I. (3) The script, structure, and grammar of the official language of Pakistan. Pr.: None; some knowledge of another language desirable.

253 791. Urdu II. (3) Cont. of the study of the script, structure, and grammar of the official language of Pakistan. Pr.: Mod. L. 790.

MUSIC

LUTHER O. LEAVENGOOD,* *Head of Department*

Professors Leavengood, Steunenberg* and Walker;* Associate Professors Hays,* Jussila,* Pelton* and Shull;* Assistant Professors Caine,* Goleeke,* Gutana, Haerle, Painter, Polich, Roby,* Sidorfsky,* Sloop* and Walker;* Instructors Edwards and Walker*

UNDERGRADUATE

The Department of Music is a member, with institutional accrediting, of the National Association of Schools of Music.

Curricula in Applied Music and Music Education with majors in voice, piano, organ, stringed, woodwind, and brass instruments are offered. For specific requirements of each curriculum, see pages 119 and 184.

A major program of music leading to the degree of Bachelor of Music or B. S. in Music Education may be elected in one of these three fields: Music Literature, Music Theory, or Applied Music. The general requirement is 30 semester hours of selected music courses subsequent to the completion of Music 201, 202, 304, 305 (see courses under Theory of Music). Of these, Music 421, 422, 506, 507 (Theory of Music), and 651, 652 (Music History and Music Literature), are required in each field. If the field is Music Literature, the program also calls for Music 401, 402 (Theory of Music), and six semester hours selected from Music 609, 661, 662, 663, 664 (Music History and Literature), and Applied Music in one course selected from Music 252 through 287 to the extent of eight semester hours. If the field is Music Theory, the program calls for Music 401, 402, 501, 502 (Theory of Music), two semester hours chosen from Music 609, 661, 662, 663, 664 (Music History and Literature), and eight semester hours of Applied Music in Music 270 (Piano). If the field is Applied Music, other than the basic requirements, the program calls for two semester hours selected from any other courses above which are in the 600 series, and 16 hours of Applied Music in either

Music 270 or 278. The major in music in the Curriculum in Humanities is not intended to prepare students to teach in the public schools of Kansas.

Prerequisites in applied music for students taking a 30-semester-hour major in the Bachelor of Music degree program are the same as for candidates for the Bachelor of Science degree in Music Education. See page 117 for requirements for this degree.

For a minor, the following courses are required: Music 100, 201, 202 (Theory of Music), and one applied music course selected from Music 252 through 287 to the extent of four semester hours. Music 050 (Applied Music) is required for two semesters.

Students who intend to be certified to teach music in the public schools of Kansas as a secondary teaching subject must take in addition to the courses required for a minor in music the following courses: For grade school supervisors and choral directors, Music 412, 413 (Music Education), and two years in a choral organization; for band and orchestra directors, Music 413, 630 (Music Education), and two years in band or orchestra.

Courses in music are available to any student enrolled in the University, subject to prerequisites listed in the course descriptions. Courses in Applied Music do not require prerequisites for those not majoring in Music, but students should have a knowledge of notation and the fundamentals of music. This elective credit cannot be used later toward a music degree unless it meets the requirements of that course as they apply to those majoring in music. No more than two credits a semester will be granted for Applied Music as an elective.

Program in Applied Music

A four-year program with options in instrument and voice is offered in applied music. The curriculum is designed to give the student an opportunity for specialized training in voice, piano, organ, stringed, woodwind, or brass instrument. The student who completes the program in applied music is awarded the Bachelor of Music degree.

The basic requirements for the program in applied music are these: Music 201, 202, 304, 305, 401, 402, 506, 507 (Theory of Music), 421, 422, 651, 652 (Music History and Literature), and Phys. 126. In the instrumental option, Music 501, 502 (Theory of Music) are required. In addition, music electives totaling eight semester hours in the vocal option, and four semester hours in the instrumental major are required.

Requirements in General Education are stated on page 118. In the vocal option, these are supplemented by a total of 12 semester hours in a first language and at least five semester hours in a second language.

In the vocal option, 32 semester hours of voice (Music 287), four semester hours of piano (Music 270) and four semester hours of Vocal Ensemble (Music 290) are required. In the instrumental option, 32 semester hours of the major instrument (piano, organ, stringed, woodwind, brass, percussion) and four semester hours in Instrumental Ensemble (Music 288) are required. If piano or organ is not the major instrument, one of either must be chosen as one of the minors.

Participation in a musical organization to the extent of eight semester hours at a rate of one semester hour per semester is required of all students in the applied music program. Music 050 is required for each semester of the course.

Requirements for Entrance and Graduation

Preliminary examination in piano must be taken by all students majoring in music regardless of what curriculum is selected.

The above examinations are compulsory before any enrollment is made.

For dates of examinations, consult the calendar.

General Information

Regular attendance at student and faculty recitals, choral and orchestral concerts, and the artist series is required of all music majors. Seventy-five percent attendance is required for graduation.

All students enrolled in music must have the consent of their instructor in order to perform in public or on the radio.

Practice room privileges are included in the tuition for students who are regularly enrolled in college. All others pay the fee stated on page 189.

The various courses in voice or instrument are divided into grades. Students majoring in either the program in Applied Music or the program in Music Education must satisfy the following requirements for entrance in order to receive credit for the work and complete the grade indicated under each major before graduation.

Applied Music Requirements for the Program in Applied Music

Piano Majors: Students majoring in piano must pass grade 6 upon entrance and complete grade 10 by the end of the senior year.

Voice Majors: Students majoring in voice must pass grade 2 of the voice curriculum and grade 2 of the piano curriculum upon entrance and complete grade 6 in voice and grade 4 in piano by the end of the senior year.

Organ Majors: Students majoring in organ must pass grade 6 of the piano curriculum upon entrance and complete grade 4 of the organ curriculum by the end of the senior year.

String Majors: Students majoring in stringed instruments must pass grade 6 of the major instrument upon entrance and grade 1 for piano and complete grade 10 of the major instrument and grade 3 in piano.

Woodwind and Brass Majors: Students majoring in woodwind or brass instruments must pass grade 4 upon their major instrument upon entrance and complete grade 8 by the end of the senior year. In addition, all instrument majors must pass grade 1 in piano for entrance and complete grade 3 by the end of the senior year.

Applied Music Requirements for the Program in Music Education

Piano Majors: Students majoring in piano must pass grade 3 in piano upon entrance and complete grade 7 by the end of the senior year.

Voice Majors: No specific entrance requirements. However, a student should possess the ability to sing in time and in tune. Students majoring in voice must pass grade 2 in piano. For graduation, voice majors must complete grade 4 of the voice curriculum and grade 4 of the piano curriculum.

Organ Majors: Students majoring in organ must pass grade 6 of the piano curriculum upon entrance and complete grade 2 of the organ curriculum by the end of the senior year.

String Majors: Students majoring in stringed instruments must pass grade 3 upon their major instrument and grade 1 of the piano curriculum upon entrance. They must complete grade 7 of the major instrument and grade 3 of the piano curriculum by the end of the senior year.

Woodwind and Brass Majors: Students majoring in woodwind or brass instruments must pass grade 1 upon their major instrument and grade 1 of the piano curriculum upon entrance. They must complete grade 5 and the major instrument and grade 3 of the piano curriculum by the end of the senior year.

Outlines of each of the curriculums in music may be secured upon request from the head of the Department of Music. In each case, the major instrument should be specified.

GRADUATE

Graduate work leading to the degree Master of Science and Master of Arts is offered in the Department of Music.

Prerequisite to work in the graduate program is the completion of a four-year undergraduate curriculum leading to the degrees B. Mus., B. Mus. Ed., or B. S. in Music Education, with graduation requirements substantially equivalent to those of the music curriculums in this University.

For the degree Master of Science, either music education or applied

music may be chosen as a field of concentration, carrying a minimum of 16 semester hours. In the field of music education such cognate courses as psychology of music, problems in music and research in music may be used for partial fulfillment of this requirement. In the field of applied music a graduate recital and a master's report are required.

Electives to the extent of eight semester hours credit are required in the fields of music literature and music theory. If music education is the field of concentration, electives to the extent of four semester hours in applied music, provided proficiency warranting enrollment for graduate credit can be shown at time for enrollment, are required.

For the degree Master of Arts, the fields of concentration may be in music literature, carrying a minimum of 16 semester hours, including a master's report. In addition, six semester hours of Advanced Analysis and four semester hours of applied music are required. A minor carrying a minimum of six semester hours may be chosen from courses in one department other than the Music Department in which the candidate is qualified to carry courses on the graduate level.

Facilities for advanced work in this department include an extensive library of music and records, adequate practice facilities, and a growing collection of the most important reference works.

COURSES IN THE THEORY OF MUSIC

FOR UNDERGRADUATE CREDIT

257 100. Music Fundamentals. (3) I, S. Elementary instruction in the theory of music. Three hours rec. a week. Not open to music students.

257 201. Theory of Music I. (3) I, S. An integrated course comprising ear training, sight singing, keyboard assignments and the principles of diatonic harmony. Five hours rec. a week.

257 202. Theory of Music II. (3) II, S. Cont. of Music 201. Five hours rec. a week. Pr.: Music 201.

257 303. General Principles of Harmony. (3) I. A course designed for the general student who is interested in music, which presents such basic concepts as tonality, modality, chord structure and progression. Not open to students majoring in music or music education. Pr.: Ability to read music.

257 304. Theory of Music III. (3) I, S. Intensified study of chord connections; choral harmonization; non-harmonic tones and chromatic harmony; cont. of integrated work in ear training and keyboard harmony; clef transpositions. Four hours rec. a week. Pr.: Music 202.

257 305. Theory of Music IV. (3) II, S. Cont. of Music 160. Four hours rec. a week. Pr.: Music 304.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

257 401. Counterpoint I. (2) I, S. Devices of counterpoint and imitation leading to the writing of short contrapuntal compositions in two voices. Analysis of choral preludes and inventions. Pr.: Music 224.

257 402. Counterpoint II. (2) II, S. Cont. of Music 170. Contrapuntal composition in three or four voices, analysis of the fugue. Pr.: Music 401.

257 501. Instrumentation and Orchestration I. (2) I, S. Instruments of the band and orchestra studies with relation to tone, range, and function. Pr.: Music 304.

257 502. Instrumentation and Orchestration II. (2) II, S. Simple and familiar compositions scored for ensemble, including full orchestra. Pr.: Music 501.

257 506. Musical Form and Analysis I. (2) I. Forms used in composition; the music of Bach, Haydn, Mozart, Beethoven, Schumann, Chopin, Brahms, Wagner, and others. Pr.: Music 305.

257 507. Musical Form and Analysis II. (2) II. Cont. of Music 506. Emphasis upon the study of the larger forms of musical composition. Pr.: Music 505.

257 516. Conducting I. (2) I, S. Basic meters and the proper manner of executing each; introduction to score reading and transposition. Pr.: Music 305.

257 517. Conducting II. (2) II, S. (Choral) Continued stress on acquiring basic mechanical skills; analysis of differences between instrumental and choral conducting; study of the stylistic factors which are involved in the interpretation of representative compositions from the various historical periods; practical application of conducting skills by working with one of the large choral organizations. Pr.: Music 516.

257 521. Composition I. (2) I, S. Composition in the small forms for piano, voice, and instruments, development of style conception. Pr.: Music 402.

257 522. Composition II. (2) II, S. Cont. of Music 521, with emphasis on more complex treatment of the small and compound forms. Pr.: Music 521.

FOR UNDERGRADUATE AND GRADUATE CREDIT

257 601. Advanced Analysis I. (3) I and alt. S. Combination of harmony, counterpoint, and form as used in compositions in their historical setting. Pr.: Music 305, 505.

257 602. Advanced Analysis II. (3) II and alt. S. Modern chord structures, atonality, polytonality, form used in contemporary compositions. Pr.: Music 305, 505.

257 603. Pedagogy of Music Theory. (2) Offered on demand. The high school theory course, its objects and content; ear-training techniques and development of creative work; music history and appreciation in a high school program. Pr.: Music 305.

257 604. Composition III. (2) Offered on demand. Cont. of Composition II. An exploration of larger forms of music.

257 605. Composition IV. (2) Offered on demand. Cont. of Composition III.

COURSES IN MUSIC HISTORY AND LITERATURE

FOR UNDERGRADUATE CREDIT

257 241. The Opera. (2) Offered on demand. Survey of the history of the opera, with a review of a number of the most important operas. Course is designed for students majoring in curriculums other than music. Pr.: Music 250.

257 243. The Symphony. (2) Offered on demand. Survey of the history of the symphony, with presentations of a number of the most important symphonies. The course is designed for students majoring in curriculums other than music. Pr.: Music 250.

257 245. Programmatic Music. (2) Offered on demand. The presentation of a number of programmatic compositions with non-musical sources from which they are derived. The course is designed for students majoring in curriculums other than music. Pr.: Music 250.

257 250. Appreciation of Music. (2) Offered on demand. A study of musical materials, forms, and styles that will enable the listener to enjoy more fully the music which he may hear at concerts, in broadcasts, and on records.

257 399. Honors Seminar in Music. (1) Offered on demand. Not open to students majoring in music or music education. Pr.: Honors students only.

257 421. History of Music I. (2) I, S. Chronological study of significant musical trends; the influence of cultural forces upon musical developments; the contributions of individual composers.

257 422. History of Music II. (2) II, S. Cont. of Music 421.

FOR UNDERGRADUATE AND GRADUATE CREDIT

257 609. Music of the Twentieth Century. (2) Offered on demand. The historical aspect in musical analysis of composition since the romantic period. Pr.: Music 422, 505.

257 651. Music Literature I. (2) I, S. Style characteristics of music as revealed through a careful analysis of the music of different periods.

267 652. Music Literature II. (2) II, S. Cont. of Music 651. Pr.: Music 651.

257 661. Bach and Handel. (2) In alt. years. A comparison of the musical styles of Bach and Handel as revealed by a careful analysis of representative works. Pr.: Senior standing.

257 662. Haydn and Mozart. (2) In alt. years. A comparison of the musical styles of Haydn and Mozart as revealed by a careful analysis of representative works. Pr.: Music 305.

257 663. Beethoven. (2) In alt. years. A study of Beethoven's musical style through the careful analysis of selected works. Pr.: Music 305.

257 664. Music of the Romantic Period. (2) In alt. years. A study of musical trends in the nineteenth century through the analysis of works by representative composers. Pr.: Music 305.

257 799. Problems in Music. Credit arranged. I, II, S. Pr.: Background of courses needed for problem undertaken.

FOR GRADUATE CREDIT

257 801. Graduate Seminar in Music. (2) I, S. Library procedures, research methods and practice in preparing scholarly papers.

257 999. Research in Music. Credit arranged. I, II, S. Pr.: Registration in the Graduate School, with sufficient training to carry on the line of research undertaken.

COURSES IN MUSIC EDUCATION

FOR UNDERGRADUATE CREDIT

257 205. Music for Elementary Teachers. (3) II, S. Pr.: Music 100.

257 412. School Music I. (3) I, II, S. Methods and materials for teaching music in kindergarten, primary and intermediate grades. Pr.: Music 202 or consent of instructor.

257 413. School Music II. (3) I, II, S. Methods and teaching materials suitable for junior and senior high school. Pr.: Music 412 or consent of instructor.

FOR UNDERGRADUATE AND GRADUATE CREDIT

257 606. Survey of Choral Literature. (2) I, S. Repertoire of mixed, male and women's choral ensembles; techniques for effective program building. Pr.: Graduate standing or consent of instructor.

257 607. Choral Administration, Methods, and Techniques. (2) II, S. Administration and organization of the choral program; study and discussion of methods and techniques used for effective choral presentation. Pr.: Senior standing or consent of instructor.

257 612. The Junior High Music Program. (3) S. A methods course dealing with the particular problems of this age group such as the changing voice, the importance of the general music class, and the planning and selecting of music literature for the junior high voice. Pr.: Consent of instructor.

257 621. Workshop in Junior High School Vocal Music. (1) S. Survey of the methods, materials, and the teaching techniques of vocal music for the junior high school.

257 622. Workshop in Elementary Music. (1) S. Organizing old and new materials for various levels of elementary music, correlation of academic subjects with the music program. Pr.: Music 413 and senior standing.

257 623. Workshop in Secondary Vocal Music. (1) S. Choral techniques and interpretation of Baroque, Classical, Romantic, and Modern styles. Pr.: Music 413 and senior standing.

257 624. Workshop in Instrumental Music. (1) S. Teaching techniques,

methods, and materials for the woodwind, brass, string, percussion, and marching band. Pr.: Music 413 and senior standing.

257 625. Workshop in Piano Pedagogy. (1) S. Methods, materials, and teaching techniques for all grade levels. Pr.: Consent of instructor.

257 630. Instrumental Administration, Methods, and Techniques. (3) II, S. The school band, its administration, its training, and its materials. Emphasis is placed on the marching band. Special attention is given the percussion instruments. Pr.: Junior standing.

257 660. Survey of Writings on Music and Music Education. (3) II, S. A survey of writings in the fields of aesthetics, criticism, psychology of music, and philosophy of music education. Pr.: Graduate standing or consent of instructor.

COURSES IN APPLIED MUSIC

FOR UNDERGRADUATE CREDIT

257 050. Recital Attendance. (0) I, II.

257 111. University Choir. (1) I, II. Membership by tryout.

257 115. Band. (1) I, II. Membership by tryout.

257 121. University Chorus. (1) I, II, S.

257 125. Kansas State Singers. (1) I, II. Membership by tryout.

257 130. Orchestra. (1) I, II. Membership by tryout.

257 135. Varsity Men's Glee Club. (1) I, II, S. Membership by tryout.

257 136. Apollo Men's Glee Club. (1) I, II, S. Membership by tryout.

257 140. Women's Glee Club. (1) I, II. Membership by tryout.

257 203. Voice Class. (1) I, II, S. Basic rudiments of voice production and fundamentals of singing. Not open to majors in voice and non-music majors.

257 204. Piano Class. (0) I, II, S. Instruction in the rudiments of playing the piano. Open to students without previous study. Required of music majors who do not meet entrance requirements in piano.

257 233. Wind Techniques and Materials. (2) I, S. The fundamentals of playing and methods for teaching wind instruments.

257 234. String Techniques and Materials. (2) II, S. The fundamentals of playing and methods for teaching string instruments.

The following undergraduate courses in Applied Music offered each semester and summer carry from 0 to 4 credits, with a maximum of 32 hours in any one applicable to a degree. The fees for these courses are listed on page 189.

257 252. Baritone	**257 264. Oboe**	**257 276. Trumpet**
257 254. Bassoon	**257 266. Organ**	**257 278. Tuba**
257 256. Clarinet	**257 268. Percussion**	**257 280. Viola**
257 258. Double Bass	**257 270. Piano.**	**257 282. Violin**
257 260. Flute	**257 272. Saxophone**	**257 284. Violoncello**
257 262. French Horn	**257 275. Trombone**	**257 287. Voice**

257 288. Instrumental Ensemble. (1) I, II, S. Three hours lab. a week. Elective for selected students.

257 290. Vocal Ensemble. (1) I, II, S. Two hours lab. a week. Elective for students of superior vocal talent.

257 291. Madrigal Ensemble. (1) I, II.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

257 403. Piano Proficiency. (0) I, II, S. Required for the graduation of majors in the curricula in Applied Music, Music Education, and Humanities, with a major in Music.

257 475. Opera Workshop. (0-6) I, II, S. Courses may be repeated until six semester hours of credit have been earned. Principles and techniques of operatic and musical theatre production, with emphasis on

class rehearsal and performance of selected scenes from opera and musical drama; brief survey of the history of the opera. Offered jointly by the Departments of Music and Speech. Vocal ensemble credits may be earned in this course. Same as Speech 475.

257 530. Advanced String Techniques and Materials. (2) I, II, S. Playing and teaching skills beyond fundamentals, and presentation of materials suitable for private and public school instruction at the secondary level. Pr.: Music 234.

257 531. Advanced Wind Techniques and Materials. (2) I, II, S. Playing and teaching of materials suitable for private and public school instruction at the high school level. Pr.: Music 233.

257 550. Senior Recital. (2) II. An individual solo recital appearance. For students in Applied Music.

FOR UNDERGRADUATE AND GRADUATE CREDIT

257 610. Techniques of Vocal Instruction. (2) S. An analytical presentation of vocal methods and techniques, with primary emphasis on preparing the students to give studio lessons. Included are advanced repertoire and diction. Pr.: Senior or graduate standing.

257 637. Literature for Pipe Organ I. (2) I. Survey of literature for the pipe organ by Renaissance and Baroque composers. Open to students having an advanced study of the pipe organ. Pr.: Music 266.

257 638. Literature for Pipe Organ II. (2) II, S. Cont. of Music 637, with emphasis on literature by Romantic and Modern composers. Open to students having an advanced study of the pipe organ. Pr.: Music 637.

257 640. Ensemble. (1) I, II, S. A graduate course in ensemble techniques and materials. Pr.: Consent of instructor.

257 642. Methods and Materials for the Studio. (1) I, II, S. Methods of teaching fundamentals technique; selection of teaching materials, and outlining courses of study. For students in the Curriculum in Applied Music. Taught in divisions according to the major. Two hours rec. a week.

257 644. Practice Teaching in Applied Music. (1) II. Practice teaching in private classes for students in Applied Music. Pr.: Music 642.

FOR GRADUATE CREDIT

257 802. Repertoire in the Fields of Applied Music. (2) I, II, S. A required course for graduate students majoring in Applied Music. Taught in divisions according to the field of the specific major.

257 852. Baritone
257 854. Bassoon
257 856. Clarinet
257 858. Double Bass
257 860. Flute
257 862. French Horn
257 264. Oboe
257 266. Organ
257 268. Percussion
257 270. Piano
257 272. Saxophone
257 275. Trombone
257 876. Trumpet
257 878. Tuba
257 880. Viola
257 882. Violin
257 884. Violoncello
257 887. Voice

FEES IN MUSIC

Private Music Lessons and Practice Facilities

University students enrolled in the **Applied Music** or **Music Education** curriculums or the **Bachelor of Arts** degree **with a major in music are exempt** from fees for private music lessons and music practice facilities.

University students not majoring in one of the three music curriculums may take private music instruction by paying one of the following fees:

Two 30-minute lessons a week per semester—$42.
One 30-minute lesson a week per semester—$24.
Two 30-minute lessons a week, summer session—$21.
One 30-minute lesson a week, summer session—$12.
Single lessons, each—$4.

Practice piano, 1 hour daily per semester—$5.
Practice organ:
Two-manual, 1 hour daily per semester—$10.
Two-manual, 2 hours daily, summer session—$10.
Three-manual, 1 hour daily per semester—$20.
Three-manual, 2 hours daily, summer session—$20.

PHILOSOPHY

B. R. Tilghman, *Head of Department*

Professors Miller and Tremmel;* Associate Professors Hutcheson,* Scheer and Tilghman;* Assistant Professors Reagan and Zacks*

The program in Philosophy is located in the field of the Humanities. The aim of the program is to provide a broad knowledge of philosophy as part of intellectual history and to enable the student to think carefully and cogently about the philosophical problems that arise when one reflects critically upon virtually any area of human endeavor and experience.

UNDERGRADUATE

A major in philosophy requires 30 hours in philosophy and must include the following courses: Phil. 151, 221, 350, 351 and 770. At least 15 of the 30 hours must be in courses numbered 400 or above.

GRADUATE

Requirements for the Master of Arts degree in philosophy are: completion of the general requirements; passing an examination in one foreign language; passing written comprehensive examinations in the history of philosophy and two of the following areas: logic and foundations of science, social and political philosophy, metaphysics and the theory of knowledge, value theory (ethics and aesthetics); a thesis; and successful performance on the final oral examination.

Students planning to pursue the M. A. degree in philosophy should have adequate undergraduate preparation in logic, ethics, and the history of philosophy. Where evidence of such preparation is lacking students may be required to take certain undergraduate studies before being admitted to full graduate standing.

FOR UNDERGRADUATE CREDIT

259 150. Elementary Logic. (3) I, II, S. A study of correct thinking, its principles and conditions, in relation to observation, biases, prejudices, scientific induction, systematic deductive inference, sophistry, fallacies, and propaganda.

259 151. Symbolic Logic I. (3) I, II, S. A systematic introduction to modern logic. Truth-functions, truth-tables, calculus of propositions, classes, and relations.

259 165. Introduction to Philosophy. (3) I, II, S. An introduction to some of the major problems of philosophy based on the study of selected writings of important philosophers, both classical and contemporary.

259 166. Honors Introduction to Philosophy. (4) I, II. An introduction to some of the major problems of philosophy for students in the Honors Program.

259 175. Introduction to the Philosophy of Religion. (3) I. A course designed to acquaint the student with the nature of religious experience, the central concepts of religion, and to examine critically the language and literature of religion.

259 185. Professional Ethics. (2) I, II, S. An inquiry into the rules of correct practice and the development of ideals of professional conduct in recognized professions and related skill groups.

259 221. Ethics. (3) I, II, S. An examination of philosophical problems

concerning the nature of morality and conduct based on a study of the writings of historically important philosophers.

259 300. Man and Ideas. (3) I or II. A study of selected philosophical issues of special human significance.

259 310. Religious Dialogue. (3) II. Examines the epistemological and metaphysical and ethical concepts of religion from the perspective of Roman Catholicism, Protestantism, Judaism, and various other world religions, and places them all in the confrontation of philosophical dialogue.

259 350. History of Philosophy I. (3) I. The development of philosophical ideas in the West through the medieval period, with special emphasis on ancient Greek philosophy.

259 351. History of Philosophy II. (3) II. The development of philosophical ideas from the Renaissance to the nineteenth century.

259 398. Honors Colloquium. Credit arranged. I or II. Open only to juniors in the Arts and Sciences Honors Program.

259 399. Honors Seminar in Philosophy. Variable credit. I or II.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

259 400. Comparative Religion. (3) I. A course which analyzes and compares the central concepts of world religions—such as Hinduism, Buddhism, Taoism, Zen, Zoroastrianism, Judaism, Christianity, and Islam.

259 410. The Age of Analysis. (3) I in alt. years. A study of the development of the analytical tradition in twentieth century philosophy, emphasizing the work of Moore, Russell, and the logical positivists. Pr.: One course in philosophy.

259 414. Philosophies of South Asia. (3) II, S. Historically important systems and modes of thought associated with orthodox Hinduism, Buddhism, Jainism, Sufism, Carvaka, Islam, and Sikhism.

259 420. Existentialism. (3) I or II. A study of prominent thinkers in the existentialist tradition. Pr.: One course in philosophy.

259 425. Philosophy in Literature. (3) I or II. An examination of philosophical ideas encountered in selected writings of the world's great poets, novelists, essayists. Pr.: One course in philosophy and one in literature.

259 430. Social-Political Philosophy. (3) I or II and alt. S. A combined systematic and historical examination of social and political philosophy from antiquity to the present. Pr.: One course in philosophy or consent of instructor.

259 500. Introduction to Philosophy of Science. (3) I or II. Philosophical problems concerning science, its methods, laws, and theories. Pr.: One course in philosophy.

259 515. Aesthetics. (3) I or II, S. A study of philosophical problems concerning the nature of art, its appreciation, and criticism. Pr.: One course in philosophy and one course in art, literature, or music.

259 525. Metaphysics and Theory of Knowledge. (3) II in alt. years. A study of major theories concerning the nature of knowledge and reality. Pr.: Phil. 165 or equiv.

259 545. Philosophy of Religion. (3) II. A course designed to examine philosophically the basic concepts of religion, e. g., truth and faith, God and atheism, reason and revelation, morality and religion, evil, man, sin, salvation, eschatology. Pr.: Phil. 175 or 310 or consent of instructor.

FOR UNDERGRADUATE AND GRADUATE CREDIT

259 615. History of Medieval Philosophy. (3) I or II in alt. years. The history of the main philosophical ideas of the medieval period from St. Augustine to the Renaissance. Pr.: Phil. 165 or equiv.

259 630. American Philosophy. (3) I or II in alt. years, S. A study of

great American philosophers from earliest times to the present, including Royce, Peirce, Dewey, Santayana, and others. Pr.: Phil. 165 or consent of instructor.

259 655. Philosophic Trends. (3) I or II, or S. A detailed study of a selected philosophical school or movement. Pr.: One course in philosophy. May be taken more than once for credit.

259 695. Advanced Ethics. (3) I or II in alt. years. Examination of moral discourse and its relation to thought, emotion, and action. Pr.: Phil. 221 or equiv.

259 735. A Major Philosopher. (3) I or II. A detailed study of the major works of a selected historically important or contemporarily significant philosopher. Pr.: One course in philosophy. May be taken more than once for credit.

259 760. Symbolic Logic II. (3) II. An advanced study of logical systems and problems in logical theory. Pr.: Phil. 151.

259 765. Philosophy of Natural Language. (3) Philosophical problems concerning the nature of language and such central concepts as meaning and truth. Pr.: One course in philosophy.

259 766. Philosophy of Formalized Languages. (3) Introduction to the syntax and semantics of formalized languages: formation rules, truth, logical truth, analyticity, synonymy, definition, translation, and formal interpretations. Pr.: One course in philosophy or consent of instructor.

FOR GRADUATE AND ADVANCED UNDERGRADUATE CREDIT

259 770. Seminar in Philosophy. (2-3) A study of some selected philosopher or philosophical problem. Required for graduation of all undergraduate philosophy majors. Pr.: Two courses in philosophy. May be taken more than once for credit.

259 780. Problems in Philosophy. Credit arranged. I, II, S. Independent study for qualified students. Pr.: Background of courses required for problem undertaken.

FOR GRADUATE CREDIT

259 810. Special Topics in Philosophy. (2-5) I, II. Intensive study of topic chosen in consultation with instructor. May be taken more than once for credit.

259 820. Seminar. (2-5).

259 898. Research in Philosophy. Credit arranged. I, II, S. Pr.: Registration in the Graduate School, with sufficient training to carry on the line of research undertaken.

PHYSICAL EDUCATION

THOMAS M. EVANS,* *Head of Department*

Professors Evans and Geyer;* Assistant Professors Green, McKinney, Snyder,* Thompson* and Wauthier;* Instructors Hick, Piper, Poole, Rector and Sheriff; Emeritus: Professors Myers and Washburn**

UNDERGRADUATE

Each student receives a physical examination before enrollment in the Department of Physical Education. All freshman students enroll in Basic Physical Education 011 to satisfy the physical education requirement. Transfer students entering this University are excused from this requirement providing prior credit in courses equivalent to 011 has been granted. All university students, after completion of 011 or equivalent, are also encouraged to enroll in any one of the following: Ph. Ed. 107, 109, 110, 111, 116, 118, 124, 125, 126, 127, 128, 129, 130 where an opportunity will be given for gaining knowledge, skills and appreciation in activities for leisure-time pursuit and physical well-being.

For the major, a student should enroll in one of the curriculums in physical education. (See page 117.) For a minor, a student should enroll

in the following courses: Ph. Ed. 206, 216,* 230, 235, 356, 450, 455, 481, physical education elective, four hours, sports elective, four hours chosen from 415, 420, 426, 430.

For a minor in Health Education a student should enroll in the following courses: Bot. 121, 122,** F. & N. 130, Ph. Ed. 356, 375, 410, 481, 486.

GRADUATE

Graduate study leading to the degree Master of Science in Physical Education is offered in the Department of Physical Education.

Prerequisite to the work in the graduate program is the successful completion of a four-year undergraduate curriculum substantially equivalent to that required of undergraduate students at this University.

Persons desiring to do major work should have sufficient preparation in the biological and social sciences, and in health and physical education to prepare a person for the advanced work in physical education.

Of the 32 hours required for the graduate degree, a person must complete a minimum of 18 semester hours in the major field and a minimum of nine hours in a minor outside the field.

Facilities available for graduate work in physical education include a well-equipped library containing bulletins, journals, books and other publications. In addition, a new modern, well-equipped gymnasium will furnish numerous possibilities for experimental work in collecting data for problems and research studies of various types relating to the field of health, physical education, and recreation.

COURSES IN PHYSICAL EDUCATION FOR MEN AND WOMEN

FOR UNDERGRADUATE CREDIT

261 011. Basic Physical Education. (0) I, II, S. Activities offered: Swimming, Trampolining, Gymnastics and Tumbling. Calisthenics and Weight-conditioning Exercises, Wrestling, Adaptive Physical Education, Individual and Team Sports, Modern and Social Dance and Recreational Activities. Assignments to these activities will usually follow a motor ability test. Required of all freshmen.

The following undergraduate courses in Physical Education offered each semester and summer carry from 0 to one hour credit, with a maximum of two credit hours applicable to a degree.

261 012. Basic Varsity Baseball (0)

261 013. Basic Varsity Basketball (0)

261 014. Basic Varsity Football (0)

261 015. Basic Varsity Golf (0)

261 016. Basic Varsity Gymnastics (0)

261 017. Basic Judo Sports (0)

261 018. Basic Varsity Rowing (0)

261 019. Basic Varsity Swimming (0)

261 020. Basic Varsity Tennis (0)

261 021. Basic Varsity Track (0)

261 022. Basic Varsity Wrestling (0)

261 107. Beginning Bowling (1)

261 109. Advanced Bowling (1)

261 110. Coeducational Bowling (1)

261 111. Tennis and Golf (1)

261 112. Advanced Varsity Baseball (1)

261 113. Advanced Varsity Basketball (1)

261 114. Advanced Varsity Football (1)

261 115. Advanced Varsity Golf (1)

261 116. Sports Officiating (1)

261 117. Advanced Varsity Gymnastics (1)

261 118. Advanced Judo Sports (1)

261 119. Advanced Varsity Rowing (1)

261 120. Advanced Varsity Swimming (1)

261 121. Advanced Varsity Tennis (1)

261 122. Advanced Varsity Track (1)

261 123. Advanced Varsity Wrestling (1)

* Option on Ph. Ed. 216 and 241.

** Option on Zool. 200, 210, and 425.

261 124. Apparatus and Trampolining (1)

261 125. Bait and Fly Casting (1)

261 126. Gymnastics and Tumbling (1)

261 127. Recreational Sports (1)

261 128. Beginning Swimming (1)

261 129. Advanced Swimming (1)

261 130. Weight Training (1)

261 131. Scuba Diving (1)

261 206. Introduction to Physical Education. (1) I. Introductory survey of the field and study of the principles of health and physical education.

261 290. Kinesiology. (2) II. Mechanics of movement; body movements analyzed and principles involved applied to the teaching of physical education. Pr.: Zool. 210.

261 341. Life Saving and Water Safety Instruction. (1) I, II. Methods of teaching swimming and lifesaving. Upon satisfactory completion of this course a certificate is awarded by the American Red Cross as a senior lifesaver and a water safety instructor. Three hours lab. a week. Pr.: Advanced Swimming.

261 351. Rhythms for Elementary and Secondary Schools. (2) II. Fundamental rhythms and music, methods and materials for teaching folk, square, and social dance in elementary and secondary schools. Four hours lab. a week.

261 356. Personal and Community Health. (3) I, II, S. Presents scientific and well-balanced information concerning personal, family, and community health, so vitally essential to the individual in meeting the needs of daily living, professional, parent, and community responsibilities.

261 375. First Aid. (2) I, II, S. Prevention of accidents and the treatment of injuries in an emergency. Upon satisfactory completion of this course a certificate is awarded by the American Red Cross and the holder is in line for consideration as an instructor in first aid. Not open to students in Physical Education.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

261 481. Teaching Health in Elementary and Secondary Schools. (2) II. Materials and methods of teaching health in elementary, junior and senior high schools. Pr.: Ph. Ed. 356; Zool. 210, 425.

261 486. Administration of Health and Physical Education in Elementary and Secondary Schools. (3) I, II. Policies and procedures in organization and administration, with emphasis on elementary and secondary school health and physical education. Pr.: Junior standing.

261 570. Methods in Physical Education in Elementary Schools. (2) II, S. Methods of teaching and organization of material for a progressive elementary school physical education program. Pr.: Ph. Ed. 380.

FOR UNDERGRADUATE AND GRADUATE CREDIT

261 600. Physiology of Exercise. (2) II, S. Effects of exercise on the tissues, systems, and organs of the body.

261 610. Tests and Measurements in Physical Education. (3) I, S. A study of capacity, achievement, knowledge, and skill tests, for purposes of classification and measurement of school progress.

261 615. Community Recreation. (2) II, S. A study of organization and administration of municipal recreation programs including club work for youth, camping, playgrounds and indoor recreation centers. Pr.: Ph. Ed. 230, Psych. 110.

261 620. Administration of Physical Education in Colleges and Universities. (2) I, S. Study of policies and procedures in the organization and administration of the total program of physical education, with special emphasis from the standpoint of colleges and universities.

261 630. Curriculum Construction in Physical Education. (2) II, S. A

study of materials, problems, and guiding principles involved in curriculum construction. Pr.: Ph. Ed. 450 or equiv.

261 650. Advanced Methods of Teaching Physical Education. A study of Physical Education teaching methods applied to instruction at the secondary school level; organization of teaching materials and management of Physical Education classes.

261 675. Seminar in Physical Education. Credit arranged. Recent trends and problems in physical education. Pr.: Senior standing and consent of instructor.

261 700. Seminar in Health Education. Credit arranged. Recent trends and problems in health education. Pr.: Ph. Ed. 486 and consent of instructor.

261 799. Problems in Physical Education. Credit arranged. Pr.: Background of courses needed for problem undertaken.

FOR GRADUATE CREDIT

261 820. Supervision of Physical Education. (2) II, S. A study of the objectives, organization, and methods of supervision for elementary and secondary schools. Pr.: Educ. 477, Ph. Ed. 486.

261 840. Administration of School Health Education Program. (2) I, S. A study of the organization and administration of health service, health instruction, and health environment for primary and secondary schools; health councils. Pr.: Ph. Ed. 481.

261 860. Advanced Athletic Coaching. (1-3) Underlying principles of major sports strategy, the designing of plays, methods of teaching and controlling players; special problems of management connected with selecting, handling equipment, and making trips. Three hours maximum credit. Pr.: For advanced students with graduate standing and one year of coaching experience.

261 999. Research in Physical Education. Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken.

COURSES FOR MEN

FOR UNDERGRADUATE CREDIT

261 111. Tennis and Golf. (1) II. Study of rules, theory, and practice; methods of coaching.

261 116. Sports Officiating. (1) I. Principles and practices of officiating athletic games.

261 216. Games and Combative Activities for Elementary and Secondary Schools. (2) I. Practice and teaching methods of soccer, speedball, gymnasium games, adapted games and wrestling for elementary and secondary school physical education programs. One hour rec. and three hours lab. a week.

261 225. History of Physical Education. (2) I. The leaders in development of the Physical Education Program. Early European through today's public school systems. Pr.: Ph. Ed. 206.

261 230. Nature and Function of Play. (2) I. Theoretical explanations of play; age and sex characteristics which influence play; values of play to individual and community. Pr.: Psych. 110.

261 235. Tumbling, Balancing and Trampolining for Elementary and Secondary Schools. (1) II. Practice and teaching methods in calisthenics; the gymnastic lesson; tumbling and trampolining. Three hours lab. a week.

261 241. Apparatus Activities for Elementary and Secondary Schools. (1) I. Methods and materials for teaching graded exercises and activities on gymnasium apparatus and pyramids for use on apparatus. Three hours lab. a week.

261 245. Swimming for Elementary and Secondary Schools. (1) II, S. Methods of teaching swimming, water safety, theory and practice of

"drownproofing," diving, Red Cross swimming strokes; competitive swimming, its stroke theory and meet organization.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

261 410. Health Examinations. (3) I. Methods of giving health examinations; postural deviations; corrective exercise. Pr.: Ph. Ed. 230.

261 415. Technics of Basketball. (2) I. Study of rules, theory, and practices; methods of coaching. Pr.: Sophomore standing.

261 420. Technics of Baseball. (2) I. Study of rules, theory, and practices; methods of coaching. Pr.: Sophomore standing.

261 426. Technics of Track and Field. (2) II. Study of rules, theory, and practices; methods of coaching. Pr.: Sophomore standing.

261 430. Technics of Football. (2) II. Study of rules, theory, and practices; methods of coaching. Pr.: Sophomore standing.

261 450. Methods and Materials in Physical Education for Elementary and Secondary Schools. (3) I, II. Educational, health, and recreative significance of the physical education program; methods of teaching, materials, content, and types of activities in elementary grades, junior and senior high schools. Pr.: Senior standing.

261 455. Athletic Injuries and First Aid. (3) II, S. Standard and advanced Red Cross First Aid certificates given for successful completion of work; principles and practice of massage, taping, and care of minor athletic injuries. Pr.: Zool. 210.

261 460. Practice Teaching in Physical Education. (2) II. Supervised students assist in physical education class and officiate in intramural games. Six hours lab. a week.

COURSES IN PHYSICAL EDUCATION FOR WOMEN

KATHERINE GEYER, *In Charge*

Recreational swimming is offered on Tuesdays and Thursdays at 5 o'clock for women registered in college.

For a major, a student should enroll in one of the curriculums in physical education. (See page 117.) For a minor, a student should enroll in the following courses: Ph. Ed. 306, 320, 331, 351, 356, 366 or 515; 380, 481, 570 and 575, 526, 555, 566,* and 580.*

FOR UNDERGRADUATE CREDIT

262 051. Basic Physical Education. (0) I, II, S. Activities offered: Swimming, Body Mechanics, Individual and Team Sports, Modern Folk and Social Dance, and Recreational Activities. Assignment to swimming follows a swimming test. Required of all freshmen two semesters.

The following undergraduate courses offered each semester and carrying one credit hour with a maximum of two credit hours are applicable to a degree.

262 151. Beginning Bowling (1)
262 152. Advanced Bowling (1)
262 153. Tennis (1)
262 154. Beginning Swimming (1)
262 155. Intermediate Swimming (1)
262 156. Advanced Swimming (1)
262 157. Synchronized Swimming (1)
262 158. Intermediate Modern Dance (1)
262 159. Advanced Modern Dance (1)
262 160. Recreational Sports (1)
262 161. Tumbling (1)
262 162. Gymnastics (1)
262 163. Badminton (1)
262 164. Archery (1)
262 165. Golf (1)
262 166. Riflery (1)

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* Optional.

262 065. Physical Education W Lectures. (0) I, II. Required of women enrolled in the Curriculum in Physical Education for Women. Orientation and general survey of health, physical education, and recreation.

262 306. Tumbling and Recreational Sports. (2) I. Theory and practice of tumbling and recreational sports. One hour rec. and three hours lab. a week.

262 320. Recreational Leadership W. (2) II in even years. Principles and methods of organizing communities for leisure activities.

262 331. Individual Activities. (2) II. Methods of teaching tennis, badminton, and archery. One hour rec. and three hours lab. a week. Pr.: Ability to play tennis, badminton, and archery.

262 360. Dance Composition. (1) I, II. Principles and methods of modern dance composition. Discussion of costuming and staging dance. Three hours lab. a week. Pr.: Ph. Ed. 011, one semester of modern dance, or consent of instructor. May not be taken more than four semesters for credit.

262 366. Team Sports I. (1-3) Methods of teaching softball, hockey and volleyball and principles and practice officiating these sports. Two hours rec. and three hours lab. a week. Pr.: Ability to play softball, hockey and volleyball.

262 380. Physical Education Material for Elementary Schools. (3) I, II, S. Games, rhythms, stunts, and other activities suitable for different age periods in the elementary schools. One hour rec. and four hours lab. a week. Pr.: Sophomore standing and Educ. 200 or consent of instructor.

262 382. Camp Counseling. (2) I. Basic principles and skills in camping for future counselors. Pr.: Sophomore standing or consent of instructor.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

262 515. Team Sports II. (3) Methods of teaching soccer, speedball and basketball and principles and practice officiating these sports. Two hours rec. and three hours lab. a week. Pr.: Ability to play soccer, speedball and basketball.

262 526. Health Examinations and First Aid. (3) II. Methods of giving health examinations, analysis of normal body mechanics, postural deviations; first aid emergency treatment. Two hours rec. and three hours lab. a week. Pr.: Zool. 210, 425, junior standing, or consent of instructor.

262 531. Therapeutics. (3) I. Postural defects studied and exercises given for correction of each. Two hours rec. and three hours lab. a week. Pr.: Ph. Ed. 290, 526; Zool. 210.

262 555. Principles and Philosophy of Physical Education. (3) I. Aims and objectives, historical development, relation to general education, and analysis of programs and methods of physical education. Pr.: Senior standing.

262 566. Methods and Materials of Dance. (2) I. History of the dance; methods of teaching dance. One hour rec. and three hours lab. a week. Pr.: Semester each of beginning and intermediate dance.

262 575. Methods in Physical Education in Secondary Schools. (3) I. Organization of physical education material for a progressive program in junior and senior high school; teaching methods to achieve desired aims of education. Pr.: Ph. Ed. 306, 331, 336, 515.

262 580. Swimming. (2) II in alt. years. Methods of teaching swimming. One hour rec. and three hours lab. a week. Pr.: Semester each of beginning and intermediate swimming.

PHYSICS

ROBERT B. LEACHMAN,* *Head of Department*

Professors Bark, Cardwell,* Curnutte,* Dale,* Dragsdorf,* Ellsworth,* Leachman* and Williams;* Associate Professors Avery, Bhalla,* Crawford,* Lang* and Legg;* Assistant Professors Bradford,* Brown, Evans,* Folland,* Hathaway,* Hechtl, Lee* and Spangler;* Instructor Green; Research Associates Betz and Reuther; Emeritus: Associate Professors Chapin and Maxwell*

UNDERGRADUATE

A major in physics requires the completion of the general requirements for the Bachelor of Science degree (p. 116) and the following: Phys. 310, 311, 400, 432, 472, 502, 503; Math. 220, 221, 222, 240. Also, the student must elect one of the following options and fulfill the course requirements listed for that option: Option I. Physics and Astronomy: Phys. 640, 645; Math. 551. Option II. Engineering Physics: Nine additional hours in physics or approved engineering courses. These courses are chosen in consultation with the student's departmental adviser. Option III. Physics Teaching: Requirements of College of Education for a Teaching Certificate.

A student planning to do graduate work in physics should elect Option I. In addition, he is strongly advised to take the following courses: Phys. 632, 642, 672; Math. 550, 552; two years of German, French, or Russian.

GRADUATE

The Department of Physics offers work leading to the degrees Master of Science and Doctor of Philosophy. Students who plan to pursue a career of research or college level teaching in physics should plan a program leading to one of these degrees. Students who plan to teach physics at the high school or junior college level may wish to consider a program leading to the degree Master of Science in Physical Science Teaching. This program permits a broader choice of course work in several science fields.

In order to be admitted to full graduate standing in a program leading to the degree Master of Science or Doctor of Philosophy, a student must have completed undergraduate courses equivalent to those in the undergraduate physics core (see above). Prospective graduate students whose undergraduate training does not meet these requirements may be admitted on a provisional basis, but are required to take undergraduate courses, which may not be applied for graduate credit, to make up their deficiencies.

A brochure describing fields of research, supporting facilities, financial support, and other aspects of graduate study may be obtained on request from the Head of the Department of Physics.

FOR UNDERGRADUATE CREDIT

265 101. Man's Physical World I. (3) I, II, S. A general education course in physical science concerned with the concepts of matter and energy and their interactions. Three hours lec. a week. Not open to seniors.

265 102. Man's Physical World II. (3) I, II. Cont. of Phys. 101. Three hours lec. a week. Not open to seniors. Pr.: Phys. 101.

265 103. Man's Physical World I Laboratory. (1) I, II, S. Two hours lab. a week. Pr.: Phys. 101 or conc. enrollment.

265 104. Man's Physical World II Laboratory. (1) I, II. Two hours lab. a week. Pr.: Phys. 102 or conc. enrollment.

265 112. Descriptive Physics. (4) I, II, S. Three hours lec., one hour quiz, and two hours lab. a week. Pr.: High school algebra.

265 115. Household Physics. (4) Physical laws and principles involved in household appliances. Three hours rec. and three hours lab. a week.

265 121. Physics for Medical Technicians. (4) Physical laws and principles involved in medical technology. Three hours rec. and three hours lab. a week.

265 126. Physics for Musicians. (3) II. Selected topics applied to the physics of music and musical instruments.

265 131. Descriptive Astronomy. (3) A general qualitative study of the solar, stellar, and galactic systems.

265 135. Descriptive Meteorology. (3) II, S. Nontechnical treatment of the fundamentals of modern meteorology and associated physical processes.

265 211. General Physics I. (4) I, II, S. Mechanics, heat, and sound. Two hours lec., one hour rec., one hour quiz, and two hours lab. a week. Pr.: Math. 150.

265 212. General Physics II. (4) I, II, S. Magnetism, electricity, light, and modern physics. Two hours lec., one hour rec., one hour quiz, and two hours lab. a week. Pr.: Phys. 211.

265 310. Engineering Physics I. (5) I, II, S. Mechanics, heat, and sound; for technical students. Two hours lec., two hours rec., one hour quiz, and two hours lab. a week. Pr.: Math. 221 or conc. enrollment.

265 311. Engineering Physics II. (5) I, II, S. Magnetism, electricity, and light; for technical students. Two hours lec., two hours rec., one hour quiz, and two hours lab. a week. Pr.: Phys. 310; Math. 221.

265 330. General Astronomy I. (3) A mathematical study of the solar, stellar, and galactic systems. Pr.: Phys. 212 or 311; Math. 221.

265 331. General Astronomy II. (2) Cont. of Phys. 330. Pr.: Phys. 330.

265 333. Observational Astronomy. (1) Applied studies in observational astronomy and laboratory astrophysics. Three hours lab. a week. Pr.: Phys. 331 or conc. enrollment.

265 398. Junior Honors Colloquium. Variable credit. Open only to juniors in the Arts and Sciences Honors Program.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

265 400. Atomic Physics. (3) An introduction to contemporary theories and problems in physics. Pr.: Phys. 212 or 311; Math. 222.

265 401. Microclimatology. (3) (See Agron. 401.) A description of the climatological conditions near the ground and their application to the biological sciences. Pr.: Phys. 211; Math. 100.

265 405. Physics for Science Teachers. (2) Apparatus and demonstration methods in teaching physics. One hour rec. and three hours lab. a week. Offered on sufficient demand. Pr.: Phys. 212 or 311.

265 407. Intermediate Physics I. (3) The application of analytic geometry, calculus, vector analysis, and elementary differential equations to the description of physical phenomena and the solution of physical problems in mechanics, electricity, and magnetism. Pr.: Phys. 212 or 311; Math. 240 or conc. enrollment.

265 408. Intermediate Physics II. (3) Cont. of Phys. 407. Pr.: Phys. 407.

265 410. Light. (3) Pr.: Phys. 311 or 407; Math. 240.

265 421. Geophysics I. (3) Principles and methods of exploration geology by physical methods. Pr.: Phys. 212 or 311; Math. 221.

265 432. Mechanics I. (3) Principles of statics and dynamics of particles and rigid bodies by the methods of the calculus. Pr.: Phys. 311 or 407; Math. 240 or conc. enrollment.

265 472. Electricity and Magnetism I. (3) A study of electric and magnetic fields using the calculus. The development and solution of Maxwell's equations. Pr.: Phys. 311 or 407; Math. 240 or conc. enrollment.

265 473. Electromagnetic Circuits and Measurements. (2) A study of d. c. and a. c. circuits and measuring instruments. One hour rec. and three hours lab. a week. Pr.: Phys. 212 or 311, 502; Math. 222.

265 502. Physics Laboratory I. (3) See Phys. 610. One hour rec. and six hours lab. a week. Pr.: One year of college physics.

265 503. Physics Laboratory II. (3) Cont. of Phys. 502. See Phys. 610. One hour rec. and six hours lab. a week. Pr.: Phys. 502.

265 535. Radioactive Tracer Techniques. (3) (See Chem. 535.) Physics and chemistry of radioactive substances in the fields of biological and physical science. Two hours rec. and three hours lab. a week. Taught in cooperation with the Department of Chemistry. Pr.: Consent of instructor.

FOR UNDERGRADUATE AND GRADUATE CREDIT

265 602. Electronic Physics. (3) Basic vacuum tube and transistor circuit analysis. Studies of pulsed circuits and circuit logic. Pr.: Phys. 472.

265 604. X-ray and Crystal Physics. (3) Pr.: Phys. 472.

265 607. X-ray Laboratory. (1) Three hours lab. a week. Pr.: Phys. 604 or conc. enrollment.

265 610. Advanced Physics Laboratory. (1-3) The courses Phys. 502, 503, and 610 are designed to give the advanced student an opportunity to perform experiments of historical and current significance and to develop skill in making precise physical measurements involving the use of high-grade mechanical, optical, electrical, and thermal instruments. Pr.: Consent of instructor.

265 613. Introduction to Astrophysics. (3) Offered on sufficient demand. Selected topics in radiative transfer and gas dynamics with application to stellar structure, solar activity, planetary nebulae, planetary atmospheres, the solar wind, and the interstellar medium. Pr.: Phys. 432, 472.

265 630. Semiconductor Physics. (3) Offered on sufficient demand. The physics of conduction in homogeneous semiconductors and semiconductor device structures. Pr.: At least senior standing in physics or electrical engineering and consent of instructor.

265 632. Mechanics II. (3) Cont. of Phys. 432. Pr.: Phys. 432.

265 640. Introductory Quantum Mechanics I. (3) Methods of quantum mechanics and solution of selected problems in atomic, molecular, solid-state, and nuclear physics. Special theory and relativity. Pr.: Phys. 432, 400; Math. 240.

265 642. Introductory Quantum Mechanics II. (3) Cont. of Phys. 640. Pr.: Phys. 640.

265 645. Thermodynamics. (3) Pr.: Phys. 432; Math. 240.

265 672. Electricity and Magnetism II. (3) Cont. of Phys. 472. Pr.: Phys. 472.

265 675. Nuclear Physics. (3) Modern theories of nuclear physics. Pr.: Phys. 400.

265 685. Electro-optics. (3) Selected topics in modern optics, with special emphasis on electro-optic and magneto-optic effects. Physical phenomena forming the basis of laser technology and modulation of light waves. Pr.: Phys. 672, 640.

265 701. Journal Club. Credit arranged. Seminar in current topics in physics. Pr.: Consent of instructor.

265 705. Introduction to Theoretical Physics. (3) Pr.: Phys. 632; Math. 550, 551, 552.

265 710. Electrodynamics I. (3) Pr.: Phys. 705.

265 720. Introduction to Solid State Physics. (3) Pr.: Phys. 640.

265 725. Atomic Spectra. (3) Atomic energy levels and the origin of spectra. Pr.: Phys. 640.

265 726. Molecular Spectra. (3) Molecular energy levels and the origin of spectra. Pr.: Phys. 725.

265 740. Colloquium in Physics. Required of graduate majors and undergraduate majors.

265 799. Topics in Physics. Credit arranged.

FOR GRADUATE CREDIT

265 825. Advanced Dynamics. (3) Pr.: Phys. 705.

265 835. Electrodynamics II. (3) Pr.: Phys. 710.

265 855. Statistical Mechanics. (3) Pr.: Phys. 640, 645, 825.

265 860. Advanced Statistical Mechanics. (3) Offered on sufficient demand. Pr.: Phys. 855, 865.

265 865. Quantum Mechanics I. (3) Pr.: Phys. 640, 705, 825.

265 875. Quantum Mechanics II. (3) Pr.: Phys. 865.

265 885. Advanced Quantum Mechanics. (3) Relativistic quantum mechanics; scattering theory; second quantization; and many-body problem; introduction to quantum electrodynamics. Pr.: Phys. 875.

265 899. Problems in Physics I. (1) Independent study of the solution of advanced problems in phvsics at a level appropriate to the M. S. degree. Pr.: Graduate standing and consent of instructor.

265 915. Advanced Topics in Molecular Spectroscopy. (3) Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

265 925. Advanced X-ray Physics. (3) Offered on sufficient demand. Pr.: Phys. 604; Math. 240.

265 936. Solid State Physics. (3) Pr.: Phys. 720, 855, 875 or conc. enrollment.

265 937. Advanced Topics in Solid State Physics. (3) Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

265 945. Advanced Nuclear Physics I. (3) Pr.: Phys. 675, 865.

265 946. Advanced Nuclear Physics II. (3) Cont. of Phys. 945. Pr.: Phys. 945.

265 955. Advanced Topics in Mathematical Physics. (3) Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

265 970. Quantum Field Theory. (3) Offered on sufficient demand. Pr.: Consent of instructor.

265 997. Advanced Topics in Nuclear Physics. (3) Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

265 998. Problems in Physics II. (1) Independent study of the solution of advanced problems in physics at a level appropriate to the Ph. D. degree. Pr.: Phys. 899 and consent of instructor.

265 999. Research in Physics. Credit arranged. Pr.: Consent of instructor.

POLITICAL SCIENCE

WILLIAM W. BOYER,* *Head of Department*

Professors Boyer and Douglas;* Associate Professors Hajda* and Suleiman;* Assistant Professors Chamberlin, Gustafson,* Jones,* Linford,* Richter and Waters;* Emeritus: Professor Iles**

A major in political science provides a liberal arts student with the opportunity to acquire a broad education that will equip him to adapt to a wide variety of careers. The program for majors is designed: to encourage the student to analyze the theories, institutions, and processes of political systems in the context provided by the social sciences; to stimulate the student to attain a grasp of the broad sweep of political science as a discipline; to develop a continuing and responsible interest in political activity and public affairs; to provide the student with the opportunity to acquire a fundamental understanding of political science as a basis for citizenship, a career in government, or professional study

or service; to stimulate the qualified student's interest in graduate study in political science.

A major consists of 24 credits in political science. Courses in political science are grouped into four fields: (1) American government and politics; (2) comparative government and politics; (3) international relations; and (4) political thought.

The course credits of a major are distributed as follow:

(a) **Lower Division Courses.** Political Science 110 or 220 plus a minimum of one course under 400. Normally, these should be taken in the freshman and sophomore years.

(b) **Field Requirement.** One course numbered above 600 in each of the four fields of political science, as indicated, and such additional courses above 600 in one or more fields as are necessary to complete the minimum political science credit requirements. This distribution permits the student to develop broad competence in political science and competence in depth in one of the dimensions of the discipline.

Advisory Services

A special advisory program offered by the department is pre-legal training designed to provide a background that will help the student in his law studies and will prove useful to the lawyer in practice.

The department also maintains a special advisory program for students interested in government service.

Graduate Study

In accordance with Graduate School requirements, an M. A. degree in political science consists of a minimum of 30 semester hours of which 24 shall be in political science. Each candidate must take Political Science 800, at least one graduate seminar in political science in each of two fields, as set out above, in which he chooses to offer himself for comprehensive examinations, plus an acceptable thesis, or a substantial research paper in which case he will complete 32 semester hours.

Facilities for research include the resources of the University and Departmental libraries, and in the vicinity of the University—Eisenhower and Truman libraries, and the State Historical Library and other research centers and libraries.

FOR LOWER-DIVISION UNDERGRADUATE CREDIT

269 110. Introduction to Political Science. (3) I, II, S. Introduction to principles and major fields of political science.

269 111. Introduction to Political Science (Honors). (4) Introduction to principles and major fields of political science. Pr.: Membership in Arts and Sciences Honors Program.

269 220. American Government. (3) I, II, S. The national government, with emphasis on constitutional principles, basic structure, functions, and the political process.

269 301. Research Methods in Political Science. (3) Principles of research design, measurement of political phenomena, methods for collecting and analyzing political data, and utilization of computers in political research.

269 320. State and Local Government. (3) The American system of federalism, with emphasis on the government and politics of the American states and their subdivisions.

269 333. World Politics. (3) Introduction to the study of politics among nations, including a survey of major contemporary problems of world politics and focusing on the international struggle for power and order.

269 345. The Politics of Developing Nations. (3) Comparative analysis of politics in emergent states, with emphasis on processes of modernization and nation building.

269 399. Honors Seminar in Political Science. (1)

269 405. Introduction to the Civilizations of South Asia I. (3) I. Inter-

disciplinary survey of the development of civilizations in South Asia, geographical and demographic context, philosophical and social concepts, social and political institutions, literature and historical movements. (Same as Hist. 405, Geog. 405, Soc. 405, Anthro. 405.)

269 406. Introduction to the Civilizations of South Asia II. (3) II. Interdisciplinary survey of recent and contemporary civilizations in India, Pakistan, Ceylon, Nepal, and Afghanistan, including recent history, current economy, religion, culture, languages, literature, geography, social and political structure, ideas. (Same as Geog. 406, Hist. 406, Soc. 406, Anthro. 406.)

FOR UPPER-DIVISION UNDERGRADUATE CREDIT

269 444. The American Democracy. (3) Emphasis on extending, deepening, and intensifying understanding of the American political system. Designed especially for upper-division majors of other departments who have had no previous course in political science. Not open to students who have had Political Science 110 or 220 or equivalent.

269 555. Senior Honors Seminar. (3) Open to senior majors who have attained a 3.0 grade-point average in political science.

FOR UPPER-DIVISION UNDERGRADUATE AND GRADUATE CREDIT

I. AMERICAN GOVERNMENT AND POLITICS

269 605. The American Presidency. (3) The presidency as an institution, its evolution, Congressional relationships, executive organization.

269 610. Public Policies Toward Business. (3) Analysis of governmental processes related to domestic problems at the level of the national government; policy formation and decision making.

269 614. Rural Politics. (3) Fundamental problems of political power and decision making in agricultural policy and rural governmental settings.

269 616. Urban Politics. (3) Fundamental problems of political power and decision making in urban-suburban governmental settings.

269 617. The Administrative Process. (3) Public administration treated as a process of organization and methods management, with emphasis on conditions, elements, and problems common to all levels and functions of bureaucracy.

269 619. Administrative Policy Making. (3) The process of agency policy making, with emphasis on administrative decision making that affects private rights and interests against a setting of multiple and powerful pressures.

269 621. The Legislative Process. (3) Legislative decision making in modern democracy, with emphasis on the United States, the concept of representation, and political behavior of participants in the legislative process.

269 623. The Judicial Process. (3) Values of the rule of law and how they are maintained in Western democracies; general significance of the legal order; private rights and public duties; nature of the judicial process.

269 625. Constitutional Law I. (3) Legal foundations of the American political system as defined by constitutional provisions and judicial interpretation; pattern of governmental power; federalism, separation of powers, judicial review; Constitution as a positive instrument of government: the commerce power.

269 626. Constitutional Law II. (3) Constitution as a positive instrument of government: fiscal powers, powers over foreign affairs; Constitution as a negative restraint on government: substantive and procedural limitations.

269 665. Civil Liberties. (3) History, theory, and development of con-

stitutional liberties in the Bill of Rights and the Fourteenth Amendment.

269 677. Political Parties and Elections. (3) Origins, structure and functions of political parties; dynamics of the two-party system; roles of third parties; analysis of election results and voting behavior.

269 681. Interest Groups and Political Opinion. (3) Group theory and politics; structure, internal politics, and techniques of interest groups and their impact on public policy; analysis of formation and measurement of political opinion.

II. **COMPARATIVE GOVERNMENT AND POLITICS**

269 711. European Political Systems. (3) Comparative analysis of British democracy, totalitarianism, and contemporary Continental European political systems.

269 713. South Asian Political Systems. (3) Analysis of selected political systems of South Asia.

269 714. Middle Eastern Political Systems. (3) Comparative analysis of selected political systems in the Middle East, including nationalism and the conflict of differing ideologies. Validity and usefulness of various theories of political development are tested.

269 717. The Soviet Political System. (3) Government and politics of the Soviet Union.

269 720. Comparative Security Establishments. (3) Politics of conceiving, organizing, using and reconciling military and related security forces as societal functions in the United States, selected other polities, and international organizations.

269 721. Administration in Developing Nations. (3) Administrative problems of developing nations of Asia, Africa, and Latin America; principal models for study of comparative public administration; programs in development administration.

III. **INTERNATIONAL RELATIONS**

269 731. International Relations. (3) Analysis of the nature of international relations, with emphasis on contemporary theories explaining the international behavior of states.

269 733. American Foreign Policy. (3) Examination of American external relations since 1945 and evaluation of processes involved in the formulation and conduct of contemporary foreign policy of the United States.

269 735. International Politics of Europe. (3) Relationships among post-World War II European constitutional development, national politics, foreign policies and European communities, with attention to European considerations in global international politics.

269 737. International Law. (3) Theories of international law, and general problems, such as recognition, responsibility, war crimes, sources, evidence, codification, and settlement of disputes.

269 739. International Defense Strategies. (3) Contemporary international strategies and defense policies, with emphasis on nuclear, conventional, and guerrilla war; arms control and disarmament; diplomatic and political roles of the military.

269 741. International Organization. (3) Structure, functions, values, and effectiveness of international organizations, with emphasis on the United Nations, Common Market and other regional arrangements.

269 742. International Politics of South Asia. (3) Consideration of regional problems of the South Asian area, and international roles and foreign policies of South Asian states.

IV. **POLITICAL THOUGHT**

269 751. Political Thought: Classical to Sixteenth Century. (3) Systematic study of ideas about law, politics, and government of great

philosophers of Western Civilization from Greek antiquity to the sixteenth century.

269 753. Political Thought: Since the Sixteenth Century. (3) Study of the development of Western political thought from the sixteenth century to the twentieth century.

269 757. American Political Thought. (3) Political ideas underlying the American union, including the doctrine of rights, the nature of union, liberty, property, and democracy.

269 761. Modern Political Thought. (3) Study of contemporary political ideas and social thought.

V. **READINGS AND PROBLEMS**

269 785. Readings in Political Science. UAR CRE Students will undertake directed reading and discussion of a selected topic in political science.

269 790. Problems in Political Science. (1-3) Students will complete a research project and prepare an original paper under the supervision of a faculty member. A supervised internship or field work may be approved. Pr.: A minimum of 15 hours in political science.

FOR GRADUATE CREDIT

269 800. Seminar: Scope and Methodology of Political Science. (3) Exploration of theoretical foundations of political science, and critique of various analytical models in the study of political phenomena; construction and application of research designs and techniques. Required of all graduate students in political science.

269 801. Seminar: Public Policy and Decision Making. (3)

269 805. Seminar: American Government Problems. (3)

269 811. Seminar: International Politics. (3)

269 813. Seminar: International Political Communication. (3)

269 821. Seminar: Political Thought. (3)

269 831. Seminar: Public Administration. (3)

269 841. Seminar: Comparative Politics. (3)

269 845. Seminar: South Asian Politics. (3)

269 851. Seminar: Public Law. (3)

269 861. Seminar: Political Organization and Behavior. (3)

269 890. Research in Political Science. Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken.

PSYCHOLOGY

E. Jerry Phares,* *Head of Department*

Professors J. L. Brown, Danskin,* Langford,* Phares,* Rohles* and Sinnett;* Associate Professors S. C. Brown,* Haygood,* Mitchell,* Rappoport,* Samelson* and Thompson;* Assistant Professors Christ* and Handel;* Adjunct Professor Lacy; Emeritus: Professors Alm, Peterson and Showalter*

Psychology is the systematic study of behavior. The undergraduate curriculum at Kansas State is designed to serve several functions: (1) to give the student, as part of a liberal education, some familiarity with the principles, methods and findings of psychology; (2) to provide knowledge and skill requisite for study at the graduate level; and (3) to provide valuable background for students preparing for work in a variety of professions and jobs—e. g., medicine, law, theology, business, teaching, and engineering. The graduate program prepares the student for college teaching, research, and personnel training and human engineering work in the industrial setting.

The undergraduate major requires Stat. 320 or 520 and a minimum of 24 hours of course work, including Psych. 110, 440, 720, 775 and either Psych. 409 or 410. Additional courses are determined in consultation

with the student's adviser. Students majoring with a social science emphasis must take Math. 100 to meet the University mathematics requirement. Those with a biological science emphasis take Math. 100 and A. S. I. 400; and six hours of zoology beyond Zool. 205 in addition to curriculum requirements (see p. 117). A more detailed description of the program may be obtained from the Department of Psychology.

Students interested in the industrial relations field should take the following electives: Psych. 515 and 625 as well as Econ. 620 and 627, Soc. 541 and B. A. 400 and 431. This program, acquainting the student with economic, political, psychological and social aspects of labor-management relations, may be taken as a terminal university program or as a foundation for graduate study in the labor and industrial relations field. Students preparing for work in business should take the following electives: Psych. 505 and 515, Econ. 120, B. A. 272 and 305 as a basic program as well as some additional Business Administration courses such as B. A. 400, 405, 440, etc. These selections of electives, as well as those of students planning other careers, should be discussed with the departmental adviser.

GRADUATE

The graduate curriculum leads to the M. S. and Ph. D. degrees. At the master's level, students may take work in most of the traditional areas of psychology; however, emphasis is on doctoral programs. Doctoral programs are offered in the areas of general-experimental, industrial, and personality-social psychology. The instructional programs are supplemented by laboratory and on-the-job experience. Internships are an integral part of the training program. Participation in staff research and teaching will give the graduate student experience in a wide variety of situations.

For most students, the master's program requires two years beyond the baccalaureate level; the doctorate, two more years. It is expected that entering students will have had background work essentially equivalent to our undergraduate major. Deficiencies can be made up after enrollment.

A detailed description of the graduate programs, as well as information about financial support, may be obtained by writing to the Director of Graduate Studies in the department.

FOR UNDERGRADUATE CREDIT

273 110. General Psychology. (3) I, II, S. An introduction to the study of behavior, with emphasis on human behavior. A survey of the methods, data, and principles of psychology.

273 111. General Psychology (Honors). (4) I, II, S. An introduction to the study of behavior. Pr.: Participation in Honors Program or consent of instructor.

273 399. Honors Seminar in Psychology. (1) Selected topics. Open to non-majors in the Honors Program.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

273 405. Abnormal Psychology. (3) An introductory study of behavior pathologies, with emphasis on their etiology and treatment. Pr.: Junior standing; Psych. 110 or consent of instructor.

273 409. Experimental Psychology I. (4) II. Laboratory investigation of the sensory and perceptual processes. Two hours rec. and four hours lab. a week. Pr.: Psych. 110 and Stat. 320 or 520.

273 410. Experimental Psychology II. (4) I. Laboratory investigation of learning and motivation. Two hours rec. and four hours lab. a week. Pr.: Psych. 110 and Stat. 320 or 520.

273 415. Psychology of Childhood and Adolescence. (3) Survey of behavioral development from birth through adolescence. Pr.: Sophomore standing; Psych. 110.

273 420. Personality Development. (3) Introduction to developmental and psychodynamic views of personality, emphasizing psychoanalytic

and social learning theories, and empirical studies of personality development from adolescence to old age, supplemented by case material; considers origins of personality in heredity and early experience, socialization practices, conflict, and defense mechanisms. Pr.: Psych. 110; sophomore standing.

273 425. Psychology of Exceptional Children. (3) I, II, S. Psychological aspects of the superior, the subnormal, the emotionally disturbed and the physically handicapped child, with attention to early identification and treatment. Pr.: Psych. 415 or Educ. 202.

273 435. Social Psychology. (3) Psychology of the individual in society; social attitudes and behavior (e. g., voting, prejudice), their measurement, development and change in relation to individual personality and social influence. Pr.: Psych. 110.

273 440. Psychology of Individual Differences. (3) I. Introduction to principles and methods of psychological testing; discussion of problems and findings in the study of individual and group difference in behavior; role of biological and social factors. Pr.: Psych. 110.

273 465. Psychology of Art. (3) The role of psychological facts and principles in the production and appreciation of visual art, with emphasis on pictorial art. Pr.: Sophomore standing; Psych. 110 or consent of instructor.

273 505. Consumer Psychology. (3) II. A survey of consumer research problems and methods, with emphasis on the application of psychologically sound principles and practices in consumer surveys, advertising, and selling. Pr.: Sophomore standing; Psych. 110.

273 515. Personnel Psychology. (3) I. The application of psychological facts and principles in job analysis, employee selection and training, and interpersonal relationships in the job setting. Pr.: Sophomore standing; Psych. 110 or consent of instructor.

273 550. Group Dynamics. (3) Behavior in small groups, including a consideration of communication, the development of standards, the effect of pressures, the characteristics of leadership. Pr.: Six hours in psychology or consent of instructor.

FOR UNDERGRADUATE AND GRADUATE CREDIT

273 611. Introduction to Physiological Psychology. (4) A survey of basic concepts and experiments in the study of physiological correlates of behavior, including sensory and motor processes, learning motivation, emotion, and instinctive behavior. Three hours rec. and three hours lab. a week. Pr.: Zool. 205 and Psych. 110 or consent of instructor.

273 625. Industrial and Engineering Psychology. (3) The application of psychological facts and principles in creating the optimum work environment, work schedule, and work procedures; the role of behavioral factors in the design and operation of machines and equipment. Pr.: Psych. 110, Stat. 320 or 520 or consent of instructor.

273 700. Psychological Measurement. (4) A review of the logic and methodology underlying the construction of psychological measuring instruments from the psychophysical estimate of threshold to the scaling of complex psychological variables. Three hours rec. and two hours lab. a week. Pr.: Psych. 110 and Stat. 520.

273 705. Quantitative Methods in Psychology. (3) Examination of the nature of statistical inference in psychological research; hypothesis testing and statistical estimation, including a survey of non-parametric methods; consideration of correlational techniques useful with different kinds of psychological data. Pr.: Stat. 320 or 520 or equiv.

273 716. Comparative Psychology. (4) Behavior at different phylogenetic levels as an aid to the clarification of behavioral principles. Three hours rec. and three hours lab. a week. Pr.: Consent of instructor.

273 720. Psychology of Personality. (3) I. Discussion of different ap-

proaches to the study of personality. Pr.: Any of the following: Psych. 409, 410, 700 and consent of instructor.

273 775. History of Current Trends. (3) II. A review of the contributions of individuals and intellectual movements to the development of modern psychology. A survey of theoretical systems currently of influence. Pr.: Psych. 110; either nine additional hours of psychology or consent of instructor; senior standing.

273 790. Topics in Psychology. Credit arranged. I, II, S. Pr.: Psych. 110 and consent of instructor.

273 799. Problems in Psychology. Credit arranged. I, II, S. Pr.: Psych. 110 and consent of instructor.

FOR GRADUATE CREDIT

273 800. Advanced Measurement. (3) The logic of measurement, scaling theory, psychophysics and psychometrics, and problems in classification and prediction. Pr.: Psych. 700.

273 805. Experimental Design in Psychology. (3) Introducton to techniques of research planning and experimental design, including critical evaluation of selected experiments. Pr.: Psych. 705 or Stat. 521 or consent of instructor.

273 809. Sensory Processes. (3) Experimental study of sensory and perpetual processes, with emphasis on recent developments in the field. Pr.: Psych. 409 or consent of instructor.

273 810. Learning and Motivation. (3) Experimental study of learning and motivation, with emphasis on recent developments in the field. Pr.: Psych. 410 or consent of instructor.

273 811. Vision. (3) Principal facts of space and color perception, with emphasis on specification and measurement of stimulus conditions; the constancies; elementary principles of refraction; color blindness and other visual anomalies. Lectures and demonstrations. Pr.: Psych. 409 or 809 or consent of instructor.

273 812. Perception. (3) Various systematic approaches to perception, with emphasis on experimental and quantitative data. The role of perception in affectivity, motivation, and personality theory is stressed. Pr.: Psych. 809 or consent of instructor.

273 814. Human Learning and Retention. (3) Analysis of processes involved in human learning, transfer and retention, with emphasis on current developments in the field. Pr.: Psych. 810 or consent of instructor.

273 815. Experimental Analysis of Behavior. (3) Every other year or upon sufficient demand. The use of operant conditioning techniques in the study of sensory processes, chaining, stimulus control and punishment; applications to psychopharmacology, unusual environments, and psychotherapy. Pr.: Psych. 810.

273 820. Personality Theory. (3) A comparative examination of contemporary theories of personality structure. Pr.: Psych. 720 or consent of instructor.

273 821. Experimental Study of Personality. (3) Analysis and discussion of experimental results in personality research, particularly as they relate to theories of personality. Empirical work in such areas as anxiety, defense mechanisms, perception, needs, and development will be covered. Pr.: Psych. 820.

273 822. Psychopathology. (3) A systematic review of behavior disorders, their etiology and treatment. Pr.: Psych. 405 and 720 or consent of instructor.

273 830. Pro-seminar in Social Psychology. (3) Discussion of empirical findings and theoretical approaches to selected problem areas, such as attitude change, personality and social structure, person perception, small group processes. Pr.: Psych. 435.

273 831. Advanced Social Psychology. (3) Intensive examination of the

social determinants of behavior, with emphasis upon problems of current professional interest. May be repeated. Pr.: Psych. 830 or consent of instructor.

273 835. Introduction to Clinical Psychology. (3) Survey of the problems and methods of the clinical psychologist. Pr.: Nine hours of psychology and consent of instructor.

273 836. Techniques of Individual Intelligence Testing. (1) May be taken only in conjunction with Psych. 835 (Introduction to Clinical Psychology). Supervised practice in interviewing and in the administration and interpretation of selected individual intelligence tests. Pr.: Conc. enrollment in Psych. 835.

273 837. Projective Techniques. (3) Theory and techniques of personality assessment, with emphasis on the administration, interpretation, and research data of selected projective techniques. Pr.: Psych. 820, 822, 836 and consent of instructor.

273 840. Advanced Personnel Psychology. (3) Survey of theories and methods in job analysis, job design, personnel selection, placement and training, with special attention to criteria for evaluation of personnel practices. Pr.: Psych. 515 or equiv. and Psych. 700 or consent of instructor.

273 844. Counseling Psychology. (3) Survey of the problems and methods of the counseling psychologist, with major emphasis on theories of counseling. Pr.: Psych. 440 or 700, and 405, 420 or 720, and consent of instructor.

273 846. Advanced Industrial Psychology. (3) Review of current trends in industrial psychology and human engineering, including laboratory demonstrations and field trips. Two hours rec. and two hours field work. Pr.: Psych. 625 and consent of instructor.

273 847. Performance Theory. (3) Analysis of skilled human performance and complex man-machine systems, both military and civilian, with particular attention to the role of the human operator. Pr.: Psych. 805, 809, 810, or consent of instructor.

273 850. Seminar in Personnel and Industrial Psychology. Credit arranged. Intensive discussion of a problem of current professional interest, based on the class's study of the pertinent original literature. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 851. Seminar in Physiological Psychology. Credit arranged. Selected topics in physiological psychology. May be taken more than once. Pr.: Anat. Physi. 655, 660, or consent of instructor.

273 854. Seminar in Experimental Psychology. Credit arranged. Intensive discussion of a problem of current interest based on the class's study of the pertinent original literature. May be repeated with consent of supervisory committee. Pr.: Psych. 809, or 810, or consent of instructor.

273 856. Seminar in Psychological Measurement. Credit arranged. Intensive discussion of a problem of current interest, based on the class's study of the pertinent original literature. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 858. Seminar in Personality and Social Psychology. Credit arranged. Intensive discussion of a problem of current interest based on the class's study of the pertinent original literature. May be repeated with consent of the supervisory committee. Pr.: Psych. 820, or 830, or consent of instructor.

273 860. Practicum in Counseling Psychology. Credit arranged. Supervised practical experience in counseling. Pr.: Psych. 844 and consent of instructor.

273 865. Internship in Counseling or Industrial Psychology. Credit arranged. Pr.: For counseling students: Psych. 860 and consent of the

supervisory committee; for industrial students: Psych. 515, 625, and consent of supervisory committee.

273 999. Research in Psychology. Credit arranged. Pr.: Consent of supervisory committee.

SOCIOLOGY AND ANTHROPOLOGY

EUGENE A. FRIEDMANN,* *Head of Department*

Professors Friedmann, Hill* and Rohrer;* Associate Professor Lupri;* Assistant Professors Di Santo, Hiebert, Jogland,* Long,* O'Brien, Peters, Rogers,* Sabin and Taylor**

SOCIOLOGY

Sociology is the study of the development and the interaction of the individual in society. Some of the principal areas considered are the origin and development of cultural patterns; the growth, distribution, and characteristics of populations; the major social institutions and their trends; the problems of modern societies; community and organization planning for the orderly development of our society.

The trained sociologist is prepared for professional work with community planning and service agencies, teaching in the social sciences, and social research. Undergraduate work in sociology is also a desirable background for further professional training in other social sciences, law, social work, medicine and other fields. The student who desires to major in sociology should refer to the general requirements for the A. B. or B. S. degree (see pages 115 and 116). The student interested in sociology who also desires to prepare for teaching in secondary schools should prepare for teacher certification with a major in sociology. (See page 123.) The student interested in preparing for social work can enroll in the Pre-Professional Program in Social Work with a major in sociology.

The requirements in the A. B. or B. S. degree programs with a major in sociology (pages 115, 116) are: 24 semester hours of sociology beyond the elementary course, including Soc. 410, 620, and 710 and two of the following: Soc. 430, 440, 450, and 460. Soc. 211 should be taken to satisfy the three hours required in sociology in the A. B. degree program (page 115). Ten hours of electives in sociology are to be taken, all at or above the 500 course level. Students enrolled in the Pre-Professional Program in Social Work will be required to take 26 semester hours of sociology beyond the introductory course; Soc. 260 and 510 are required courses in this curriculum in addition to the other requirements of the sociology major; six hours of electives will be taken at the 500 level or above.

Major work leading to the degree of Master of Arts is offered in the following areas: Sociological Theory and Research Methods, Demography and Human Ecology, Social Organization and Social Structure, Social Interaction and Processes, Deviant Behavior and Social Disorganization.

Prerequisite to major graduate work in these fields is the completion of the baccalaureate at a recognized college or university, superior academic standing, and background work in sociology preparing the student for advanced study.

At least 50 per cent of the course work for an M. A. in Sociology is to be graduate level seminars in sociology (at least 12 semester credit hours). A candidate for the master's degree will be required to pass a written comprehensive examination over his graduate course work and associated topics. This examination will be given three or four weeks before the final examination week of the semester preceding the student's final semester of work for the degree.

COURSES IN SOCIOLOGY

FOR UNDERGRADUATE CREDIT

277 104. Frshman Interdisciplinary Honors. (4) A freshman honors course focusing on selected sociological problems, conducted by faculty

from several departments. Pr.: Conc. enrollment in Western Civilization 106.

277 130. Rural Sociology. (3) I, II. Social and cultural life of rural people, principal groups, institutions and organizations and their functioning in communities.

277 150. Courtship and Marriage. (2) II. Basic principles and problems which pertain to family life.

277 211. Introduction to Sociology. (3) I, II, S. Development, structure, and functioning of human groups; social and cultural patterns; and the principal social processes.

277 214. Introduction to Sociology. H (4) II. Development, structure and functioning of human groups; societal and cultural patterns; the nature of sociological inquiry. Lecture, discussion and independent study.

277 260. Introduction to Social Work. (3) II. A survey of the fields of social work, the relationship of social work to other social developments and vocational opportunities.

277 399. Honors Seminar in Sociology. (1) I, II. Readings and discussion of selected topics. Open to non-majors in the Honors Program.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

277 405. Introduction to the Civilizations of South Asia I. (3) I. Interdisciplinary survey of the development of civilizations in South Asia; geographical and demographic context; philosophical and social concepts; social and political institutions, literature and historical movements. (Same as Hist. 405, Geog. 405, P. Sci. 405, Anthro. 405.) Pr.: Soc. 211.

277 406. Introduction to the Civilizations of South Asia II. (3) Interdisciplinary survey of recent and contemporary civilizations in India, Pakistan, Ceylon, Nepal, and Afghanistan, including literature, geography, social and political structure, ideas. (Same as Hist. 406, Geog. 406, P. Sci. 406, Anthro. 406.) Pr.: Soc. 211.

277 410. Senior Seminar in Sociology. (3) II. Summarization and integration of courses in sociology. Pr.: Soc. 211 or consent of instructor.

277 430. Population and Human Ecology. (3) I. Theories, policies, growth, composition, spatial aspects, movements, and world population trends. Pr.: Soc. 211 or consent of instructor.

277 440. Social Organization and Institutions. (3) I. The development and character of the major social institutions in contemporary American society; functions, interrelationships, and trends. Pr.: Soc. 211 or consent of instructor.

277 450. Group Behavior and Primary Interaction. (3) I. Modes of group organization, processes that tend to maintain or change these forms of organization, relations between groups, and effects on individual behavior. Pr.: Soc. 211 or consent of instructor.

277 460. Social Problems. (3) I, II, some S. Problems of personal and social disorganization, such as adolescence, juvenile delinquency, crime, mental illness, unemployment, and family instability; methods of prevention and treatment. Pr.: Soc. 211 or consent of instructor.

277 510. Social Welfare as a Social Institution. (3) II. The development and present status of social welfare in meeting changing human needs and the requirements in other parts of our social system; the analysis of present-day philosophy and functions of social welfare. Pr.: Soc. 211.

277 530. Community Organization and Leadership. (3) II. American community organization; special emphasis on community problems and planning. Pr.: Soc. 211 or consent of instructor.

277 531. Urban Sociology. (3) I. Growth, development, and structure of the city as determined by geographical, ecological, and social factors; relation of rural and urban communities; problems of the city

and various approaches to their solution. Pr.: Soc. 211 or consent of instructor.

277 540. Racial and Cultural Minorities. (3) II, some S. Racial and cultural groups; attitudes, prejudices, and conflicts; approaches to understanding and control of race and minority group relations. Pr.: Soc. 211 or consent of instructor.

277 541. Industrial Sociology. (3) II in odd years. Human relations in industry, interrelationships of industry and the social order. Pr.: Soc. 211 or consent of instructor.

277 560. Criminology. (3) I, II, some S. Nature, extent, and causes of crime; programs for prevention and treatment. Pr.: Soc. 211 or consent of instructor.

FOR UNDERGRADUATE AND GRADUATE CREDIT

277 610. Development of Social Thought. (3) I in odd years. Development of social thought from ancient civilization to the middle of the nineteenth century; approaches to the study of society; ideas on human origins and human nature, character and results of associative life, social trends, and social betterment. Pr.: Soc. 211 and junior standing or consent of instructor.

277 620. Methods in Social Research. (3) I, II. Development, use, and interpretation of findings of the case method, social survey, and other techniques of social investigation. Pr.: Soc. 211 or consent of instructor and junior standing.

277 630. Advanced Rural Sociology. (3) II. The development of rural sociology; comparative rural life in the United States and other countries through the use of case studies of rural social organization and cultures. Pr.: Soc. 130.

277 640. Sociology of the Family. (3) I. Origin and development of marriage customs and systems of family organizations; the preparation for family life under present conditions. Pr.: Soc. 211.

277 643. Sociology of Occupations and Professions. (3) II in even years. The social nature of work and related phenomena; occupational structure, recruitment and training, adjustment problems, and the interpersonal relationships at work. Pr.: Soc. 211 or consent of instructor and junior standing.

277 650. Sociology of Mass Communications. (3) I in even years. Social organization and change as influenced by the control, structure, and function of mass communications. Pr.: Soc. 211 or consent of instructor and junior standing.

277 660. Juvenile Delinquency. (3) I. Nature, extent, and causes of delinquency; characteristics of delinquents; means of prevention and treatment. Pr.: Soc. 211 or consent of instructor and junior standing.

277 701. Problems in Sociology. Credit arranged. I, II, S. Pr.: Soc. 211 and junior standing.

277 710. Recent and Contemporary Social Thought. (3) I. A survey and appraisal of Western social thought in the late nineteenth and twentieth centuries; explanations of human origins and potentialities, socialization and control of behavior, character and results of associative life, social trends, and methods of social analysis. Pr.: Soc. 211 and junior standing.

277 730. Methods of Demographic Analysis. (3) Procedures and techniques for the collection, evaluation and analysis of demographic data, measures of population composition and of fertility, mortality and migration. Construction of life tables; population estimates and forecasts.

277 740. Social Systems. (3) I in odd years. Comparison of social systems in the Orient, Middle East, Europe, and the Americas. Pr.: Soc. 211 and junior standing.

277 741. Social Differentiation and Stratification. (3) I. Analysis of

societal organization based on age, sex, residence, occupation, community, class, caste, and race. Pr.: Soc. 211 and junior standing.

277 750. Social Control. (3) II. How social groups control the behavior of their members through the socialization process, sanctions, norms, rewards, and punishments; the effect that size and kind of group have on social control. Pr.: Soc. 211 and junior standing.

277 751. Social Change. (3) I in even years. Social and cultural evaluation, including diffusion and parallel development; the lag hypothesis; influential factors in, and consequences of, social change; the process of social change, contemporary theories, including directed social change. Pr.: Soc. 211 and junior standing.

277 760. Correctional Communities and Their Administration. (3) II. The world of the prisoner; an analysis of the society of captives and their captors within the total correctional process. Pr.: Soc. 211 and junior standing.

277 761. Probation and Parole. (3) Probation and parole systems; roles of judges, parole board members, and professional personnel; criteria for parole selection and evaluation of success; attitudes toward probation and parole.

FOR GRADUATE CREDIT

277 811. Seminar in Sociological Theory. Credit arranged. I or II in odd years. Contemporary sociological theory as systems of explanation of social phenomena and as bases for empirical research. Particular attention given to problems of conceptualization, system building and verification. Pr.: Soc. 620 and 710 or equiv.

277 820. Seminar in Sociological Research. Credit arranged. II. Application of scientific techniques to the design and execution of research. Pr.: Soc. 620 or equiv.

277 830. Seminar in Community Analysis. Credit arranged. I or II in even years. Various aspects of the structural and functional analyses of communities: demographic, ecological, organizational, institutional. Pr.: Soc. 530 or equiv.

277 831. Seminar in Demographic Analysis. Credit arranged. I or II in even years. Demography as a professional scientific discipline with intensive analysis of demographic techniques. Pr.: Soc. 430 or equiv.

277 840. Seminar in Social Organization. Credit arranged. I. Detailed discussion of a selected approach to organizational analysis, aspect of organizational phenomena, or type of organization. May be repeated once. Pr.: Consent of instructor.

277 843. Research in Family Organization. (3) Selected research topics in the analysis of contemporary family structures; the relation of the family to other societal systems; comparative perspectives and the use of cross-national data in family research.

277 850. Seminar in Primary Group Structure and Process. Credit arranged. I or II in odd years. Longitudinal and cross-sectional analyses of the basic elements in social interaction. Pr.: Soc. 450 or equiv.

277 851. Seminar in Societal and Institutional Dynamics. Credit arranged. I or II in even years. Analyses of change of societies and institutions; consideration of rates, degree, and direction of change, and of means employed to plan change in modern or emerging nations. Pr.: Soc. 751 or equiv.

277 862. Seminar in Deviant Behavior and Social Disorganization. Credit arranged. I. Analysis in detail and depth of selected forms of deviant behavior and their relevance to social disorganization. Pr.: Consent of instructor.

277 900. Research in Sociology. Credit arranged. I, II, S. Research for thesis or master's report.

277 901. Research in Rural Sociology. Credit arranged. I, II, S. Research for thesis or master's report.

ANTHROPOLOGY

Anthropology emphasizes the interdependence of man's genetically inherited and socially learned characteristics in the study of human nature. Accordingly, it is comprised of two main divisions: physical anthropology and cultural anthropology. Additionally, anthropologists base their generalizations on the most diverse possible sample of biological types and cultures, including those of nonliterate or folk peoples and those of the prehistoric past. Thus, physical anthropologists study both present-day races and the fossil remains of extinct groups; and cultural anthropologists study existing cultures of various levels of complexity as well as prehistoric cultures.

Professional anthropologists engage in teaching or research at the university level or work in applied areas such as the designing of garments or equipment for the military, identification of human remains, mental health research, public health research, consultation and research in the administration of dependent peoples, and training programs for those who work among culturally alien peoples. Those who wish to work as professional anthropologists should plan to obtain a graduate degree.

The undergraduate major is of special value for those who expect to work in technical assistance programs, foreign missionary enterprises, the diplomatic service, or in any other capacity involving dealing with culturally different persons in the United States or in other countries. It is relevant to all lines of endeavor which require an understanding of how human cultures function, e. g., social work, religious ministry, counseling, personnel administration, teaching, and industrial relations.

Course work is available in five areas: **ethnology** (the comparative and generalizing study of culture); **ethnography** (the descriptive study of nonliterate or folk cultures); **linguistic anthropology** (the cross-cultural study of languages); **archaeology** (the study of prehistoric cultures); and **physical anthropology** (the study of man's evolution and racial variation).

The requirements for the A. B. and B. S. degrees with a major in anthropology (pp. 115, 116) are: Anthro. 200, 260, 280, 460, 610, 620, an area ethnography course (630-659), an area archaeology course (500; 700-719), and three additional hours elected by the student.

COURSES IN ANTHROPOLOGY

FOR UNDERGRADUATE CREDIT

278 200. Introduction to Cultural Anthropology. (3) I, II, S. Introduction to basic anthropological concepts; technological, social and religious characteristics of nonliterate cultures.

278 201. Introduction to Cultural Anthropology. H (4) I. Introduction to basic anthropological concepts; technological, social, and religious characteristics of nonliterate cultures; discussion and independent study.

278 260. Introduction to Archaeology. (3) I. History of archaeological research; survey of concepts and methods of the field and laboratory; brief outlines of the major Old and New World cultural sequences.

278 280. Introduction to Physical Anthropology. (3) II. History of research; principles of evolution and human genetics; man's primate relations; fossil evidence of the evolution of man; the study of modern race; culture and evolution.

278 399. Honors Seminar in Anthropology. (1) Offered on demand. Readings and discussion of selected topics. Open to non-majors in the Honors Program.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

278 400. Culture and Personality. (3) II. Anthropological contributions to personality study; cross-cultural comparisons of personality types; means of personality formation in nonliterature and folk cultures; culture change and personality. Pr.: Three hours of anthropology or consent of instructor.

278 405. Introduction to the Civilizations of South Asia I. (3) I. Interdisciplinary survey of the development of civilizations in South Asia; geographical and demographic context; philosophical and social concepts; social and political institutions; literature and historical movement. Pr.: Anthro. 200. (Same as Hist. 405, Geog. 405, P. Sci. 405, Soc. 405.)

278 406. Introduction to the Civilizations of South Asia II. (3) Interdisciplinary survey of recent and contemporary civilizations in India, Pakistan, Ceylon, Nepal, and Afghanistan, including recent history, current economy, religion, culture, languages, literature, geography, social and political structure, ideas. Pr.: Anthro. 200. (Same as Hist. 406, Geog. 406, P. Sci. 406, Soc. 406.)

278 430. Folk Cultures. (3) I, some S. Culture as a concept for understanding human behavior; comparative study of technological, economic, kinship, associational, political, religious, aesthetic, and ideological customs of several nonliterate or folk cultures.

278 460. Linguistic Anthropology. (3) I. The functions of language as an aspect of culture; diversity, distribution, and dynamics of language; linguistics in anthropology. Pr.: Three hours of anthropology or consent of instructor.

278 500. Archaeology of the Old World. (3) II. Origin and evolution of human culture and technology; the major prehistoric sequences of Asia, Africa, and Europe; emphasis on period of plant and animal domestication and the European sequences. Pr.: Anthro. 200, 260, or consent of instructor.

278 510. Survey of World Prehistory. (3) II. A discussion of the stages of evolution of man's culture from that point at which he began to make patterned tools to the rise of high civilizations of the Near East, and the Americas. Areas stressed will include Europe, East Africa, India, China, the Near East, Mexico, and Peru. Pr.: Anthro. 200 or 260.

278 530. Race and Culture. (3) II. The biological meaning of race; the interrelationships of biological and cultural traits in human evolution; processes of racial formation of man; methods of classifying human races; cultural inheritance; the distinction of race, culture, personality, and intelligence; a review of modern racism; race as an evolutionary episode.

FOR UNDERGRADUATE AND GRADUATE CREDIT

278 600. Cultural Dynamics. (3) II. Cultural processes and their conditions and consequences; mechanisms by which customs originate and become culturally significant; development, modification, and decline of customs and cultures; processes and consequences of intercultural contact; applied anthropology. Pr.: Anthro. 200 or consent of instructor.

278 602. Ethnological Theory. (3) I. Investigation and evaluation of major theoretical approaches in anthropology; evolutionism, historicalism, diffusionism, functionalism, configurationalism, philosophical and psychological approaches; contemporary methodology and theory. Pr.: Anthro. 200 or consent of instructor.

278 610. Social Organization in Nonliterate Cultures. (3) I. Families, lineages, clans, age sets, tribal fraternities, secret societies, tribes, nations, and other groups found among the world's folk peoples. Special emphasis on how these relate to human behavior. Pr.: One of Anthro. 200, 430, Soc. 211, or consent of instructor.

278 620. Senior Seminar. (3) II. Review and integration of the several aspects of anthropology. Pr.: Senior undergraduate standing and 15 hours of anthropology.

278 625. Independent Reading and Research in Anthropology. (1-3) I, II, S. Guided reading and research on a specific anthropological topic of student interest, leading to preparation of a research paper. Topic

and credit to be arranged. Pr.: Three hours of anthropology and consent of instructor.

278 630. Indians of North America. (3) II. Aboriginal cultures of Canada and the United States; culture contact and change among surviving groups.

278 632. Indians of Middle America. (3) I. Description and comparison of Tarahumara, Aztec, Maya, Cuna, and other civilizations and nonliterate cultures of Mexico, Central America, and the Caribbean ring. Culture contact and change in surviving tribes.

278 645. Cultures of South Asia. (3) I. Cultural survey of the contemporary tribes and Hindu caste communities in their historical and geographical context followed by a more intense analysis of selected Indian and Pakistani village case studies stressing indigenous economic, social, political and religious structures.

278 650. Cultures of Negro Africa. (3) II. Description and comparison of the aboriginal cultures of Africa south of the Sahara. Culture contact and change.

278 705. Archaeology of North America. (3) I. Peopling of the New World; the Archaic period; spread of agriculture; prehistoric village community life. Specific cultural sequences of the U. S. and Arctic. Pr.: Anthro. 200, 260, or consent of instructor.

278 710. Archaeology of Middle America. (3) II. Early man, the beginnings of agriculture; the rise of civilization; the classic empires of the Maya, Aztec, Tarascans, and their neighbors; relationships with the Southeastern and Southwestern United States. Pr.: Anthro. 200, 260, or consent of instructor.

278 720. Archaeological Field Methods. (3) I. Archaeological site survey, site excavation, and laboratory analysis of sites and artifacts from the Manhattan, Kansas, region. Field work on Saturday, 8:00-5:00, while weather permits, laboratory work thereafter. Pr.: Consent of instructor.

278 741. Fossil Man and Human Evolution. (3) I. Human origins and evolution as indicated by fossil evidence; interpretation of man-apes, Pithecanthropus, Neanderthal, Cro-Magnon and other major fossil groups within the context of evolutionary theory, primate comparisons, and cultural evolution. Pr.: Anthro. 200, 280.

SPEECH

NORMA D. BUNTON,* *Head of Department*

Professors Bunton, W. Dace* and Given;* Associate Professors Brooks,* Climenhaga, Engler* and Flanagan;* Assistant Professors Burke,* Cleary, Hinrichs* and Rainbolt;* Instructors Aseneta, T. Dace and McCarthy; Emeritus: Professor Hill**

UNDERGRADUATE

Speech, as an academic discipline, integrates the study of oral communication from the mass media through interpersonal behavior. The Department of Speech offers study in the areas of General Speech and Speech Education, Linguistics, Theater and Interpretation, Speech Pathology and Audiology.

The student may major in any of the above areas or a combination of these areas. The major course work will be planned by the student in conference with a member of the Speech staff serving as adviser. The undergraduate major requires a minimum 30 hours of course work in Speech. All majors must complete the following core: Spch. 145, 210, 360, 608 or 652. Alternatives where noted will be selected in consultation with an adviser.

Pre-Speech Pathology and/or Audiology majors may complete the prerequisite course work necessary for graduate study in Speech Pathology and Audiology with the following courses: Spch. 213, 370, 621, 622, 632, 645, 623 or 646, 720 or 668, and 721. Students interested in place-

ment in a Kansas public school setting must additionally plan for the completion of the curricular option in Speech Pathology with the College of Education. Students so planning may omit Spch. 145, 360, and 720 or 668.

GRADUATE

In the Department of Speech major work is offered leading to the degree Master of Arts in the following fields: General Speech, Speech Pathology and Audiology, Theater, and Linguistics (see Interdepartmental Program in Linguistics, p. 123).

The Speech degree may include work in speech education, rhetoric, public address, small group communication, audiology, pathology, and linguistics.

A student majoring in any of the above areas may select a minor field either outside the department or within the department. Only certain areas are approved for minor work within the department when the major is also within the department.

Prerequisite to major graduate work in these fields is the completion of the four-year undergraduate program substantially equivalent to that required of general arts and science students. the curriculum to include sufficient elementary work in the appropriate area of speech to prepare the student for the advanced field chosen.

Facilities for graduate work in these fields include laboratories, studios, workshops, and clinical equipment. Cooperative relationships with departments offering work related to the two areas assist in developing research and study.

All graduate students in speech are required to take Spch. 800, Introduction to Graduate Study in Speech, in their first semester of graduate work or in the earliest subsequent semester the course is offered.

Specific requirements for research, advising and program planning are available in the departmental office.

COURSES IN GENERAL SPEECH AND SPEECH EDUCATION

FOR UNDERGRADUATE CREDIT

281 070. Spoken English for International Students.* (3) I, II. Semi-intensive aural-oral familiarization in American English as a second language.

281 080. Speech Seminar. (0) Special topics and lectures for speech majors. Required of all majors each semester.

281 105. Oral Communication I. (2) Selection and outlining of speech material, with emphasis on content, organization, and oral presentation.

281 106. Oral Communication Ia. Alternate to Spch. 105, permitting greater emphasis on preparation and delivery of speech material. Credit not granted for both Spch. 105 and 106.

281 107. Oral Communication Ib. (3) Speaking, reading, and writing for international student whose linguistic ability in American English is below that of the native American student; emphasis on aural-oral approach to structural patterns of spoken English. Pr.: Satisfactory score on the Speech Proficiency examinations and English Readiness Examinations for International Students.

281 108. Oral Communication IH. (2) Honors—Participation in and analysis of oral message situations, with emphasis on communication purposes, message design and presentations.

281 109. Oral Communication IaH. (4) Honors Speech preparation and delivery; a survey of topics basic to rhetoric, communication and linguistics. For Arts and Sciences Honors students.

281 120. Debate and Drama Participation. (1 or 2) Four hours maximum credit. Pr.: Consent of director of the activity.

* Three hours academic credit, not applicable toward degree requirements. Student in curriculum requiring 120 hours must therefore accumulate 123 or 124 hours when taking this course. Hours will apply toward grade-point average.

281 176. Argumentation and Debate. (3) Basic theories of argumentation, with emphasis on their application in academic debate. Pr.: Spch. 105 or 106.

281 200. Oral Communication II. (2) Cont. of Spch. 105 and 106. Study and practice of persuasive appeals in oral and written communication, with special consideration and analysis of the use of these appeals in contemporary speeches. Pr.: Spch. 105 or 106.

281 360. Language and Communication. (3) Basic studies in general semantics, communication models and related materials; emphasis upon problems of reference, definition and meaning in a communicative context.

281 398. Junior Honors Colloquium. Variable credit. I, II. Open only to juniors in the Arts and Sciences Honors Program.

281 399. Honors Seminar in Speech. (1) Readings and colloquia on selected topics. For non-speech majors in the Honors Program. Pr.: Honors students only.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

281 405. Principles of Message Effects. (3) Contemporary rhetorical study of the problems of determining message effects and relating them to significant variables of speech situations.

281 410. Persuasion. (3) The study of communication as persuasion; analysis of contemporary use of persuasion through the study and practice of various modes of proof.

281 455. General Phonetics. (3) Theory of articulatory phonetics and classification of speech sounds according to place and mode of articulation; to prepare students to recognize, transcribe, and reproduce speech sounds both familiar and exotic. (Same as Engl. 455.)

FOR UNDERGRADUATE AND GRADUATE CREDIT

281 616. Group Discussion Methods. (3) Examination of selected information, techniques and principles regarding the activities of face-to-face groups; emphasis upon achieving creative group endeavor through discussion.

281 618. Discussion and Conference Leadership. (3) Principles and functions of leadership in face-to-face groups.

281 655. History of American Public Address. (3) Study of American speakers, from the time of Jonathan Edwards to the present, including their training, speeches, and effectiveness. Pr.: Junior standing and consent of instructor.

281 665. Rhetorical Theory and Criticism. (3) Study of rhetorical theory and criticism from early Greek to modern times.

281 799. Problems in Speech. Credit arranged. Open to students in any speech area. Pr.: Junior standing and consent of instructor.

FOR GRADUATE CREDIT

281 800. Introduction to Graduate Study in Speech. (2) Methods of research and investigation in speech; nature of research. Required of all graduate speech majors. Pr.: Graduate standing.

281 999. Research in Speech. Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken and consent of instructor.

LINGUISTICS*

FOR UNDERGRADUATE AND GRADUATE CREDIT

281 652. Introduction to Linguistics. (3) Study of the basic concepts of modern descriptive linguistics. (Same as Engl. 652 and Mod. L. 652.)

281 664. Topics in Applied Linguistics. (3) Principles of contrastive structural analysis, especially English/French, English/Spanish, and English/German. Course on another topic may be repeated for credit.

* Courses cross listed with Departments of English and Modern Languages.

Pr.: Spch. 652 or Mod. L. 652 or Engl. 652. (Same as Engl. 664 and Mod. L. 664.)

281 669. Language Typology. (3) Presentation and discussion of the languages of the world and the variant methods of their classification.

281 672. Transformational Grammar. (3) Close examination of the transformational-generative theory of grammar. The varying schools of thought are considered, as well as extant transformational descriptions of languages. Practical work in the writing of transformational statements is an integral part of the course. Cross list with English. Pr.: Linguistics 652 or consent of instructor; Engl. 652 or Mod. L. 652 or Spch. 652 or consent of instructor and junior standing. (Same as Engl. 669 and Mod. L. 669.)

281 673. Introduction to Historical Linguistics. (3) Methods of historical linguistics as used in the reconstruction of earlier forms and stages of a language. Pr.: Junior standing. (Same as Engl. 673, Mod. L. 673.)

281 674. Methods and Techniques of Learning a Second Language. (3) Linguistics applied to the learning of a foreign language, especially English as a foreign language. Pr : Twelve hours of a modern language, including English, and Spch. 652 or Mod. L. 652 or Engl. 652. (Same as Engl. 674 and Mod. L. 674.)

281 676. Phonetics and Phonemics of English. (3) Detailed study of the speech sounds of English, their production, functions as signals, and realizations in the stream of speech in English. Pr.: Spch. 210 and Engl. 652 or Mod. L. 652 or Spch. 652 or consent of instructor and junior standing. (Same as Engl. 676 and Mod. L. 676.)

281 677. Morphology and Syntax of English. (3) Consideration of current theories of grammar, with emphasis on morphemics and tagmemics. Pr.: Engl. 451. (Same as Engl. 677 and Mod. L. 677.)

281 678. Field Methods in Linguistics. (3) An introduction to field work dealing with selection of informants, collection of data, elicitation techniques, use of electronic aids such as tape recorders and sound-stretchers, and the processing of field data. Work in a language previously unknown to the student forms a laboratory part of the course. Pr.: Linguistics 652 and General Phonetics 455 or consent of instructor.

281 879. Current Trends in Linguistics. (3) A close examination of the state of current theory and research in an aspect of linguistics seen as a new development in the field, or an indication of new trends. Pr.: Twelve semester hours in linguistics or equiv.

COURSES IN THEATER AND INTERPRETATION

FOR UNDERGRADUATE CREDIT

281 145. Introduction to Theater. (3) Consideration of theater organization and production; principal emphasis on college and secondary school practice, with some attention to Broadway and European Theater activity. Pr.: Spch. 105.

281 245. Acting I. Theory and practice in the fundamentals of acting for the theater. One hour rec. and three hours lab. a week.

281 255. Technical Production I. (3) An introduction to the technical problems of theater production, including planning, painting and mounting scenery as well as other aspects of backstage organization. One hour rec. and three hours lab. a week.

281 350. Techniques of Makeup. (2) Techniques of makeup for stage, movies, and television.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

281 410. Opera Workshop. (0-6) Principles and techniques of operatic and musical theatre production, with emphasis on class rehearsal and performance of selected scenes from opera and musical drama; brief survey of the history of opera. Offered jointly by Departments of Music and Speech. Vocal ensemble credit can be earned in this course. Same as Music 475. Appointment six hours maximum credit.

281 472. Storytelling. (2) A consideration of literary materials appropriate for children in nursery schools, kindergarten and elementary schools. Major emphasis is directed toward training in the art of storytelling. Pr.: Spch. 105 or 106.

281 526. Oral Interpretation of Literature. (3) Techniques of reading from the printed page, selecting portions from various forms of literature, including narrative poetry, essay, lyric, sonnet, non-fictional prose, scenes from plays, and selected short stories.

281 555. Acting II. (3) Study of acting as an art form and a method of personal development. Investigation of acting styles in outstanding periods of dramatic literature; study of individual acting styles of great actors. Pr.: Spch. 245 for students with drama concentration.

FOR UNDERGRADUATE AND GRADUATE CREDIT

281 600. Directing. (3) A lecture-laboratory course covering the principles and techniques of directing for theater; investigation into the historical emergence of the director; study of current theories. Pr.: Consent of instructor.

281 605. Development of the Theater I. (3) Greek to modern times. An integration of the theory, literature, and physical conditions of the theater as they relate to the total development of dramatic art. Pr.: Junior standing.

281 610. Costuming for the Theater. (3) Studies in stage costuming: history, characterization, fabrics, construction. A lecture-laboratory course including student planning and construction of costumes for university productions. Pr.: Junior standing.

281 611. Children's Theater I. (3) Introductory course in theory and practice for Children's Theater. Reading, demonstrations, practice, study of play scripts; play selection and production methods; operation of and assistance in production of plays for the child audience. Pr.: Consent of instructor.

281 614. The Art of the Film. (3) History, critical theory and techniques of the film as an art form, from its inception to the present.

281 615. Development of the Theater II. (3) The theater in modern times. Cont. of Spch. 605. Pr.: Junior standing.

281 624. Greek Drama. (3) A survey of Greek drama and stagecraft from Aeschylus through Menander; principal emphasis on the Greek writers of tragedy and Aristotle's *Poetics*. Pr.: Junior standing.

281 626. Modern Drama. (3) A survey of the work of leading playwrights, critics, directors and designers in the modern theater, with emphasis on the founding of experimental theaters in Russia, Germany, France and England. Pr.: Junior standing.

281 640. Playwriting. (3) Theoretical study and practical application of fundamentals of playwriting with regard to plot, characters, and production; adaptation of drama for the medium of television. Pr.: Junior standing.

281 663. Scene Design. (3) Principles and styles of design for the stage, utilizing sketches, diagrams, plates, and models. Pr.: Spch. 255 for students with drama concentration.

281 667. Stage Lighting. (3) History and techniques of lighting for the stage and television. Pr.: Junior standing.

281 680. Technical Production II. (3) A lecture-laboratory course in advanced technical theater problems of organization, planning and execution of scenery, costumes and lighting. Pr.: Spch. 255.

281 682. History of the Physical Stage. (3) A survey course in the emergence and development of the theater building as a distinct architectural form, with particular emphasis on the effect of the physical environment on the play. Pr.: Spch. 255.

COURSES IN SPEECH, SPEECH PATHOLOGY, AND AUDIOLOGY

FOR UNDERGRADUATE CREDIT

281 110. Training of the Speaking Voice. (2) Understanding of the vocal mechanism and its relation to the production of speech; laboratory period for the study and practice of speaking skills. Intended for students who desire to improve deficiencies in their speaking ability. May be repeated for a maximum of four hours credit.

281 210. Elements of English Phonetics. (3) Analysis of sounds which make up English speech and consideration of how sounds vary phonetically and physiologically; acquire skill in the transcription of speech into the symbols of the International Phonetic Alphabet.

281 213. Introduction to Speech Pathology. (3) An introduction to the field of clinical speech and hearing, speech disorders and their management; a survey of the classes of speech, hearing and language disorders.

281 370. Speech and Hearing Mechanisms. (4) Examination of contributions from acoustics, anatomy, and physiology to the mechanics of speech production and hearing; laboratory experience. Pr.: Spch. 210.

FOR UNDERGRADUATE AND GRADUATE CREDIT

281 621. Experimental Analysis of Vocal Behavior. (3) Study of behavior modification principles which are relevant to the experimental analysis of vocal behavior. The types of vocal behavior investigated extend from uncoded utterances to complex language responses.

281 622. Hearing Problems and Hearing Testing. (3) Study of social, emotional, and educational problems of the deaf and hard of hearing; experience in the use of the screening audiometer for pure tone hearing testing. Pr.: Spch. 370.

281 623. Audiology. (3) Theory and techniques of audiometric elevation including supervised practice in a simulated clinical setting with selected auditory tests. Pr.: Spch. 622.

281 630. Speech Pathology in the Public Schools. (3) Survey of the disorders of speech and hearing in children, their educational implications, and the organization and administration of public school clinical speech services.

281 632. Speech and Language Development. (3) Study of the characteristic sequences of speech and language development. Variables which influence developmental rate are discussed in detail. Significant findings are integrated and classified through application of linguistic methodology.

281 645. Modification of Communication Disorders. (3) Behavior modification principles are utilized to develop techniques for attenuating, establishing, and maintaining vocal behavior of individuals who possess communication deficits. Pr.: Spch. 213 and 621.

281 646. Disorders of Articulation. (3) Research, theories, and principles concerning the diagnosis and management of articulation disorders. Pr.: Spch. 213 and 370.

281 668. Speech Reading and Auditory Training. (3) Methods of instructing the hard-of-hearing and the deaf in principles and techniques of speech reading (lip reading and auditory training). Pr.: Spch. 630 or consent of instructor.

281 710. Hearing Conservation and Rehabilitation. (3) Principles and practices involved in the conservation, preservation, and rehabilitation of hearing. Pr.: Spch. 622 or 630 or consent of instructor.

281 720. Cleft Palate and Laryngeal Disorders. (3) Research and theory concerning nature, etiologies, evaluation, and principles of treatment of speech disorders resulting from cleft palate, laryngectomy, and vocal fold pathology. Pr.: Spch. 213 and 370.

281 721. Diagnostic Methods in Speech Pathology. (3) Consideration of the fundamental techniques and tools for analyzing the basic com-

munication processes and delineating the deviations that may be encountered; laboratory observation and participation. Pr.: Spch 645, 646, and 720.

281 722. Speech Pathology and Audiology in Interdisciplinary Settings. (3) Consideration of the interdisciplinary management of speech disorders in hospital and clinical settings. Laboratory observation and participation. Pr.: Spch. 645 and 646.

281 761. Practicum in Speech Pathology and Audiology. (0-6) Speech Pathology: Supervised clinical methods in speech pathology; experience in diagnosis, organization, and administration of therapy. Audiology: Supervised clinical procedures in descriptive and diagnostic hearing examinations as related to rehabilitative and medical orientations; therapy procedures for the hard-of-hearing; hearing aid selection. May be repeated for a maximum of six hours credit. Pr.: Major in Speech Pathology or Audiology.

FOR GRADUATE CREDIT

281 802. Neuropathologies of Speech and Language. (3) Research and theory concerning nature, etiologies, evaluation, and principles of neuropathologies of speech and language, including cerebral palsy and aphasia. Pr.: Spch. 370 and 645.

281 821. Experimental Phonetics. (3) Methods and logic for experimental analysis of the physical and perceptual properties of speech signals; functional relation of the substructures of the speech mechanism to the speech signal; electronic analogs for the synthesis of speech and their relevance to the understanding of production and perception of speech; laboratory experience. Pr.: Spch. 370 and 652.

281 822. Advanced Audiometry and Hearing Aids. (3) Special speech and pure tone audiometric techniques for differentiating neural from conductive impairments, for identifying recruitment, malingering, and other hearing problems; administration of test for hearing aid evaluations. Pr.: Spch. 623.

281 833. Research Techniques in Clinical Audiology. (3) Study of the auditory mechanism, with emphasis on critical evaluation of current methods employed in clinical audiology. Pr.: Spch. 623.

281 834. Stuttering. (3) Research and theory concerned with stuttering behavior, causes, developmental factors, evaluation, and remedial procedures. Pr.: Spch. 645.

281 845. Topics in Speech Pathology or Audiology. (3) Critical review of recent research related to measurement and modification of speech, hearing or language deficits. May be repeated for a maximum of six hours with change in topic.

STATISTICS AND COMPUTER SCIENCE

HOLLY C. FRYER,* *Head of Department*

Professors Banerjee, Feyerherm,* Fryer* and Zacks;* Associate Professors Conover,* Erdelyi* and Nassar;* Assistant Professors Dayton, Fisher, Koh, Walker and Waller; Instructor Unger*

UNDERGRADUATE

Statistics is a combination of classical mathematics, the theory of probability and some new concepts related to inductive reasoning which have developed during the last three-quarters of a century. Almost all activities of plants and animals (including man) depend to some degree on chance events; and most decisions made by mankind depend on sampling information—which also depends on chance events, and hence on probability. Consequently, the field of interest and activity for a statistician potentially is very broad. Likewise, the professional activities open to a trained statistician are quite varied. The existence of high-speed

calculating machines relieves the statistician of tedious computations and elevates his professional activity to that of an adviser, a consultant, a supervisor, and/or a person engaged in basic research.

As soon as man created numbers, he began to develop ways to calculate with them. The computations had to be done with some sort of tools: fingers and sticks in the dust, pencil and paper, beads, an abacus, mechanical desk calculators, electric desk calculators, analog computers, digital computers and now electronic digital computers. Calculations which were impossible or even unthought of 20 years ago are now routine.

The first digital computer, the Harvard Mark I, was demonstrated in 1944. The first electronic digital computer, the ENIAC, was exhibited in 1945. Today there are over 45,000 digital computers in use in the world. These machines represent what is called the hardware of digital computing.

A computer must be directed to do computations, store information, and produce the final information required in a usable form by means of programs known as software.

The creation and utilization of the best possible hardware and software is, broadly speaking, the field of computer science.

A person wishing to major in statistics may seek a Bachelor of Arts degree by satisfying the general requirements of that degree (p. 115) and completing Math. 222 or 232, 240, Stat. 320, either 321 or 510, 410-411 and 520-521; or the student may seek a Bachelor of Science degree by satisfying the general requirements of that degree (p. 116) and completing the aforementioned courses in mathematics and statistics. The student should consult someone in the Department of Statistics and Computer Science about this choice before enrolling.

A person wishing to major in computer science may (1) for the Bachelor of Arts degree undergraduates fulfill general requirements and complete Math. 240, Comp. Sci. 315, 385, 425, and 525; six additional hours in computer science, logic, linguistics, and/or statistics, or (2) for the Bachelor of Science degree undergraduates fulfill general requirements plus the additional course requirements for the Bachelor of Arts degree as indicated above.

GRADUATE

The Department of Statistics and Computer Science offers graduate studies leading to the Master of Science and Doctor of Philosophy degrees in probability and statistics.

Many graduate majors in statistics have majored in some other area as undergraduates. If the student has had mathematics through the calculus and 12 additional credits in mathematics and/or statistics, the master's degree in statistics can be earned in the normal time.

Persons who have earned the master's degree in statistics can study toward the doctor's degree, either industry or governmental service as statistical consultants, or join organizations which do scientific research in the biological, physical and social sciences or in the humanities. Holders of the master's degree also can be teachers in colleges and universities, but it is preferable to plan to obtain the doctorate if the student plans to enter the teaching profession at the college or university level. Excellent fellowships and assistantships are always available for persons receiving the master's degree in statistics and wishing to study toward the doctorate.

It is possible for a graduate major in computer science to complete the requirements for the master's degree in 12 months, provided he or she has previously fulfilled all the requirements for a bachelor's degree in computer science. However, it is more usual to take two years and receive a strong master's degree and be prepared either to seek the Ph. D. degree thereafter or obtain an excellent job in industry, research, government service, or education.

FOR UNDERGRADUATE CREDIT

285 320. Elements of Statistics. (3) I, II, S. A basic first course in probability and statistics; frequency distributions; averages and measures of variation; probability; simple confidence intervals and tests of significance appropriate to binomial and normal populations; correlation and regression, including confidence intervals and tests of significance for bivariate populations. Pr.: Math. 100 or 110.

285 321. Business and Economic Statistics. (3) I, II, S. Application of statistical principles to business and economic studies and decisions; sources of data; index numbers; time series; business cycles; market research; seasonal variation; forecasting. Pr.: Stat. 320.

285 399. Honors Seminar in Probability and Statistics. (1) I, II, S. Selected topics of general interest and importance. Open to non-majors in the Honors Program. Pr.: One course in statistics or probability.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

285 400. Introductory Biometrics. (3) I. Application of statistical concepts and methods to problems of population dynamics and forest mensuration; interpretation and presentation of quantitative measurements, with recognition of biological principles. Pr.: Stat. 320.

285 410. Introductory Probability and Statistics I. (3) I, S. Permutations, combinations, and principle of choice; random events and variables, sample spaces; simple measures and concepts of probability; marginal, conditional, and joint probability laws; mathematical expectation and moments; probability density and distribution functions for one or more discrete variables; normal distribution; moment generating functions; some concepts of sampling; applications. Pr.: Math. 222 or conc. enrollment.

285 411. Introductory Probability and Statistics II. (3) II, S. Law of Large Numbers, Chebycheff's Inequality; continuation of continuous random variables; uniform exponential, gamma, and beta distributions; Central Limit Theorem; sampling distributions for normal sampling; introduction to statistical inference. Pr.: Stat. 410, Math. 222.

285 510. Statistical Quality Control. (3) II. Elementary, practical methods of estimating the uniformity of manufactured products; control charts; sampling acceptance procedures. Pr.: One previous course in statistics.

285 520. Statistical Methods I. (3) I, II, S. Development of concepts and techniques appropriate to experimental research; methods for estimating parameters and testing hypotheses about them; linear correlation and regression; introduction to analysis of variance. Pr.: Math. 100 and junior standing.

285 521. Statistical Methods II. (3) II, S. Analysis of variance and covariance; multiple linear regression methods; partial correlation; curvilinear regression; orthogonal comparisons; simple experimental designs. Pr.: Stat. 520.

FOR UNDERGRADUATE AND GRADUATE CREDIT

285 610. Theory of Statistics I. (3) I, S. Probability models, concepts of probability, random discrete variables, moments and moment generating functions, bivariate distributions, continuous random variables, sampling, Central Limit Theorem, characteristic functions. More emphasis on rigor and proofs than in Stat. 410 and 411. Pr.: Math. 222.

285 611. Theory of Statistics II. (3) II, S. Introduction to multivariate distributions; sampling distributions, derivation and use; estimation of parameters, testing hypothesis; multiple regression and correlation; simple experimental designs; introdutcion to non-parametric statistics and discrimination. Pr.: Stat. 610.

285 625. Digital Statistical Analysis. (3) I, II. Program languages; programming for analysis of variance and covariance, missing data, least-squares analysis, multiple regression and correlation, and chi-square. Pr.: Stat. 521 or conc. enrollment.

285 630. Multivariate Statistical Methods. (3) I, S. Multivariate analysis of variance and covariance; classification and discrimination; principal components and introductory factor analysis; canonical correlation; digital computing procedures applied to data from natural and social sciences. Pr.: Stat. 521, Math. 505.

285 710. Sample Survey Methods. (3) II in alt. years. Design, conduct, and interpretation of sample surveys in the social sciences. Pr.: Stat. 520.

285 716. Non-parametric Statistics. (3) II. Testing hypotheses when the form of the parent population is unknown; rank and sign tests. Pr.: Stat. 520 or 610.

285 720. Design of Experiments I. (3) I, S. Planning experiments so as to minimize error variance, and avoid bias; Latin squares; split-plot designs; switch-back, or reversal, designs; incomplete block designs; efficiency. Pr.: Stat. 521.

285 721. Design of Experiments II. (3) II, S. Incomplete block designs; theory of the construction and analysis of experimental design. Pr.: Stat. 720 and Math. 505 or equiv.

285 731. Statistical Population and Quantitative Genetics I. (3) I, S. Equilibrium law of gene frequencies; forces that change gene frequency; gene frequency distributions; prediction equations for selection. Pr.: Stat. 521 and six semester hours of genetics.

285 732. Statistical Population and Quantitative Genetics II. (3) II. Estimation of genetic parameters; inbreeding, heterosis, level of dominance; epistasis, genetic load, linkage; experimental approaches to statistical genetics. Pr.: Stat. 731.

285 734. Bioanalysis. (3) I in alt. years. Purposes and types of bioassays; direct assays; quantitative dosage-response relationships; efficiency, reliability, and sensitivity; composite responses; quantal responses; time responses. Pr.: Stat. 521 or 611.

285 760. Discrete Probability Theory. (3) I. Occupancy problems; conditional probability and statistical independence; laws of large numbers; generating functions; recurrent events; runs and renewal theory; random walk. Pr.: Stat. 610.

285 765. Applied Stochastic Processes. (3) II. Study of types and applications of stochastic processes; Wiener, Poisson, renewal counting, generalized and compound Poisson, Markov chains. Pr.: Stat. 610.

285 799. Topics in Statistics. Credit arranged. I, II, S. Pr.: Consent of instructor.

FOR GRADUATE CREDIT

285 810. Seminar in Probability and Statistics. (1) I, II. Discussion and lectures on topics in probability and statistics; one seminar talk by each student registered for credit. Pr.: Graduate standing and at least two graduate courses in statistics.

285 850. Advanced Studies in Probability and Statistics. (3) I, II, S. Theoretical studies of advanced topics in probability, decision theory, Markov processes, experimental design, stochastic processes, and other advanced topics. May be repeated. Pr.: Stat. 611 and consent of instructor.

285 860. Linear Models I. (3) I in alt. years. Multivariate normal; covariance matrix and operations with it; distribution of quadratic forms; some specific linear models; application to experimental design, analysis of variance and variance components. Pr.: Stat. 521, 611; Math 507 or 701.

285 861. Linear Models II. (3) II. Generalized inverses; polynomial regression; experimental design, variance-component, and mixed models. Pr.: Stat. 860.

285 865. Multivariate Analysis. (3) II in alt. years. Likelihood estimates, vectors of random variables; Hotelling's T^2; distribution of simple, partial, and multiple correlation coefficients; classification and

discrimination; distribution of the sample covariance matrix and generalized variance; testing multivariate hypotheses. Pr.: Stat. 830, Math. 621.

285 890. Foundations of Probability I. (3) I. Distribution functions, characteristic function, sums of independent random variables, central limit theorem. Pr.: Math. 726.

285 891. Foundations of Probability II. (3) II. Conditional random variables, martingales, ergodic theorems. Pr.: Stat. 890.

285 895. Advanced Inference I. (3) I. Statistical decision problem, risk functions, and optimal procedures; classical and Bayesian sufficient statistics; estimation: least squares, moments, maximum likelihood, best unbiased, best invariant; asymptotic optimal maximum likelihood procedures—minimax; procedures. Pr.: Stat. 861, Math. 622.

285 896. Advanced Inference II. (3) II. Testing hypotheses: Neyman-Pearson Lemma; monotone likelihood ratio and exponential families; method of least favorable distribution; uniformity best unbiased and best invariant procedures; confidence sets and uniformly best test procedures. Pr.: Stat. 895.

285 999. Research in Statistics. Credit arranged. I, II, S. Pr.: Consent of instructor.

COURSES IN COMPUTER SCIENCE

FOR UNDERGRADUATE CREDIT

286 315. Fundamentals of Computer Programming. (3) I, II, S. Introduction to a procedure-oriented language, the description of a digital computing system, the strategy of problem solving using a digital computer, and the concepts and properties of algorithms; applications to problem solving. Pr.: High school algebra.

286 385. Introduction to Algorithmic Processes. (3) I, II, S. Introduction to algorithms, language and notation for describing algorithms; analysis of computational problems and development of algorithms for their solution; the notions of lists, tables, data sets (files) and records. Pr.: Comp. Sci. 315.

286 425. Computer Organization and Programming. (3) I, II, S. Logical organization of computers; number systems and arithmetic, control units and instruction sequencing, assemblers, addressing systems, subroutine linkages (transfer vectors), and input-output operations. Pr.: Comp. Sci. 315.

286 505. Mathematical Machines and Computability. (4) I. Elements of matrix algebra pertinent to digital computations; computer methods of solving linear equations and inverting matrices; error analysis, problem conditioning and post-optimizations; rectangular and singular systems; a generalized inverse for matrices; algorithmic methods of solving eigenvalue problems; progressive algorithms; applications. Three hours lec. and one hour lab. on a digital computer. Pr.: Math. 222, Comp. Sci. 385.

286 506. Mathematical Machines and Computability II. (4) Computer algorithms for finding roots of polynomials and the real roots of transcendental equations; error analysis, effect of uncertainty in the coefficients; computer algorithms for the approximation of continuous functions; numerical integration, differentiation and computer algorithms for solving ordinary differential equations. Three hours lec. and one hour lab. on a digital computer. Pr.: Comp. Sci. 505.

286 525. Introduction to Information Structures. (3) I. Study of information representations and relationships between the form of representation and processing techniques; transformations between storage media; referencing of information as related to the structure of its representation, and implications for the design of the referencing language. Pr.: Comp. Sci. 425.

286 610. List Processing Languages. (3) II, S in alt. years. The nature and mechanics of typical list processing languages, e. g., LISP

and SNOBOL will be presented with their characteristic advantages and disadvantages. Pr.: Comp. Sci. 385.

286 615. Computer Logic. (3) II, S. Propositional calculus, exiomatics; turing machines; unsolvable problems; quantification theory; satisfiability and validity, models, first-order theories; foundational considerations. Pr.: Math. 220, Comp. Sci. 385 or 425 or consent of instructor.

286 620. Programming Systems. (3) I, S. Languages for writing software, design of assembly systems, macro-instructions, operating systems (monitors), interrupt systems, storage allocation, and multiprogramming. Pr.: Comp. Sci. 385 and 525.

286 635. Non-numeric Programming. (3) I, II. Use of computers in problems not involving numerical analysis; combinatorial problems, learning mechanisms, heuristic programs, and pattern recognition. Pr.: Comp. Sci. 385 and 525.

286 640. Programming Languages. (3) II, S. Formal description of procedure-oriented languages, translation of algorithms to languages, description of languages in terms of alphabet and syntax, application to languages such as ALGOL and FORTRAN, compilers, procedures, storage, syntactic decomposition, hierarchies. Pr.: Math. 222 and Comp. Sci. 425.

286 701. Automata Theory. (3) II in alt. years. Finite automata; synchronous sequential circuits; Kleenes' Theorem; semi-groups; monomorphisms; generator systems; algebraic linguistics; potentially infinite machines; theory of computability, recursive functions; programming systems. Pr.: Comp. Sci. 615, Math. 512.

286 712. Seminar in Computer Science. (1) I, II, S.

286 798. Topics in Computer Science. Credit arranged. I, II, S.

FOR GRADUATE CREDIT

286 815. Special Topics in Computer Science. (2-4) I, II, S. Study in selected areas of artificial intelligence, computational linguistics, linear and non-linear programming, theorem proving by computer, models of intelligent processes, and the like. Pr.: Consent of instructor.

286 998. Research in Computer Science. Credit arranged. I, II, S.

TECHNICAL JOURNALISM

RALPH R. LASHBROOK,* *Head of Department*

Professors Howe and Lashbrook; Associate Professors Backer and Macy; Assistant Professors Applegate, Brinkman, Eaton, Kinghorn, Leaming, Mrozinski and Ohlemeier; Emeritus: Professors Ellis, Hostetter and Medlin; Associate Professors Amos and Whan*

The Department of Technical Journalism is one of 55 schools and departments accredited by the Association for Education in Journalism and is a member of the American Association of Schools and Departments of Journalism.

UNDERGRADUATE

Students interested in journalism can major in one of 13 sequences leading to either the Bachelor of Science degree or the Bachelor of Arts degree. The sequences include news-editorial, radio and television production, radio and television management, advertising, public relations, secondary school journalism, magazine, photography, home economics journalism, agricultural journalism, outdoor writing, business journalism and engineering journalism.

The sequences can be applied toward the Bachelor of Science degree and the Bachelor of Arts degree.

Students interested in Agricultural Journalism should note requirements on page 52; those interested in Home Economics and Journalism should note requirements on page 319.

GRADUATE

Advanced work leading to the degree Master of Science in Journalism or Master of Arts in Radio and Television is offered in the field of journalism. Prerequisite to advanced work in this field is the completion of a four-year college curriculum.

Those who do not have an undergraduate degree from one of the 55 schools and departments accredited by the Association for Education in Journalism must expect to take 10 to 12 hours of courses as a prerequisite to or in conjunction with their graduate study. Those who have had professional journalism experience and can pass a graduate proficiency examination will not be required to take some or all of the prerequisite courses.

The graduate program in journalism has two options: 30 hours including a thesis or 32 hours including a report. The thesis option would require 24 hours of course work and a six-hour thesis, while the report option would require 30 hours of course work and a two-hour report.

Graduate students in journalism draw upon the applied sciences, the social sciences, and the professional skills of journalism for assistance in the solution of problems which relate to the supplying of information to the public or to the training of those who supply such information. They enjoy the cooperation of the research, teaching, and service units of the University as a whole. Thus, the services and information of the agricultural and engineering experiment stations, the Bureau of Research in Home Economics, the Extension Service, the Department of English, the College of Education, and the facilities of the library and the radio station are available and form the basis for application of research in journalism to economically, socially, and esthetically important relationships.

COURSES IN JOURNALISM

FOR UNDERGRADUATE CREDIT

289 050. Technical Journalism Lecture. (0) Required. I, II. Addresses by practicing communications workers and members of the department. Required of all students majoring in journalism.

289 105. Graphic Arts Survey. (1) I, II. History and art of printing; typography of advertisements and headline display; principles of effective makeup. Pr.: Sophomore standing and conc. enrollment in Journ. 300.

289 235. Survey of the Mass Media. (3) I, II. Historical, social, legal and economic aspects of mass communications; current practices and responsibilities; role of newspapers, magazines, radio, television, motion pictures and other mass media in society, and their impact on world affairs.

289 300. Typography Laboratory. (1) I, II. Typesetting, proofreading, correction of forms as a background for journalism. Three hours lab. a week. Pr.: Sophomore standing and conc. enrollment in Journ. 105.

289 306. Reporting I. (2) I, II. Introduction to the field of journalism; news gathering and writing. Pr.: Sophomore standing and ability to type 30 words a minute.

289 310. Reporting Laboratory. (1) I, II.

289 316. Reporting II. (3) I, II. Two hours rec. and six hours reporting for the *Kansas State Collegian* each week. Pr.: Journ. 306.

289 320. Principles of Advertising. (3) I, II. Study of goods to be advertised, analysis of the market, psychology of advertising, preparation of advertising copy. Pr.: Junior standing.

289 326. Advertising Copy and Layout. (3) II. The writing of effective copy, testing the pulling power of ads, and the principles covering preparation of copy and layout are stressed. A study is made of current advertising.

289 330. Editing. (2) I, II. Six hours lab. a week. Pr.: Journ. 316.

289 335. Photojournalism I. (3) I, II, S. Basic camera and laboratory techniques of news photography.

289 350. Agricultural Journalism. (3) I, II, S. Survey of agricultural information techniques, with emphasis on principles of news and feature writing.

289 355. Advertising Salesmanship. (2) I. Application of principles of space selling and layout to specific lines of business by work with advertising clients of a newspaper. Pr.: Junior standing and consent of instructor.

289 358. Publications Management. (1-4) I, II, S. Practical work in writing, editing, advertising, business practices, and photography on student publications under supervision of an instructor. Three hours lab. a week for each hour of credit.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

289 400. Radio and Television News. (2) II. Processing and broadcasting of radio news. Pr.: Journ. 306. For non-journalism students.

289 406. Yearbook Editing and Management. (2) I. Planning, editing, layout, financing, and management of a yearbook, with special emphasis on the problems of *The Royal Purple.* One hour lec. and three hours lab. a week. Pr.: Journ. 316 and junior standing.

289 435. Photojournalism II. (2) I, II. Advanced work in taking, processing and editing photographs for newspapers and magazines, including picture page layout and legal implications. Pr.: Journ. 335.

FOR UNDERGRADUATE AND GRADUATE CREDIT

289 600. Public Affairs Reporting. (2) I. Reporting news of local, state, and national affairs. Two hours rec. and three hours lab. a week. Pr.: Journ. 316 or consent of instructor.

289 606. History of Journalism. (3) I. Pr.: Junior standing and Hist. 165, 170 or consent of instructor.

289 610. The Family Page. (3) I, II, S. Study of contemporary trends in community and family life reporting, with emphasis on interpretive writing and creative editing. Laboratory by appointment. Pr.: Journ. 330 or consent of instructor.

289 615. Magazine Article Writing. (2) II, S. Study of technical, trade, and general publications; writing for general magazines, agricultural and business publications, and women's departments. Pr.: For students in journalism, senior standing or consent of instructor; for students in Home Economics and Journalism, Journ. 610; for other students, consent of instructor.

289 617. Magazine Production. (3) I. The practical application of theory in the fields of writing, editing, graphic reproduction, layout, and management of magazines. Pr.: Journ. 105, 300, and 330.

289 620. Interpretation of Contemporary Affairs. (3) I, II. Critical questions regarding recent developments in state, national, and international affairs; editorials and interpretive articles which document and analyze the news; introduction to research in public affairs.

289 626. Formation of Public Opinion. (3) II in alt. years. Role of the press and communication agencies in formation of public opinion, work of propagandists and pressure groups. Pr.: Junior standing and consent of instructor; for graduate credit, eight hours of social science.

289 630. Public Information Methods. (2) I. Pr.: Journ. 316.

289 635. Public Relations. (3) II. Media, methods, principles, and practices of public relations. Pr.: Junior standing or consent of instructor.

289 640. Law of the Press. (3) II. Study of laws which guarantee and protect privileges and define duties and responsibilities of mass media; law, libel, privacy, and governmental regulations pertinent to the press. Pr.: Senior standing or consent of instructor.

289 645. Readings in Journalism. (2) I, II, S. Investigation of the literature of journalism.

289 652. Supervision of School Publications. (1-3) S. Supervision of high school yearbooks and newspapers. Three hours maximum credit. Pr.: Graduate standing or consent of instructor.

289 660. The Journalist in a Free Society. (3) I. A consideration of influences and controls that define the role of the journalist in American society, including law as it relates to the press. Open to non-majors. Pr.: Senior standing or consent of instructor.

289 665. Newspaper Management. (2) II in alt. years. Relations of departments of a newspaper to one another; costs, statistics, advertising, news, and business methods in publishing. Pr.: Journ. 320.

289 671. Mental Health Information Seminar. (3) I. Survey of public attitudes toward mental illness and mass media's role in reporting.

289 675. Professional Journalism Practicum. (2-4) I, II, S. For advanced students. Supervised practical work in the area of professional journalism. Includes laboratory investigation, field work and internships.

289 676. Behavioral Science Reporting. (3) II. Reporting and writing on problems of human behavior.

289 720. Research Methods in Journalism. (3) I, II, S. Survey of research methods used in the study of the mass media.

289 799. Problems in Technical Journalism. Credit arranged. I, II, S. Pr.: Background of courses needed for problem undertaken.

FOR GRADUATE CREDIT

289 999. Research in Technical Journalism. Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken.

COURSES IN RADIO AND TELEVISION

FOR UNDERGRADUATE CREDIT

290 132. KSDB-FM Participation. (1) Supervised performance in the various departments of the campus FM station.

290 152. Radio-Television Speech and Procedures. (3) Basic training in speech and operational procedures of broadcasting. Three hours lec. and two hours lab. a week. Required of all radio-television majors.

290 160. Survey of Broadcasting. (2) Survey of the radio industry; economic, political and social significance of broadcasting. Required of students with radio-television concentration.

290 225. Radio-Television Continuity. (3) Study of the forms and the preparation of non-dramatic scripts for all types of broadcast programs. Required of majors. Pr.: Journ. 160 for students with radio-television concentration.

290 326. Introduction to Television. (2) Study of the development of TV; its codes and control; its relation to other media; economic and social implication. Required of majors. Pr.: Journ. 160 for students with radio-television concentration.

290 330. Advanced Radio Production. (2) Advanced theory and techniques of modern radio production including tape editing, production commercials, documentaries, dramatic narratives, use of modern equipment and other production concepts. Pr.: Journ. 152 and 225.

290 392. Television Film. (2) Study of the principles and techniques of motion picture film production for television; theory of television film production and practical use of film equipment. Pr.: Journ. 160, 225, 326 for students with radio-television concentration; consent of instructor for non-majors.

FOR UNDERGRADUATE AND GRADUATE CREDIT

290 661. Television Production. (3) Emphasis placed on basic television production. Pr.: Journ. 225 and 326 for students with radio-television concentration; consent of instructor for non-majors.

290 662. Instrumental Television. (3) The principles of instructional television: its development, programming, techniques, and application. See Educ. 662. Pr.: Junior standing and consent of instructor.

290 670. Radio-Television Programming. (3) Study of the principles of planning and the development of radio and television programs and schedules. Pr.: Journ. 225 and 326 for students with radio-television concentration.

290 672. Advanced Television Production. (3) Study of visual and dramatic principles in television from the point of directors, producers and performers. Pr.: Journ. 661 for students with radio-television concentration.

290 677. Radio-Television Advertising. (3) Study of the principles and practices in broadcast advertising. Pr.: Journ. 320 for students in Technical Journalism. Journ. 225 for students with radio-television concentration.

290 685. Radio-Television Writing I. (3) Study of the principles and the preparation of dramatized, broadcast programs. Pr.: Journ. 225 for students with radio-television concentration.

290 690. Broadcasting Criticism. (3) Study of the principles and criteria of mass media criticism, with emphasis on those considerations unique to broadcasting. Pr.: Consent of instructor.

290 692. Broadcasting Law. (3) A study of the major laws and legal decisions which affect broadcasting. Primary attention given to the Communications Act and the Federal Communications Commission's Rules and Regulations; other laws relating to broadcasting and broadcast management considered. Pr.: Junior standing and consent of instructor.

290 695. Radio-Television Writing II. (3) Cont. of Journ. 685. Pr.: Journ. 685 or consent of instructor.

290 726. Radio-Television Station Management. (3) Study of the principles and the problems of broadcast station management. Pr.: Junior standing.

290 745. Broadcasting of Women's Programs. (3) Principles of writing, production, and criticism of radio and television programs presented by women, and those prepared for an audience of women and/or children. Required of women majors. Pr.: Journ. 225 for students with radio-television concentration.

290 750. Broadcast Research. (3) Study of research in broadcasting; its literature and methodology. Pr.: Junior standing.

ZOOLOGY—SEE BIOLOGY

The College of Commerce

ROBERT A. LYNN, *Dean*
EUGENE J. LAUGHLIN,* *Acting Associate Dean*
MILDRED E. BUZENBERG, *Assistant Dean*

Professor Clark; Associate Professors Allen,* Barton-Dobenin,* Eriksen,* Gilkison,* Gugler,* Laughlin,* Mulanax* and Swisher;* Assistant Professors Buzenberg, Coleman, Goheen, Gudgell, Rapp, Reed, Richards, Riley and Tuxbury*

The main objective of the College of Commerce is to provide a challenging opportunity for professional study and development in accounting and business administration. Undergraduate and graduate programs alike are designed to facilitate maximum development of the student into an informed, capable and responsible individual.

Throughout a student's academic career, the business firm is critically examined as a key social, economic and political institution of our time. To equip the prospective executive and specialist for future professional responsibilities, the College orients instructional activities around two themes: one, the businessman as a manager and executive, decision maker, planner, organizer and controller of operations in a particular firm; and the other, the businessman as an analyst of, and adapter to the larger economic and political environment of which he and the firm are integral parts. Both subject matter and instructional techniques focus on decision making and implementation of decisions through critical and creative analysis.

In addition to its instructional programs, the College of Commerce recognizes its responsibilities and opportunities to work closely with the business community. It provides to business, through the general faculty, professional services in accounting, finance, marketing and management. In cooperation with the Division of Extension, the College of Commerce sponsors numerous short courses and conferences for business and management groups.

THE UNDERGRADUATE PROGRAM

At the undergraduate level, the College of Commerce seeks to produce a university graduate with: (1) a broad education in the Arts, Sciences and Humanities; (2) a solid knowledge and appreciation of the functioning of the business world; (3) sufficient knowledge and skill in a field of specialization to permit him to obtain a position in business; and (4) the proven ability to think creatively and analytically so that he may progress into positions of greater responsibility in the future. To accomplish this purpose, the College is future oriented. To be of any lasting value, education for business must develop in its students the abilities to project their thinking and to shape the future.

During the first three years, students take work in written and oral communication, mathematics, statistics and quantitative analysis, social, behavioral and natural sciences and the humanities. Required "core" courses in accounting, administration, business law, economics, finance, management, marketing and personnel administration provide the fundamentals of business administration. Seven fields of specialization are available for selection by advanced Business Administration majors.

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

Major in Business Administration

The major in Business Administration is designed from a general management viewpoint. During the junior and senior years, students, in consultation with faculty advisers, will select approximately 12 credit hours in a special area of interest. These fields of specialization include: Finance, General Business, Management, Marketing, Personnel Administration, and Secretarial Training. Students preparing to teach commercial subjects in high school normally enroll in the College of Commerce dur-

ing their first two undergraduate years, then transfer into the College of Education at the beginning of their junior year.

Effective for all students entering the College of Commerce after September 1, 1964, and all students graduating after September 1, 1969.

COMMUNICATIONS

Engl.	229 100	English Composition I		3
Engl.	229 120	English Composition II		3
Spch.	281 106	Oral Communication Ia		3
		One of:		
	Engl. 229 200	English Composition III	(3)	2-3
	Engl. 229 416	Scientific Report Writing	(2)	
	Engl. 229 430	Narrative Writing I	(3)	
	Engl. 229 436	Narrative Writing II	(3)	
	Spch. 281 200	Oral Communication II	(2)	
	Spch. 281 608	Persuasion	(3)	
	Spch. 281 616	Group Discussion Methods	(3)	
	Spch. 281 618	Discussion and Conference Leadership	(3)	
Engl.	229 090	English Proficiency		0
				11-12

QUANTITATIVE

Math.	245 100	College Algebra	3
Stat.	285 320	Elements of Stat.	3
Math.	245 220	Anal. Geom. & Calc. I or	4 or
Math.	245 340	Intro. to Analytic Proc.	3
Stat.	285 321	Bus. & Econ. Statistics	3
			12-13

SOCIAL SCIENCES

P. Sci.	269 444	American Democ.	3 or
P. Sci.	269 220	American Government	3
Psych.	273 110	General Psychology	3
Soc.	277 220	Intro. to Soc.	3
		Geog., Hist., Pol. Sci., Psych., and/or Soc.	6
			15

NATURAL SCIENCES* 12

HUMANITIES 6

BUSINESS ADMINISTRATION AND ECONOMICS

B. A.	305 105	Elem. of Business Administration	2
B. A.	305 272	Introd. Accounting	5
B. A.	305 305	Managerial Accounting	3
Econ.	225 110	Economics I	3
Econ.	225 120	Economics II	3
B. A.	305 325	Business Law I	3
B. A.	305 326	Business Law II	3
B. A.	305 400	Administration	3
B. A.	305 405	Business Finance	3
B. A.	305 431	Personnel Admin.	3
B. A.	305 440	Marketing	3
B. A.	305 600	Business Policy	3
B. A.	305 602	Business and Society	3

Economics Electives (selected in consultation with faculty adviser) 6
Field of Specialization (see "Fields of Specialization" below) 12

OTHER

Phys. Educ. (two semesters) 0
Free Electives 10-12

Total credit hours required of all students 126

* Students must take at least one scientific laboratory. No distinction will be made between the Biological and Physical Sciences for purposes of satisfying this requirement.

Fields of Specialization

During the junior year, each student will select, in consultation with his faculty adviser, one Field of Specialization from the following:

FINANCE

Required

				Cr. Hrs.
B. A.	305	505	Investments	3
B. A.	305	615	Financial Mngt.	3

PLUS

Six Credit Hours Selected from the Following Course Work

B. A.	305	312	Insurance	3
B. A.	305	507	Financial Inst.	3
B. A.	305	617	Controllership	3
Econ.	225	410	Intermediate Macro.	3
Econ.	225	430	Money and Banking	3
Econ.	225	610	Public Finance	3
Econ.	225	681	International Trade	3

MARKETING

Required

				Cr. Hrs.
B. A.	305	343	Sales Communication	3
B. A.	305	540	Retailing or	
B. A.	305	542	Sales Management	3
B. A.	305	640	Marketing Analysis	3

PLUS

Three Credit Hours Selected from the Following Course Work

B. A.	305	540	Retailing or	
B. A.	305	542	Sales Management	3
Journ.	289	320	Prin. of Advertising	3
Psych.	273	505	Consumer Psychology	3

GENERAL BUSINESS

Required

Twelve credit hours to be selected from the following courses.

				Cr. Hrs.
B. A.	305	601	Advanced Mngt.	3
B. A.	305	610	Bus. Meas. & Forecast.	3
B. A.	305	631	Organ. Behav. & Admin.	3
Psych.	273	515	Personnel Psychology	3
B. A.	305	505	Investments	3
B. A.	305	615	Financial Mngt.	3
B. A.	305	540	Retailing or	
B. A.	305	542	Sales Management	3
B. A.	305	640	Marketing Analysis	3

MANAGEMENT

Required

				Cr. Hrs.
B. A.	305	601	Advanced Mngt.	3
B. A.	305	610	Bus. Meas. & Forecast	3

PLUS

Six Credit Hours Selected from the Following Course Work

B. A.	305	615	Financial Mngt.	3
B. A.	305	630	Industrial Relations	3
B. A.	305	631	Organ. Behav. & Admin.	3
Econ.	225	620	Labor Economics	3
Econ.	225	740	Managerial Economics	3
P. Sci.	269	610	Pub. Pol. Toward Bus.	3

PERSONNEL ADMINISTRATION

Required

				Cr. Hrs.
B. A.	305	631	Organ. Behav. & Admin.	3
Psych.	273	515	Personnel Psych.	3

PLUS

Six Credit Hours Selected from the Following Course Work

B. A.	305	630	Industrial Relations	3
Econ.	225	620	Labor Economics	3
Psych.	273	435	Social Psychology	3
Psych.	273	505	Consumer Psychology	3
Psych.	273	625	Indus. & Engg. Psych.	3
Soc.	277	602	Indus. Sociology	3

SECRETARIAL STUDIES

Required

				Cr. Hrs.
B. A.	305	236	Transcription I	3
B. A.	305	237	Office Prac. & Tech.	3
B. A.	305	238	Office Machines Lab.	0
B. A.	305	301	Office Management	3
B. A.	305	302	Data Processing	2

PLUS

Credit must be earned in the following course work. Such course work, however, will not be counted toward satisfying the "Field of Specialization" requirement of 12 credit hours.

B. A.	305	230	Typewriting I	3
B. A.	305	231	Typewriting II	3
B. A.	305	235	Shorthand I	4

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

Major in Accounting

Students majoring in Accounting have an opportunity to prepare for careers in public, industrial or governmental accounting. Satisfactory completion of the degree requirements qualifies the graduate to take the Certified Public Accounting examination. The College has an internship program for qualified seniors in Accounting which provides valuable practical experience with recognized public accounting firms.

Effective for all students entering the College of Commerce after September 1, 1964, and all students graduating after September 1, 1969.

COMMUNICATIONS

Engl.	229 100	English Composition I		3
Engl.	229 120	English Composition II		3
Spch.	281 106	Oral Communication Ia		3
		One of:		
	Engl. 229 200	English Composition III	(3)	2-3
	Engl. 229 416	Scientific Report Writing	(2)	
	Engl. 229 430	Narrative Writing I	(3)	
	Engl. 229 436	Narrative Writing II	(3)	
	Spch. 281 200	Oral Communication II	(2)	
	Spch. 281 608	Persuasion	(3)	
	Spch. 281 616	Group Discussion Methods	(3)	
	Spch. 281 618	Discussion and Conference Leadership	(3)	
Engl.	229 090	English Proficiency		0
				11 12

QUANTITATIVE

Math.	245 100	College Algebra	3
Stat.	285 320	Elements of Stat.	3
Math.	245 220	Anal. Geom. & Calc. I or	4 or
Math.	245 340	Intro. to Analytic Proc.	3
Stat.	285 321	Bus. & Econ. Statistics	3
			12-13

SOCIAL SCIENCES

P. Sci.	269 444	American Democ.	3 or
P. Sci.	269 220	American Government	3
Psych.	273 110	General Psychology	3
Soc.	277 220	Intro. to Soc.	3
		Geog., Hist., Pol. Sci. Psych., and/or Soc.	3
			12

NATURAL SCIENCES* 12

HUMANITIES 6

BUSINESS ADMINISTRATION AND ECONOMICS

B. A.	305 105	Elem. Business Admin.	2
B. A.	305 272	Introd. Accounting	5
Econ.	225 110	Economics I	3
Econ.	225 120	Economics II	3
B. A.	305 325	Business Law I	3
B. A.	305 326	Business Law II	3
B. A.	305 400	Administration	3
B. A.	305 405	Business Finance	3
B. A.	305 431	Personnel Admin.	3
B. A.	305 440	Marketing	3
B. A.	305 600	Business Policy	3
B. A.	305 602	Business and Society	3

Economics Electives (selected in consultation with faculty adviser): 6

ACCOUNTING

B. A.	305 371	Intermed. Accounting	3
B. A.	306 361	Cost Accounting	3
B. A.	305 461	Adv. Cost Acctg.	2
B. A.	305 472	Valuation Accounting	3
B. A.	305 481	Taxation I	3
		Accounting Electives (selected in consultation with faculty adviser)	6
			20

OTHER

Phys. Educ. (two semesters)	0
Free Electives	12-14
Total credit hours required of all students	130

* Students must take at least one scientific laboratory. No distinction will be made between the Biological and Physical Sciences for purposes of satisfying this requirement.

A Suggested Freshman Year Program for the Degree, BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

First Semester				Cr. Hrs.
Engl.	229	100	Engl. Comp. I	3
Math.	245	100	College Algebra	3
P. Sci.	269	220	American Government	3
			Nat. Sci. and/or Humanities	4-5
Ph. Ed.	261	011	Basic Phys. Educ.	0
B. A.	305	105	Elem. of Bus. Ad.	2
Total				15-16

Second Semester				Cr. Hrs.
Engl.	229	120	Engl. Comp. II	3
Spch.	281	106	Oral Comm. Ia	3
Psych.	273	110	General Psych. or	
Soc.	277	220	Intro. to Sociol.	3
			Nat. Sci. and/or Humanities	6-7
Ph. Ed.	261	011	Basic Phys. Educ.	0
Total				15-16

DUAL DEGREE IN BUSINESS ADMINISTRATION

The dual degree program allows a student to acquire the Bachelor of Science in Business Administration degree in addition to his non-business degree. Ordinarily, the program must be commenced during a student's junior year, or at the latest, during the first semester of his senior year. The program is not generally intended for students who have completed their non-business degree.

The following requirements are effective for all students entering the Dual Degree Program offered by the College of Commerce after September 1, 1964, and all students graduating after September 1, 1969. To qualify for the business degree, a student must take a minimum of 30 hours of course work not counted toward the first degree. The following list of courses must be completed, either as part of the student's non-business degree, or in addition to it:

				Cr. Hrs.
B. A.	305	272	Introd. Accounting	5
B. A.	305	305	Managerial Accounting	3
Econ.	225	110	Economics I	3
Econ.	225	120	Economics II	3
B. A.	305	325	Business Law I	3
B. A.	305	326	Business Law II	3
B. A.	305	400	Administration	3
B. A.	305	405	Business Finance	3
B. A.	305	431	Personnel Admin.	3
B. A.	305	440	Marketing	3
B. A.	305	600	Business Policy	3
B. A.	305	602	Business and Society	3

Business Electives, including at least one course offered by the Department of Economics 6

Total credit hours required 44

PRE-LAW

Law schools emphasize various objectives in pre-law study for the development of basic skills and insights. These objectives are: (1) the acquisition of skills in comprehension and expression; (2) understanding human institutions; and (3) the ability to think clearly, carefully and independently. The stated purpose of the undergraduate program in commerce is to achieve these objectives. A pre-law student enrolled in the College of Commerce not only achieves these important goals, but also obtains a broad business background that is desirable preparation for the study of law.

THE GRADUATE PROGRAM

The College of Commerce provides graduate training and research for qualified students that leads to either the Master of Science in Business Administration or the Master of Science in Accounting.

For admission to graduate study in *full standing*, the applicant must have been graduated from an institution whose requirements for the bachelor's degree are substantially equivalent to those of Kansas State University and must have an undergraduate average of B or better in the junior and senior years. The applicant who does not meet all the requirements for admission to full standing in the Graduate School may be admitted to *provisional standing* and will be advised of any deficiencies or other conditions to be met to attain full standing. The student ad-

mitted to provisional standing will be admitted to full standing upon completion of at least nine hours of work for graduate credit with a grade of B or better in three-fourths of such graduate work, and upon the removal of any course or subject-matter deficiencies which were specified at the time of his admission to provisional standing. Furthermore, the applicant must take the Admission Test for Graduate Study in Business (the ATGSB) administered by the Educational Testing Service. Requests for applications for the admission test and all questions concerning the test, including time and place at which it is given, should be addressed to the Educational Testing Service, Box 966, Princeton, New Jersey 08540. This test should be taken as far in advance of admission as possible. The applicant should notify the Educational Testing Service to report his test scores to the Director of Graduate Study, College of Commerce, Calvin Hall, Kansas State University, Manhattan, Kansas 66502.

Program Leading to the Degree, MASTER OF SCIENCE IN BUSINESS ADMINISTRATION

The program leading to the degree, Master of Science in Business Administration, is designed to provide broad education in business management. Limited specialization is possible through the use of elective courses. Admission is possible in either the fall or spring semester (or summer, effective June, 1969).

Admission Requirements: In addition to the general admission requirements set forth above, the student must have completed work in the following areas:

Area	*Hrs. Cr.*
Accounting	3
Economics	6
Business Law	3
(Two hours acceptable on transfer)	
Management	3
Marketing	3
Business Finance	3
Statistics	3
Math through Calculus*	..
	24

The Program of Study: Generally, each candidate must complete the following core courses, or their reasonable equivalent, and fulfill either Option A or Option B.

		Cr. Hrs.
305 800	Administrative Sciences	3
305 820	Decision Theory of the Firm	3
305 830	Legal and Social Environment of Business	3
305 840	Marketing Systems Analysis	3
305 850	Research Methods in Business	3
305 851	Business Operations Analysis	3
305 860	Management Information and Control Systems I	3
305 861	Management Information and Control Systems II	3
	Total required core	24
Option A:		
	Required core	24
	Elective area (see below)	6
	Master's report	2
	Hours required for graduation	32
Option B:		
	Required core	24
	Master's thesis	6
	Hours required for graduation	30

Electives: Elective areas include, but are not necessarily limited to, the following: Computer Science, Economics, Finance, Management, Marketing, Operations Research, Political Science, Psychology, Sociology, Statistics.

* Calculus is strongly recommended but not required for admission for academic year 1968-69.

Program Leading to the Degree, MASTER OF SCIENCE IN ACCOUNTING

The program leading to the degree, Master of Science in Accounting, is designed to prepare graduate students for careers in public, industrial or governmental accounting. Admission is possible in either the fall or spring semester (or summer, effective June, 1969).

Admission Requirements: In addition to the general admission requirements set forth above, the student must have completed work in the following areas:

Area	*Hrs. Cr.*
Accounting	14
Economics	9
Business Law	5
Management	3
Business Finance	3
Marketing	3
Statistics	3
Math*	..
	40

* Math through Calculus is strongly recommended but not required.

The Program of Study: Generally, each candidate must complete one of the following options.

OPTION A

Course		*Cr. Hrs.*
305 670	CPA Problems	3
305 671	CPA Review	2
305 672	CPA Law	2
305 681	Auditing II	3
305 800	Administrative Sciences	3
305 820	Decision Theory of the Firm	3
305 830	Legal and Social Environment of Business	3
305 850	Research Methods in Business	3
305 861	Management Information and Control Systems II	3
305 870	Accounting Theory I	3
305 871	Accounting Theory II	3
305 899	Master's Report	2
	Hours required for graduation	33

OPTION B

305 800	Administrative Sciences	3
305 820	Decision Theory of the Firm	3
305 830	Legal and Social Environment of Business	3
305 840	Marketing Systems Analysis	3
305 850	Research Methods in Business	3
305 851	Business Operations Analysis	3
305 860	Management Information and Control Systems I (or elective in finance)	3
305 861	Management Information and Control Systems II	3
305 870	Accounting Theory I	3
305 871	Accounting Theory II	3
305 899	Master's Report	2
	Hours required for graduation	32

COURSES IN BUSINESS ADMINISTRATION

FOR UNDERGRADUATE CREDIT

305 105. Elements of Business Administration. (2) I, II. An introductory study of business administration from a managerial viewpoint. Topics include: The management process; interrelationship of functional areas of a business; and exposure to principles of business organization and operation. Required of freshmen and sophomores once during the first year of enrollment in the College of Commerce, but not open to students with junior or senior standing.

305 201. Fundamentals of Business for Professional People. (2) I. The course covers business topics selected to acquaint students in professional curriculums with the business problems involved in establishing and maintaining a professional practice; topics include accounting, insurance, law, investments, and finance. Not open to students in College of Commerce.

305 210. Personal Finance. (2) I, II. Finance from the viewpoint of the individual; principles and practices of credit buying, borrowing, saving and investing; purchase of government bonds, insurance, real estate, and annuities; problems of taxation and wills. Not open to students in College of Commerce. Pr.: Sophomore standing.

305 230. Typewriting I. (3) I, II, S. The technique of touch typewriting, care of the machine, and skill in operation. Pr.: Ability to type 35 words per minute.

305 231. Typewriting II. (3) I, II. Cont. of Typewriting I. Pr.: B. A. 230.

305 235. Shorthand I. (4) I, II, S. Fundamentals of Gregg Shorthand. Meets five hours each week. Pr.: B. A. 231.

305 236. Transcription I. (3) II. Advanced shorthand with speeds of 100 to 120 or higher. Setting up of business letters in various styles—gaining of speed in transcription of letters and manuscripts. Pr.: B. A. 235.

305 237. Office Practice and Technique. (3) I. Training for the executive secretary. The course work covers dictation and transcription, secretarial functions and responsibilities, and the use of office machines. Pr.: B. A. 236 and conc. enrollment in B. A. 238.

305 238. Office Machines Laboratory. (0) I, II. Instruction and practice covering the various calculators, ten-key adding machines, voice writers and duplicators. One hour a week.

305 273. Principles of Accounting. (3) I, II, S. Principles of accounting; use of accounting records and statements for individual and corporate business organizations. Not open to students in College of Commerce. Pr.: Sophomore standing.

305 301. Office Management. (3) I, II. An examination of the theory and practice of office management. The scope of the course is defined by the five functions of the office manager—organizing, staffing, directing, planning, and controlling.

305 302. Data Processing. (2) II. The application of data processing and punched card machines and systems to the operation of a business enterprise, including capabilities, limitations, system design, and operation. Pr.: Math. 100 or 110.

305 305. Managerial Accounting. (3) I, II, S. Development and use of accounting information as an instrument of management control. Coverage includes analysis of financial statements, cost accounting applications, budgeting, and accounting reports to management. Pr.: B. A. 272 or equiv.

305 312. Insurance. (3) I, S. A study of life, property, casualty, and health insurance from the purchaser's point of view. Pr.: Econ. 110.

305 325. Business Law I. (3) I, II, S. A study of law as it relates to business. Coverage includes contracts, agency and partnerships. Pr.: Sophomore standing.

305 326. Business Law II. (3) I, II, S. Cont. of Business Law I. Coverage includes corporations, property—real and personal, sales and commercial paper. Pr.: B. A. 325.

305 343. Sales Communication. (3) I. Intensive investigation of the art of persuasive sales communication, with emphasis on selection, organization and effective oral presentation of marketing, sales and promotional information. Pr.: Sophomore standing or consent of instructor.

305 350. Small Business Operation. (3) II. Opportunities in business ownership, principles governing the starting of a small enterprise: importance, status, problems, and management of small business. Pr.: Econ. 110. Not open to students in College of Commerce.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

305 400. Administration. (3) I, II, S. Fundamental processes in managing the going concerns. Provides a basic understanding of administrative problems through study of organization theory, quantitative, and behavioral aspects of decision making. Pr.: Junior standing.

305 405. Business Finance. (3) I, II, S. Emphasis on analyzing the timing, risk and return of the different forms of financing. Pr.: Econ. 120 or 430 and B. A. 305 or 371; junior standing.

305 431. Personnel Administration. (3) I, II, S. Development and use of management concepts and principles as they apply to the management of people. Study of formal and informal organizations and communications as they affect work performance. Pr.: Junior standing.

305 440. Marketing. (3) I, II, S. A general survey of marketing from a social-economic point of view; a study of the institutional organization of the market and the functioning of marketing agencies in the distribution of goods. Pr.: Econ. 110 and junior standing.

305 505. Investments. (3) I. A study of investment institutions, and principles and practices from the individual viewpoint. Corporate, civil, foreign, and real estate investment are compared as to risk, return, and intrinsic value. Pr.: B. A. 405.

305 507. Financial Institutions. (3) II. The role of financial intermediaries in the flow of funds; emphasis on the financial management concepts that underlie these institutions and their impact on business and economic growth. Pr.: B. A. 405.

305 540. Retailing. (3) I, II, S. An introduction to retailing from the management point of view; study of retail policies and organization; the operation of the buying and selling functions, merchandise control, store systems, personnel management, retail accounting, and expense control. Pr.: B. A. 440.

305 542. Sales Management. (3) II. From the point of view of the manufacturer or wholesaler, a study of management problems relating to sales—including sales programs, product and distribution policies, price policy, management of sales force, sales promotion, and market research. Pr.: B. A. 440.

FOR UNDERGRADUATE AND GRADUATE CREDIT

305 600. Business Policy. (3) I, II, S. Integration of the subject matter of required courses in business and economics through study of the problems of policy formulation and administration. Cases are used as the basis of class discussion and written reports. Business simulation is used as an additional pedagogical technique. Pr.: Open only to graduating seniors and graduate students; B. A. 400, 405, 431, and 440.

305 601. Advanced Management. (3) II. Emphasis on decision-making methodology, models and applications; the integrative nature of management systems and the decision-making process, structure, and appraisal. Pr.: B. A. 400.

305 602. Business and Society. (3) I, II, S. The impact of changes in the non-market environment on business; the relationship of business to social, economic and political forces. Pr.: Senior or graduate standing plus nine hours of credit in the social sciences.

305 610. Business Measurements and Forecasting. (3) I. Function and methods of analysis of business data, with emphasis on the use of data for executive decision in analyzing planning and control in the operations of a business. Topics include tables, charts, time series analysis, index numbers, current economic indicators, forecasting techniques, quality control, and sampling applications. Pr.: Stat. 320 or consent of instructor.

305 615. Financial Management. (3) I. Analysis of problems in advanced financial planning and control. Pr.: B. A. 405.

305 617. Controllership. (3) I. Emphasis on control of operation through cost analysis, internal and external reporting, and income determination concepts. Pr.: B. A. 305, or 361 and 371.

305 630. Industrial Relations. (3) II. Study of strategies and procedures in industrial relations including prenegotiations and negotiations, griev-

ance procedure, arbitration, labor law, conflict resolutions, behavioral aspects of union-management relations and current issues. Pr.: Junior standing.

305 631. Organizational Behavior and Administration. (3) II. An interdisciplinary study of organizational factors within the business firm; psychological, social-psychological, and sociological variables crucial in understanding and predicting behavior in individuals and groups; emphasis on empirical research. Pr.: B. A. 400 or 431 or consent of instructor.

305 640. Marketing Analysis. (3) I. Designed to assist the students in developing their thinking about the nature of research in the field of marketing; to determine when research should be used to aid decision making; to acquaint the students with various research concepts, methods, and techniques; and to develop their ability to evaluate, use, and present research findings. Pr.: B. A. 440.

FOR GRADUATE CREDIT

305 800. Administrative Sciences. (3) I. The development of the behavioral bases of individual and group functioning in business, governmental, educational and other organizations. Pr.: B. A. 400 and 431 or consent of instructor.

305 820. Decision Theory of the Firm. (3) I, S. An integration of economic theory and operations research, with business decisions and application of these tools to management problems. Pr.: Econ. 120, Stat. 320, and B. A. 305.

305 830. Legal and Social Environment of Business. (3) II, S. Problems affecting business, government and society are used to develop insight into the existence of business problems calling for judgments involving human and social values. Pr.: Consent of instructor.

305 840. Marketing Systems Analysis. (3) II. A detailed analysis of the marketing operation of selected regional and national business firms. Analysis techniques will be stressed in providing deeper insight into present-day marketing systems. Pr.: B. A. 440 and 640 or equiv.

305 841. Seminar in Marketing. (3) II. Study of current literature, marketing theory, and intensive investigation of various problem areas. Pr.: B. A. 330 or consent of instructor.

305 850. Research Methods in Business. (3) I. Statistical methods of analysis specifically applicable to graduate students in business. Experimental design, data collection and methods of analysis are covered. Pr.: Stat. 320 and B. A. 400.

305 851. Business Operations Analysis. (3) II. The use of quantitative decision models in business decisions; includes linear and dynamic programming, queuing, inventory control, simulation and multi-strategy game theory. Pr.: One course in calculus and one in EDP.

305 860. Management Information and Controls I. (3) I. The reliability of accounting data for business decisions and the relevance of such data to particular decisions are evaluated within the framework of changing economic conditions. Pr.: Econ. 120 and B. A. 305.

305 861. Management Information and Controls II. (3) II. The data necessary to judge economic flexibility and risk of investment proposals, cost of capital and capital structure are evaluated under static and dynamic assumption regarding money and capital markets. Pr.: B. A. 405.

305 998. Research in Business Administration. Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken.

COURSES IN ACCOUNTING

FOR UNDERGRADUATE CREDIT

305 272. Introductory Accounting. (5) I, II, S. The fundamentals of accounting for business administration and accounting majors. Pr.: Sophomore standing.

305 361. Cost Accounting. (3) I, II, S. Allocation of production costs to determine unit costs of goods manufactured and sold, and the utilization of such data by management. Pr.: B. A. 170 or 272.

305 371. Intermediate Accounting. (3) I, II, S. Application of accounting principles to corporations; working papers, statement analysis, and basic accounting theory. Pr.: B. A. 272.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

305 461. Advanced Cost Accounting. (2) I, II. Budgetary control with standard costs; cost and profit analyses for decision-making purposes. Pr.: B. A. 305 or 361.

305 471. Advanced Accounting. (3) I, II. Accounting for partnerships, installment sales, consignments, consolidated statements, and other special topics. Pr.: B. A. 371.

305 472. Valuation Accounting. (3) I, II, S. Theory and application of accounting principles to the valuations of balance sheet accounts. Pr.: B. A. 371.

305 481. Taxation I. (3) I, II, S. Fundamental concepts of income determination in federal and state income tax regulations; examination of the impact of tax regulations on business and personal financial planning and decision making. Pr.: Junior standing.

305 482. Taxation II. (3) II. Intensive examination of specific problems encountered in federal and state income tax regulations, with emphasis on research and preparation for the Certified Public Accounting examination. Designed for those anticipating careers in accountancy. Pr.: B. A. 481.

305 575. Accounting Internship. (3) I. Provides six weeks of practical diversified public accounting experience for accounting majors. The course objective is a broader educational experience for participating students. Pr.: B. A. 471, 480, 680, and consent of instructor.

FOR UNDERGRADUATE AND GRADUATE CREDIT

305 670. C. P. A. Problems. (3) I. A study of problems in various C. P. A. examinations. Pr.: B. A. 471 and consent of instructor.

305 671. C. P. A. Review. (3) II. Study of theory of accounts and commercial law as given in C. P. A. examinations and review of current literature. Pr.: B. A. 471 and consent of instructor.

305 672. C. P. A. Law Review. (2) II. A review of the law required to become a C. P. A. All applicable subjects will be covered. Pr.: B. A. 325 and 326 or their equiv.

305 680. Auditing I. (3) I, II. Theory and procedure used in simple balance sheet audits. A short audit case will be used. Pr.: B. A. 472.

305 681. Auditing II. (3) II. Theory and procedure used in more complex balance sheet and detailed audits; a study of auditing questions as given in C. P. A. examinations, and review of current literature. Pr.: B. A. 680 and consent of instructor.

305 799. Problems in Accounting. Credit arranged. I, II, S. Pr.: Background of courses needed for the problem undertaken.

FOR GRADUATE CREDIT

305 870. Accounting Theory I. (3) I. An intensive treatment of problems related to corporation accounting and reporting, with emphasis on income determination and balance sheet valuation. Pr.: Consent of instructor.

305 871. Accounting Theory II. (3) II. A critical examination of accounting literature, with emphasis upon accounting theory and intensive study of current issues in accounting theory. Pr.: Consent of instructor.

305 999. Research in Accounting. Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken.

The College of Education

JAMES D. MCCOMAS,* *Dean*

Professors Agan, DeMand,* Littrell,* McComas,* Moggie,* Moore,* O'Fallon,* Olson* and Trent;* Associate Professors Bradley,* Hanna,* Howard, Laughery, McAnarney,* Peccolo,* Prawl* and Trennepohl;* Assistant Professors Albracht,* Bartel,* Caine, Coppedge,* Craig, Donald, House,* Kaiser,* Loeb,* Owens,* Price,* Schell,* Smethers and Teague;* Instructors Bloomquist, Driss, Hudson, Nowatzki, Replogle, Sullivan and Werner; Emeritus: Professors Baker,* Green,* Rust* and Strickland;* Associate Professors Baxter* and Hall**

The College of Education is charged with over-all professional leadership in the area of teacher education at Kansas State University. Specifically, the work of the College gives primary consideration to: (1) preparing teachers for elementary schools and secondary schools; (2) preparing elementary school principals, secondary school principals and school superintendents; (3) preparing guidance counselors and directors of guidance programs; (4) providing preparation in the selected areas of special education of exceptional children; (5) providing Ph. D. programs in education; (6) providing consultative services to the public schools; and (7) cooperating in placement services. A central feature of the Teacher Education Program involves cooperation between the College of Education and other university colleges and departments.

THE UNDERGRADUATE PROGRAM

The curriculum in elementary education or secondary education at Kansas State University is a four-year program. The program in either curriculum includes the necessary general education, academic major, and professional education to meet the certification requirements established by the State Board of Education.

Students planning to transfer to Kansas State University after one or two years at a junior college are encouraged to plan their degree programs in a four-year sequence. The faculty of the College of Education is available to advise any student on his selection of courses which will meet Kansas State University degree requirements. These students transferring to KSU as juniors will enroll in the College of Education and may complete requirements for admission to teacher education during their first semester of residence.

The Kansas State University teacher education program is accredited by three accrediting agencies: Kansas State Board of Education, North Central Association of Colleges and Secondary Schools, National Council for Accreditation of Teacher Education.

CURRICULUM IN ELEMENTARY EDUCATION

Bachelor of Science in Elementary Education

Hours required for graduation, men and women, 126

The student preparing to teach in the elementary school is enrolled in a pre-elementary education curriculum in the College of Arts and Sciences for the freshman and sophomore years. Freshmen and sophomores are advised by a College of Education adviser in the dean's office of the College of Arts and Sciences. The adviser is available for the purpose of advising and counseling students concerning the courses essential for entry into the Teacher Education program. All sophomores *must* make application for admission to Teacher Education. If the application is approved, the student is admitted to the College of Education and is assigned an adviser for the junior and senior years.

I. GENERAL EDUCATION REQUIREMENTS:

A. Communications: English Composition I and II, six (6) hours; Oral Communication, two (2) hours; English Proficiency.

B. Social Sciences (must include General Psychology, 3 hours;

additional 9 hours selected from economics, geography, political science, history, sociology, anthropology): Twelve (12) hours.

C. Literature or Language: Five (5) hours.

D. Natural Science: Sixteen (16) hours including eight (8) hours of biological science and eight (8) hours of physical science. Must include one laboratory course. No mathematics may be included.

E. Mathematics: Three (3) hours.

F. Literature for Children: Three (3) hours.

G. Personal and Community Health: Three (3) hours.

H. Physical Education: Two semesters required.

I. Electives.

II. PROFESSIONAL EDUCATION REQUIREMENTS:

A. Educational Psychology I and II: Six (6) hours.

B.

	Hours
Principles of Elementary Education	3
Science for Elementary Schools	3
Mathematics for Elementary Schools	3
Language Arts for Elementary Schools	3
Social Studies for Elementary Schools	3
Elementary School Reading	3
Educational Sociology	3
	21

C. Additional Requirements: Six (6) hours.

	Hours
Music for Elementary Teachers	3
Art for Elementary Schools	3

D. Teaching Participation in Elementary Schools: Eight (8) hours.

III. OTHER REQUIREMENTS:

A. Fifteen (15) hours selected from the field of concentration. Courses excluding those taken to meet General Education Requirements are to be taken from one of the following fields:

Biological Sciences	English and Speech
Home Economics	Modern Foreign Language
Music and Art	Physical Science and Mathematics
Social Science	

B. Remaining hours selected in General Education.

ADMISSION TO TEACHER EDUCATION:

All sophomores intending to qualify to teach in the elementary schools must have an approved application for admission to Teacher Education on file in Room 111, Holton Hall. Admission to Teacher Education is a prerequisite for enrollment in Educational Psychology II and the Student Teaching Block.

A. Dates:

1. Students must apply before **March 1** of the sophomore year but not later than the semester in which they take Educational Psychology I.

2. Transfer students must apply by November 1 to be admitted for the second semester.

B. Academic Standards Committee:

The Academic Standards Committee of the College of Education must approve the application for admission to Teacher Education before the student may enroll in Educational Psychology II.

C. Requirements for Admission to Teacher Education:

1. Over-all grade-point average of 2.2 in all resident work attempted at Kansas State University (minimum 12 hours).

2. 2.0 or better in either English Composition I or II.
3. 2.0 or better in one of the following speech courses: 105, 106, 135, 200, 472, or 526.
4. Recommendation by the pre-elementary adviser.
5. Recommendation by the Student Health Center.
6. Clearance by the Dean of Students.

ELEMENTARY EDUCATION BLOCK:

The Elementary Education Block is used to denote that semester of the senior year in which student teaching will be done. During this semester the student is enrolled in:

Elementary School Reading
Educational Sociology
Teaching Participation in the Elementary School

ADMISSION TO STUDENT TEACHING

An application for student teaching is made through the student's adviser. The form must be returned to the adviser prior to March 1 of the year preceding student teaching. Prerequisites for elementary student teaching are:

1. Admission to Teacher Education.
2. Educational Psychology II, Educ. 302.
3. English Proficiency, Engl. 090.
4. Clearance by Student Health.
5. Clearance by Dean of Students.
6. Recommendation by the adviser.
7. Over-all grade-point average of 2.2 in all resident work attempted at Kansas State University (minimum 12 hours).
8. Completion of September Observation.
9. Completion of a minimum of 90 semester hours.

CURRICULUM IN SECONDARY EDUCATION

Bachelor of Science

Hours required for graduation, men and women, 126

The student preparing to teach in the secondary school is enrolled in a pre-education curriculum in the College of Arts and Sciences* or the College of Commerce for the freshman and sophomore years. Dual advisement is provided during the entire four years for all prospective secondary teachers. For the first two years each student is assigned to the pre-education adviser in the College of Arts and Sciences or to the pre-education adviser in the College of Commerce. In addition to the pre-education adviser, each student is assigned to an adviser in his major who is responsible for the selection of courses in his major and teaching field.

All sophomores must make application for admission to teacher education. If this application is approved, the student is admitted to the College of Education. For the junior and senior years the student continues to be advised by the same adviser in his major area. At the time of his admission to the College of Education the student is assigned an adviser in the College of Education who will replace the pre-education adviser.

There are 22 subject fields (See page 247) applicable to teaching at the secondary level.

* The pre-education adviser in the College of Arts and Sciences is a member of the College of Education faculty.

I. GENERAL EDUCATION REQUIREMENTS:

A. Communications: English Composition I and II, six (6) hours; Oral Communication, two (2) hours; English Proficiency.

B. Social Sciences (must include general psychology, 3 hours; additional 9 hours selected from economics, geography, political science, history, sociology, anthropology): Twelve (12) hours.

C. Literature or Language, five (5) hours.

D. Natural Science: Sixteen (16) hours (must include one laboratory course); must include at least one course in biological science and one course in physical science; may not include more than four (4) hours of mathematics.

E. Electives.

II. PROFESSIONAL EDUCATION REQUIREMENTS:

A. Educational Psychology I and II: Six (6) hours.

B. Principles of Secondary Education: Three (3) hours; Educational Sociology, three (3) hours.

C. Methods of Teaching in the Secondary Schools, two or three (2 or 3) hours, and Teaching Participation in the Secondary School, six (6) hours.

ADMISSION TO TEACHER EDUCATION

All sophomores intending to qualify to teach in the secondary schools must have an approved application for admission to Teacher Education on file in Room 111, Holton Hall. Admission to Teacher Education is a prerequisite for enrollment in Educational Psychology II and the Student Teaching Block. These requirements for admission to Teacher Education are applicable to all students whether enrolled in a curriculum in the College of Education or in curriculums of other colleges in the University.

A. Dates:

1. Students must apply before **March 1** of the sophomore year but not later than the semester in which they take Educational Psychology I.

2. Transfer students must apply by November 1 to be admitted for the second semester.

B. Academic Standards Committee:

The Academic Standards Committee of the College of Education must approve the application for admission to Teacher Education before the student may enroll in Educational Psychology II.

C. Requirements for Admission to Teacher Education:

1. Over-all grade-point average of 2.2 in all resident work attempted at Kansas State University (minimum 12 hours).

2. Grade-point average of 2.5 in all resident work attempted at Kansas State University in the major teaching field (as defined by the Certificate Handbook of the State of Kansas).

3. 2.0 or better in English Composition I or II.

4. 2.0 or better in one of the following speech courses: 105, 106, 135, 200, 472 or 526.

5. Recommendation by both major and pre-education advisers.

6. Recommendation by Student Health Center.

7. Clearance by the Dean of Students.

SECONDARY EDUCATION BLOCK:

The Secondary Education Block is used to denote that semester of the

year in which student teaching will be done. During this semester the student is enrolled in:

Principles of Secondary Education
Educational Sociology
Methods of Teaching in the Secondary Schools
Teaching Participation in the Secondary School

ADMISSION TO STUDENT TEACHING

An application for student teaching on the secondary level is made through the student's College of Education adviser. The form must be returned to the adviser prior to March 1 of the year preceding student teaching. Prerequisites for secondary student teaching are:

1. Admission to Teacher Education.
2. Educational Psychology II, Educ. 302.
3. English Proficiency, Engl. 090.
4. Clearance by Student Health.
5. Clearance by Dean of Students.
6. Recommendations from the major adviser and education adviser.
7. Over-all grade-point average of 2.2 in all resident work attempted at Kansas State University (minimum 12 hours).
8. A grade-point average of 2.5 in all resident work completed in the teaching field.
9. Completion of September Observation.
10. Completion of a minimum of 90 semester hours.

SECONDARY EDUCATION MAJOR FIELDS

AGRICULTURAL EDUCATION: Students planning to be Agricultural Education Majors will be enrolled in and receive their degree from the College of Agriculture. See page 57.

ART EDUCATION: Art 100, 190, 195, 196,* 200, 205, 210, 222, 224, 235,* 246,* 265,* 270,* 290, 496, 600, 230,* 787; an additional six hours in an area indicated.*

BIOLOGICAL SCIENCE: Biol. 205 and 210 or 198 and 201, 220, 425, 673, or 659, 15 hours of biological science electives; Chem. 110; Entom. 211; Geol. 100.

BUSINESS EDUCATION: B. A. 105, 230, 231, 235 and 236 or six hours of marketing or six hours of finance, 237, 238, 272, 301, 302, 305, 323, 326, 405, 440; Econ. 110, 120, 430; Math. 100; P. Sci. 220; Soc. 220.

CHEMISTRY: Biol. 205 and 210 or 198 and 201; Chem. 210, 230, 271, 350, 351, 585, five hours of chemistry electives; Math. 220, 221, 222; Phys. 310, 311.

EARTH SCIENCE: Biol. 205 and 210 or 198 and 201; Chem. 210, 230, 250; Geog. 207; Geol. 100, 110, 420, 430, 460; Math. 100, 131, 135, 150; Phys. 211, 212.

ECONOMICS: Econ. 110, 120, 410, 710; Math. 100; B. A. 273; P. Sci. 220; Soc. 211; Stat. 320; six hours of history; three hours of social science electives, 12 hours of courses numbered 400 or above in the department of economics selected with the advice of the student's adviser.

ENGLISH: Three of the following four: Engl. 380, 381, 385 or 386; 350 or 651; 406, 451, 475, 599; nine hours in literature electives.

GEOGRAPHY: Geog. 115, 150, 151, 215, 216, 325, 12 hours of courses numbered 500 and above in geography.

HOME ECONOMICS EDUCATION: Students planning to be Home Economics Education Majors will be enrolled in and receive their degree from the College of Home Economics. See page 312.

HISTORY: Hist. 111, 112, six hours (100-399), 600; P. Sci. 220 and three hours elective; three hours elective each in economics, sociology, and geography; 15 hours of courses numbered 400 and above distributed

in three of the five fields of (a) Ancient, Medieval and Early Modern Europe, (b) Modern Europe including Britain, (c) Non-Western history, (d) the Americas including Latin America, (e) History of Science, History of Technology, Military History.

JOURNALISM: Engl. 270; Phil. 150; P. Sci. 220; Journ. 050, 235, 306, 310, 316, 330, 335, 358, 652; three hours in American Literature, three hours in American History, an advanced course in English Composition, and three hours journalism electives.

MATHEMATICS: Math. 220, 221, 222, 240; Stat. 320 or 410; and 18 hours of mathematics selected from Math. 417, 420, 470, 475, 512, 513, 573, 691. It is recommended that a course in physics be included as a part of General Education.

MODERN LANGUAGES: Thirty hours in one language. A second teaching field is recommended.

MUSIC EDUCATION: Students planning to be Music Education Majors will be enrolled in and receive their degree from the College of Arts and Sciences. See page 187.

PHYSICAL EDUCATION: Students planning to be Physical Education Majors will be enrolled in and receive their degree from the College of Arts and Sciences. See page 193.

PHYSICAL SCIENCE: Biol. 205 and 210 or 198 and 201; Chem. 210, 230, 250, 350, 351; Geol. 100, 430; Math. 220, 221; Phys. 310 and 311 or 211 and 212 and 407, 400; three hours of physics or mathematics electives.

PHYSICS: Chem. 210, 230, 250; Math. 220, 221, 222, 240; Phys. 310, 311, 400, 432, 472, 502, 503, 740.

POLITICAL SCIENCE: Hist. 111, 112, 251, 252; P. Sci. 220 (freshman, sophomore), 444 (junior, senior); three hours each in economics and sociology, plus 21 hours in political science.

PSYCHOLOGY: Math. 100, Psych. 110, 420, 435, 440; nine hours psychology electives (excluding Educational Psychology I and Educational Psychology II); Stat. 320 or 410; completion of a second teaching field.

SOCIOLOGY: Soc. 211, 410, 620, 710; two of the following courses: Soc. 430, 440, 450, 460. Nine hours of electives in sociology are to be taken, all at or above the 500 course level. Also, three hours in mathematics, logic or philosophy; three hours in economics; three hours in geography; three hours in political science; six hours in history.

SPEECH: Thirty hours of speech courses, including Spch. 145, 210, 360, 410 or 652.

THE GRADUATE PROGRAM

Admission to the Graduate School is required of all students enrolling in graduate courses at Kansas State University. Further information concerning graduate work is found in the Graduate School section, page 35.

Graduate study is offered in the College of Education in the fields of adult education, agricultural education, educational administration, guidance and counseling, home economics education, secondary education, elementary education, and curriculum and supervision. In addition, the College, through the Graduate School, offers the Ph. D. in Education with major emphasis in Curriculum and Instruction, Adult and Vocational Education, Administration, Guidance and Counseling and Student Development. Additional cooperative options are available with emphasis in the various disciplines within the University.

Application for initial admission to Graduate Education shall be concurrent with application for admission to the Graduate School. Application procedures, periodic review of qualifications, and recommendations to the Dean of the College of Education will be made by the Graduate Selection and Admissions Committee of the College of Education.

The applicant shall have the undergraduate preparation necessary to satisfy the requirements of the graduate program he expects to pursue.

Procedures for Initial Admission to Graduate Education

Applicants shall make available the following documents required for initial admission:

1. Two (2) copies completed Graduate School Application form
2. Two (2) copies of official transcript(s)
3. Three (3) statements of qualifications for graduate study
4. One (1) copy of statement of academic objectives

The qualifications of each College of Education graduate student will be reviewed at the end of the enrollment period in which at least the initial nine (9) hours of graduate work are completed at Kansas State University. The review is for the purpose of determining eligibility to continue in Graduate Education. All students applying for admission to Graduate Education must complete the initial application requirements at least thirty (30) days prior to the term they expect to next enroll.

Procedures for Continuance in Graduate Education

Applicants shall make available the following documents:

1. Completed form of Request for Continuance in Graduate Education
2. Evidence of Completion of Graduate English Proficiency Examination
3. Evidence of completion of aptitude test of Graduate Record Examination
4. Two (2) Graduate Rating Scales from Kansas City University professors, one of which must be a College of Education professor
5. Recommendation by major professor
6. Approved Program of Studies
7. Copies of official transcripts of graduate work completed at other institutions if work is to be applied toward completion of degree

Transfer graduate students must meet the same basic requirements outlined above.

All graduate students desiring admission to Graduate Education or requesting review of status must submit the required materials at least thirty (30) days preceding the term they expect to next enroll.

Detailed procedures for applying for the Ph. D. in Education may be secured by writing to the Dean of the College of Education.

COURSES IN EDUCATION

FOR UNDERGRADUATE CREDIT

405 202. Educational Psychology I. (3) I, II, S. Physical, intellectual, emotional, social, and personality development from conception to adulthood; understanding of these phases of development and their importance for education essential as background for those desiring to enter the teaching profession. Pr.: Psych. 110 and sophomore standing.

405 300. Principles of Elementary Education. (3) I, II, S. An over-all view of the elementary school: organization, management, purpose, curriculum trends, and pupil characteristics. Pr.: Junior standing.

405 302. Educational Psychology II. (3) I, II, S. The learning process, with special emphasis on abilities and teaching-learning processes, and measurement and evaluation of school learning. Pr.: Educ. 202, junior standing, and admission to Teacher Education.

405 325. Safety. (3) I, II, S. Fundamentals of accident analysis and prevention, maintenance, human factors, safety standards, treatment of special hazards. Three hours rec. a week. Pr.: Junior standing.

405 326. Problem in Safety Education. (1) Pr.: Consent of instructor.

405 328. Driver and Traffic Safety Education I. (3) I, S. Critical analysis of traffic accidents, attitude factors, essential knowledge of automobile operation, traffic laws and regulations. Includes laboratory experience in the use of psychophysical testing and in the teaching of

driving skills. Two hours rec. and three hours lab. a week. Pr.: Psych. 110, Educ. 202, 325, a valid driver's license, and good driving record.

405 329. Problem in Driver Education. (1) Pr.: Consent of instructor.

405 330. Driver and Traffic Safety Education II. (3) II, S. This course deals with professional preparation for secondary school instruction in this field. Primary areas of study include classroom and in-car teaching techniques. A study of organization and administration of driver education; emphasis on competence in transferring knowledge and skills, as well as inspiring satisfactory attitude in students. Two hours rec. and three hours lab. a week. Pr.: Educ. 328, 21 years of age, and senior standing.

405 417. Teaching Participation in Elementary Music. (3) I, II, S. Observation in teaching under the direction of selected teachers in elementary music school programs. Pr.: Music 412 and admission to Student Teaching.

405 418. Teaching Participation in Secondary Music. (3) I, II, S. Observation in teaching under the direction of selected music teachers in junior and senior high schools. Pr.: Music 413 and admission to Student Teaching.

405 450. Principles of Secondary Education. (3) I, II, S. Junior and senior high school organization and objectives, their genesis and curriculum trends, characteristics of student population, and Kansas legal status and practice. Pr.: Educ. 302.

405 451. Principles of Secondary Education. (3) I, II (Secondary Education Block). For description see Educ. 450.

405 461. School Music I. (3) I, II, S. (See Music 412.)

405 462. School Music II. (3) I, II, S. (See Music 413.)

405 470. Science for Elementary Schools. (3) I, II, S. The relationships among nature, environment, and elementary science in their role in childhood education; resources and activities suitable to the elementary school. Pr.: Admission to Teacher Education or consent of instructor.

405 471. Language Arts for Elementary Schools. (3) I, II, S. Modern trends in the teaching of reading, oral language, composition, and spelling. Pr.: Admission to Teacher Education or consent of instructor.

405 472. Social Studies for Elementary Schools. (3) I, II, S. Course of study content as a basis for consideration for modern classroom procedure; objectives and problems in the teaching of social studies. Pr.: Admission to Teacher Education or consent of instructor.

405 473. Mathematics for Elementary Schools. (3) I, II, S. The teaching of mathematics in the elementary schools, including the nature of mathematical processes, curriculum, methods of instruction, instructional materials, and the evaluation of outcomes. Pr.: Admission to Teacher Education or consent of instructor.

405 474. Elementary School Reading. (3) I, II, S. An introductory course in the content, methods, and materials of the total reading program in the elementary school. Pr.: Admission to Teacher Education or consent of instructor.

405 475. Teaching Participation in the Elementary School. Credit arranged. I, II. Observation and teaching participation under the direction of selected elementary teachers. Pr.: Educ. 300, 470, 471, 472, 473, and admission to Student Teaching.

405 476. Methods of Teaching in the Secondary School. (2 or 3) I, II. General principles of teaching applied to secondary school instruction; motivation, organization of subject matter; lesson planning; evaluation and reporting; challenging the levels of ability; organization and management of the classroom; attention given to both methodology and materials of the secondary schools. Pr.: Admission to Student Teaching.

405 477. Teaching Participation in the Secondary School. Credit arranged. I, II. Observation and teaching participation under direction of selected teachers in junior and senior high schools. Pr.: Admission to Student Teaching.

FOR UNDERGRADUATE AND GRADUATE CREDIT

405 601. Principles and Practices of Guidance. (3) I, II, S. Need and nature of guidance; functions; personnel, their duties and relations; programs and evaluation of results. Pr.: Educ. 475 or 477, or consent of instructor.

405 602. Audio-Visual Instruction. (2 or 3) I, II, S. Principles and technics in the use of visual and audio-visual materials; operation and maintenance of equipment and sources of supply. Pr.: Educ. 478 or 476, or 550 or conc. enrollment.

405 603. Junior High School. (2 or 3) I, II, S. Origin, objectives, program, and administration of the junior high school, and relations with lower and higher education units. Pr.: Teaching experience.

405 604. Extra-Class Activities. (3) II, S. Organization, sponsorship, and objectives of clubs, publications, athletics, dramatics, musical organizations, assemblies, home room, and student council in junior and senior high schools. Pr.: Educ. 450, senior standing, or consent of instructor.

405 605. Extension Organization and Policies. (3) II. Development and objectives of extension work; organization and administration of extension service, with special emphasis on extension service in Kansas. Pr.: Senior standing, juniors by consent of instructor.

405 608. Special Education. (3) On sufficient demand. A general study of the field of special education, with emphasis on the development and organization of instructional materials; parent education; and coordination of the services of physicians, health departments, welfare agencies, and the school. Included in the study of administration of special services at the national, state, and local levels. Pr.: Educ. 202 and 300 or 450.

405 609. Psychology of Exceptional Children. (3) (See Psych. 425.)

405 611. Occupational Information. (2) I, S. A study of the competencies and skills and demands on persons in various occupations, with attention to the collection, evaluation, filing, and use of occupational information. Pr.: Senior standing and consent of instructor.

405 612. Use of Tests in Counseling. (3) II, S. Training in the selection and administration of psychometric instruments and in their practical application in the counseling setting; the validation and interpretation of results obtained with them. Pr.: Psych. 110, Stat. 320, or conc. enrollment. Senior standing and consent of instructor.

405 613. Elementary Mathematics Curriculum. (2) S. A study of the recent curricular developments in elementary school mathematics, research in the field and program evaluation are stressed. Limited to students in Institute in Mathematics for Elementary School Personnel. Pr.: Graduate standing and consent of instructor.

405 615. Reading Programs for Secondary Schools. (3) On sufficient demand. A study of the organization and implementation of reading programs for secondary schools. Consideration will be given to materials, methods of instruction, and the reading skills needed for secondary school subjects. Pr.: Senior standing and consent of instructor.

405 616. Educational Sociology. (3) I, II, S. A study to gain an understanding of the ways in which the school can effectively utilize the social process in developing and educating the individual and to show the interrelationships of such institutions as the family, the church, the playgrounds, and the various youth-serving agencies with the school. Pr.: Senior standing.

405 620. The Junior College. (3) I, II, S. The philosophy, organization, curriculum, and personnel of the junior college; the role of the junior

college in the community and in higher education. Pr.: Educ. 302 and consent of instructor.

405 630. Band Administration and Percussion Techniques. (3) II, S. (See Music 630.)

405 662. Instructional Television. (3) On sufficient demand. The principles of instructional television; its development programming, techniques, and application. Pr.: Junior standing and consent of instructor. (See Spch. 662.)

405 680. Kindergarten Education. (3) I, II, S. A specialized study of the kindergarten in the American school; methods and materials for working with the kindergarten child, including communication and explanation skills and readiness for reading. Pr.: Educ. 202, 300 and junior standing.

405 752. Methods of Extension Teaching. (3) II. Recommended methods of extension teaching; application to agriculture and home economics programs. Pr.: Senior standing, juniors by consent of instructor.

405 795. Problems in Education. Credit arranged. I, II, S. Work is offered in agricultural education, educational administration, educational measurement, educational psychology, educational sociology, elementary education, extension education, guidance, home economics education, statistical methods, and teaching methods. Pr.: Background of courses needed for the problem undertaken.

FOR GRADUATE CREDIT

405 800. Statistical Methods in Education. (3) On sufficient demand. Nature of measurement in education, organization of data, computation and interpretation of basic statistics, sampling methods and theory. Pr.: Nine hours of education, Stat. 320 or 620 and consent of instructor.

405 801. Educational Measurement and Evaluation. (3) On sufficient demand. The role of measurement and evaluation in the educational process, the selection and use of standardized tests, and the development of classroom tests and other evaluative procedures. Parts of the course are differentiated to meet the particular needs of either elementary or secondary teachers. Pr.: Nine hours of education or consent of instructor.

405 802. Research Methods and Treatment of Data. (3) I, II, S. Principles of research in education; nature, organization, and presentation of research data; basic statistical computations and interpretations; selection of research problems. Pr.: Nine hours of education or consent of instructor.

405 803. Curriculum Development. (3) I, II, S. An over-all view of the entire school curriculum, patterns of organization, outlining of instructional fields, and specific helps in curriculum development for administrators and classroom teachers. Pr.: Twelve hours of education or consent of instructor.

405 804. Curriculum Construction for Secondary Schools. (2 or 3) On sufficient demand. Procedures for organizing and conducting programs for curriculum improvement in the secondary schools; techniques for the development and evaluation of curriculum materials. Opportunity is provided for work on individual curriculum problems. Pr.: Educ. 803 and teaching experience.

405 805. Extension Program Development. (2-3) On sufficient demand. Nature and importance, basis, objectives and procedures of Extension Program Development. Pr.: One year of Extension experience; consent of instructor.

405 806. Philosophy of Education. (3) I, II, S. Distinctive functions or purposes of education in a democracy. Philosophy of education is analyzed in terms of the what, the why, and the how of education. Pr.: Twelve hours of education and consent of instructor.

405 807. General School Administration. (3) I, II, S. Basic philosophy and objectives of education and their application to national, state,

and local organization, including problems of policy making and general administration. Intended primarily for school administrators. Pr.: At least one year of teaching experience.

405 808. School Business and Finance. (3) I, II, S. Professional preparation primarily for school administrators and persons planning to enter that work, including problems of finance, administration, and support of schools at local, state, and federal levels. Pr.: At least one year of teaching experience.

405 809. Supervision and Improvement of Instruction. (3) I, II, S. A course designed for administrators, supervisors, and classroom teachers who wish to help themselves and others isolate and analyze teaching problems. Pr.: At least one year of teaching experience.

405 810. Elementary School Administration. (3) I, II, S. Aims and objectives of elementary education; organization and administration of the elementary school; pupil accounting duties and qualifications of staff; community relations and articulation with other schools. Pr.: Educ. 300 and teaching experience.

405 811. Curriculum Construction for Elementary Schools. (2 to 3) On sufficient demand. Procedures for organizing and conducting programs for curriculum improvement in the elementary schools; techniques for the development and evaluation of curriculum materials. Opportunity is provided for work and individual curriculum problems. Pr.: Educ. 803 and teaching experience.

405 812. The School Plant. (3) I, II, S. Determination and provision of building and other plant needs by the local public school district, including planning, financing, construction, and utilization. Pr.: At least one year of teaching experience.

405 813. School-Public Relations. (2 or 3) I, II, S. Interrelationships that should exist between the school and the community and the role of the teacher and administrator in such relationships; agents, media, and administration needed to bring about school-community understanding and cooperation. Pr.: At least one year of teaching experience.

405 814. Secondary School Administration. (3) I, II, S. Aims and functions of junior and senior high schools and junior colleges; problems in the progress of studies, extra-class activities, pupil accounting, community relations, and articulation with other schools. Pr.: At least one year of teaching experience.

405 815. Educational Media Programs. (3) On sufficient demand. Organization, administration, and evaluation of educational media service programs, with emphasis on the provision of services, materials, equipment, facilities, staff and financial resources essential in support of modern instructional programs. Includes studies of programs in varying sizes and types of educational institutions. Pr.: Educ. 602 or consent of instructor.

405 816. Adult Education. (3) On sufficient demand. Objectives, program, facilities, procedures, and problems of adult education in a community, emphasizing the relation of school administrators and extension staff to this work. Pr.: Psych. 110 or one year of field experience; approval of the instructor.

405 817. Organization and Administration of the Guidance Services Program. (2 or 3) I, II, S. Staff, facilities, tools, and techniques of the school and community in an organized guidance program. Pr.: Twelve semester hours in courses required to meet standard counselor qualifications; consent of instructor.

405 818. Practicum in School Administration. (3 to 6) I, II, S. Supervised on-the-job experience in school administration. Pr.: Kansas School Administrator's Certificate or consent of instructor.

405 819. Advanced Educational Psychology: Learning. (3) On sufficient demand. The learning process, with special emphasis on human abilities and early and contemporary learning theories, with applications to

selected recent developments in teaching and persistent problems and issues in education. Pr.: Educ. 302 or its equiv.

405 820. Public School Law. (1 or 3) On sufficient demand. The nature of legal responsibilities faced by the public school administrator; resources available to him for solution of legal problems. Designed to develop understanding of the legal base upon which public education is built and controlled. Pr.: Educ. 807 or consent of instructor.

405 821. Guidance in the Elementary School. (3) On sufficient demand. The nature and philosophy of guidance in the elementary school; the function of specialized child appraisal and counseling techniques in the unique interrelationships of the specialist and the teacher in the team approach to elementary school guidance. Pr.: Educ. 475, 601 and consent of instructor.

405 827. Individual Intelligence Testing. (3) On sufficient demand. Theory of the appraisal of general aptitude, with an emphasis on techniques of administration, interpretation, and application in the school setting; supervised practice with selected individual tests. Pr.: Educ. 601, Psych. 420, 440 or equiv., 405 or equiv. and consent of instructor.

405 832. Counseling Theory. (3) II, S. Theories, methods, and problems in counseling, relating the counseling process to dynamics of human behavior. Pr.: Educ. 612 or Psych. 420 or equiv. or conc. enrollment.

405 833. Group Guidance. (3) On sufficient demand. Utilization of groups as a basic tool for counseling and guidance to provide a broader concept for patterning social interaction and learning climates within the school. Specific applications of group techniques in guidance and personnel programs are included. Pr.: Educ. 832, Psych. 550.

405 835. Supervision of Student Teaching. (3) On sufficient demand. Organization and functions of student teaching programs; orienting, supervising and evaluating student teachers in elementary and secondary schools. Pr.: Teaching experience and consent of instructor.

405 839. Guidance Services Practicum. (2 or 3) I, II, S. Supervised experience in guidance services in secondary schools; preparation and use of pupil personal records, tests, provision, and use of occupational and educational information, counseling, placement and follow-up, and use of school and community personnel and resources. Pr. or conc.: Educ. 832 and consent of instructor.

405 841. Principles of Student Personnel Administration. (2) On sufficient demand. Principles, administrative organization, procedures, and problems of student personnel work in higher education; analysis of policy formation, staff relationships, finance and controls, and physical plant needs; an introduction to the personnel services: health, housing, food, union, placement, counseling, and activities program. Pr.: Graduate standing and consent of instructor.

405 842. Directed Professional Development. (5) I, II. Research and teaching under supervision in the secondary school. Open only to outstanding liberal arts graduates enrolled in the special program for the professional preparation of such graduates for teaching in critical areas in secondary schools. Pr.: Registration in Graduate School and consent of instructor.

405 843. Principles of College Teaching. (2) I. A consideration of the social, economic, and professional status of "academic man"; analysis of the major functions of the college teacher: instruction (course and curriculum development), policy making, counseling, and research and scholarship; the treatment of the administrative context of teaching: organization, finance and control of student personnel services, and the problems of admission. Pr.: Consent of instructor.

405 844. Problems of College Teaching. (2) II. Focus is upon the instructional function; the source, determination, and formulation of course objectives; the selection of learning experiences (organization of materials, choice of methods); and the principles of evaluation. The general principles involved in these aspects of the instructional process

are adapted to the major field and teaching interest of the students enrolled in the class. Pr.: Consent of instructor.

405 845. Advanced Elementary School Reading. (3) I, S. Selected topics in the following areas will be studied: the nature of the reading act; reading readiness; skill development; individual differences; corrective reading; reading in the content fields; and trends and innovations in reading instruction. Pr.: Educ. 471 or 474 or consent of instructor.

405 846. Diagnosis and Correction of Reading Disabilities. (4) I, S. Causes of reading disabilities; diagnostic instruments and procedures; report writing; materials and methods of remedial instruction. Individual case study will be emphasized. Pr.: Reading methods course and teaching experience or consent of instructor.

405 847. Clinical Practices in Reading. (3) II, S. Supervised experience in the diagnosis and treatment of reading problems. Pr.: Educ. 846 (Diagnosis and Correction of Reading Disabilities).

405 848. Organization and Administration of Reading Programs. (2) II, S. An investigation of several topics of special interest to educators responsible for developing a total reading program, K-12, with special attention to the remedial reading program. Pr.: Educ. 615 or 845 or consent of instructor.

405 849. Vocational Psychology. (3) On sufficient demand. Environment and human factors in occupational adjustment; appraisal of vocational fitness. Pr.: Consent of instructor.

405 850. Individualized Instructional Programs. (3) On sufficient demand. A study of the rationale, procedures, techniques, and materials which are appropriate and necessary to individualizing instructional programs. Particular emphasis given to organizational structure, curriculum, and administration of nongraded, multigraded, and multitracked programs. Pr.: Teaching experience or consent of instructor.

Seminars in Education. Credit arranged. On sufficient demand. These seminars will consider research in the several fields of education represented in terms of the special interests of the studnts. Pr.: Consent of instructor.

405 851. Agricultural Education.

405 852. Curriculum and Improvement of Instruction.

405 853. Educational Administration.

405 854. Elementary Education.

405 855. Guidance Services.

405 856. Secondary Education.

405 857. Social Foundations.

405 858. Special Education.

405 859. Adult Education.

405 860. Trends in Elementary School Language Arts. (3) On sufficient demand. An analysis of current methods, issues, and trends in teaching speaking, listening, and writing through the study of significant literature and research findings. Pr.: Teaching experience or consent of instructor.

405 861. Contemporary Mathematics Education in the Elementary School. (3) On sufficient demand. Advanced study of selected topics in elementary school mathematics emphasizing new programs, trends, controversial topics, and new recommendations for persistent problems; findings of recent research stressed. Pr.: Teaching experience or consent of instructor.

405 862. Creativity in Education. (3) II, S. Clarification of creativity in education, recognition of creative talent, and ways to release it; emphasis on learning models and research in creative content and processes, with major consideration of divergent production and its relationship to the other learning processes in the cognitive domain. Pr.: Teaching experience or consent of instructor.

405 865. Planning and Developing Instructional Materials. (3) On sufficient demand. The principles and processes involved in planning and producing instructional materials, ranging from the preparation of simple graphic and photographic materials to computer-assisted programmed instruction. Pr.: Educ. 602 or consent of instructor.

405 999. Research in Education. Credit arranged. I, II, S. Work is offered in agricultural education, educational administration, educational measurement, educational psychology, educational sociology, elementary education, guidance, home economics education, teaching methods, and statistical methods. Pr.: Sufficient training to carry on the line of research undertaken.

COURSES IN AGRICULTURAL EDUCATION

FOR UNDERGRADUATE CREDIT

405 319. Agricultural Education Colloquium. Credit arranged. Discussion, assigned readings, and lectures over the selected trends, developments, and problems which are peculiar to the over-all field of agricultural education in Kansas. Developments in new legislation, techniques, and philosophies are discussed and applied. Students are encouraged to engage in self-study concerning their place in the profession of Agricultural Education.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

405 500. Methods of Teaching Agriculture. (2 or 3) I, II. Lesson plans; organization of materials and directions of class, laboratory, and field instruction work in vocational agriculture; individual farming programs and class and group activities; coordination of farm mechanics work; administration, organization, and coordination of the Future Farmers of America organization with the program of instruction in vocational agriculture. Pr.: Educ. 302 and admission to Student Teaching.

FOR UNDERGRADUATE AND GRADUATE CREDIT

405 700. Seminar in Agricultural Education. Credit arranged. On sufficient demand. Seminars will consist of problems in the several fields.

405 701. Administration and Supervision of Vocational Education. (2) On sufficient demand. Objectives, curriculum organization and content, administrative and supervisory problems from the viewpoint of the city superintendent; leadership needs which must be met in a school system that offers vocational education. Problem basis of treatment is used. Pr.: Educ. 450 and one year of teaching experience.

405 702. Vocational Education. (3) I, II, S. Provision for vocational education in Kansas and other states and countries; principles underlying such education; relation of vocational education to the community, county, state, and nation. Pr.: Educ. 302.

405 703. Teaching Adult Classes in Agriculture. (2 or 3) On sufficient demand. Organization and preparation of materials, and methods used in teaching adult classes in vocational education in agriculture for young farmers and adults. Departments are visited for evaluation of programs and results. Pr.: Educ. 702.

405 704. Technics in Agricultural Education. (3) On sufficient demand. Teaching in the field of vocational education in agriculture; the agricultural curriculum; course of study; farming programs and supervision; laboratory and field instruction; sources, selection, preparation, and use of audio-visual instructional material. One hour rec. and six hours lab. a week. Pr.: Educ. 702.

405 705. Organization Problems in Teaching Farm Mechanics. (2) On sufficient demand. Analysis of the farm mechanics course of study; needs and interests of boys; learning difficulties; skills and technical knowledge required; correlation with agriculture; application of laws of learning to the teaching process; determination of objectives. Pr.: Educ. 477.

405 706. Field Experience in Agricultural Education. (1 or 2) On sufficient demand. A course designed for prospective teachers to help bridge the gap between classroom theory and student teaching. Emphasis will be placed on observation of and participation in school and community organizations and programs. Pr.: Educ. 702 and consent of instructor.

FOR GRADUATE CREDIT

405 822. Young Farmer and Adult Farmer Education in Agriculture. (2 or 3) I, II, S. Organization, objectives, and procedures for conducting Young Farmer and Adult Farmer classes. Designed for teachers in service. Pr.: Experience in teaching vocational agriculture.

405 823. Agricultural Education for Beginning Teachers. (1 to 3) S. Securing and organizing information and planning teaching activities which will help the beginning vocational agriculture teacher. Pr.: Graduation from the Curriculum in Agricultural Education.

405 824. Curriculum in Agriculture I. (2 or 3) S. Curriculum problems; planning local programs in agriculture; developing facilities and plans for meeting current and advanced problems in the teaching of agriculture. Pr.: One year of teaching in agriculture.

405 825. Curriculum in Agriculture II. (2 or 3) S. Cont. of Educ. 824. Pr.: Educ. 824 or consent of instructor.

405 836. Field Studies in Agricultural Education. (2 or 3) On sufficient demand. Planning, organizing, and coordinating the various phases of the local program of vocational education in agriculture. Pr.: Experience in teaching agriculture or consent of instructor.

COURSES IN HOME ECONOMICS EDUCATION

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

405 485. Practicum in Home Economics Extension. (3) S. Two months experience. Application for admission: State leader, home economics, spring semester. Pr.: Junior standing and consent of instructor.

405 550. Methods of Teaching Home Economics. (2) I, II. Selection of techniques: organization, preparation, and presentation of materials for teaching secondary programs. One hour rec. and two hours lab. a week. Pr.: Junior standing; Educ. 450 or conc. enrollment; taken semester prior to Educ. 477.

405 551. Methods of Teaching for Dietetic Students. (3) I. Principles of teaching applied to selection, organization, and development of subject matter for individuals and courses taught by dietitians. Pr.: Senior standing in Institutional Management and Dietetics.

FOR UNDERGRADUATE AND GRADUATE CREDIT

405 750. Curriculum in Home Economics. (3) I, II, S. Philosophy and principles of home economics education; development of guides for teaching and evaluating reimbursable secondary programs. Pr.: Educ. 450.

405 751. Methods in Adult Homemaking Classes. (1 to 3) S. Principles of teaching applied to adult classes; a demonstration class in one or more phases of homemaking. Pr.: Educ. 550 or equiv.

FOR GRADUATE CREDIT

405 829. Supervision in Home Economics. (3 or 2) I, S. Philosophy and principles of effective supervision related to home economics programs, application of principles to problems met by supervisors. Pr.: Educ. 750 and teaching experience.

405 830. Trends in Home Economics Teaching. Credit arranged. I, II, S. Advanced study of evolving trends and materials for secondary programs; application to teaching and curriculum. Pr.: Educ. 750 and teaching experience.

405 837. Seminar in Home Economics Education. Credit arranged. II, S.

Critical analysis of selected issues in home economics education. May be taken more than one semester with consent of advisory committee. Pr.: Teaching experience.

405 838. Research in Organization and Presentation of Home Economics. Credit arranged. I, II, S. Individual research problems in phases of organization and administration of home economics. May be chosen as the basis for thesis for the master's degree. The nature of the problem will depend upon the student's major interest.

405 840. Occupational Home Economics Education. Credit arranged. I, II, S. Development of curriculums and teaching materials pertinent to the programs for job training in home and community service occupation. Pr.: Teaching experience.

The College of Engineering

RALPH G. NEVINS, *Dean*
CECIL H. BEST, *Associate Dean*
KENNETH K. GOWDY, *Assistant Dean*

A course of study leading to a degree in the College of Engineering provides a well-rounded university education designed to develop the general qualities of leadership and human understanding inherent to an educated person. In addition it equips the student with a sound theoretical background to meet the new and demanding problems of our rapidly expanding technology. To assure the continued economic and technologic development of this nation, an increasing number of able high school students will wish to select careers in this challenging profession. In the College of Engineering at K. S. U. an outstanding faculty combines with excellent physical facilities to provide a stimulating environment in which to prepare for a professional career.

The College of Engineering offers the Bachelor of Science degree in each of the following curriculums:

A general description of each of these curriculums, including a list of the faculty and departmental course offerings, is presented on pages 271 through 303. Although the curricula are outlined with eight semesters of course work, the average student assignment is such that they should be considered 4 ½-year programs. Also included in this section is a summary of the graduate program of each department. The Master of Science degree is granted by the Applied Mechanics Department and in each of the above areas listed for the Bachelor of Science degree. To round out the graduate program in the College of Engineering, the Doctor of Philosophy degree is offered in six departments: Applied Mechanics, Chemical Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering, and Nuclear Engineering. Additional information on the graduate program is included in the section on the Graduate School, page 35.

HONORS PROGRAM

The Honors Program in the College of Engineering offers the academically gifted student an intellectual challenge consistent with his ability. Based upon his University entrance tests, a student from the top five per cent of the entering freshmen in engineering may be invited to participate in the program. Transfer students with superior academic records also are eligible. Final approval to participate is based upon an interview with the Chairman of the Engineering Honors Committee. Acceptance on the part of the student is optional.

Selection to the Honors Program will not shorten the time required for graduation for most students, but should prove to be a stimulating experience. In addition to enrolling in Honors Sections in much of his course work, the student may enroll in a variety of seminars, colloquia, and research problems designed to enrich and challenge the superior student. The Honors Program in Engineering is closely integrated with the Honors Program of the other Colleges at K. S. U. and provides an excellent opportunity for interdisciplinary study.

COOPERATIVE EDUCATION PROGRAM

The College of Engineering, through its Cooperative Education Program, offers students in engineering an opportunity to obtain practical industrial experience as an integral part of their formal education. The

future engineers participate in pairs, alternating semesters in work and study. While one student is a full-time employee in industry, the other studies in his chosen professional engineering field. Participants are selected from students who are progressing satisfactorily toward a degree and have completed at least two semesters in their chosen curriculum.

SUMMER SCHOOL

Many of the courses appearing in the engineering curriculums, not only those which are offered in the College of Engineering but also in the College of Arts and Sciences, may be taken during the summer term. High school seniors, who have had insufficient mathematics to enroll in Analytic Geometry and Calculus I, are urged to investigate the possibility of summer school to remove this mathematics deficiency. College Algebra and Plane Trigonometry are offered during the summer session and provide an excellent transition from high school mathematics into the engineering curriculum.

Information concerning the courses offered is contained in the Summer School Catalog, which may be obtained from the Director of Admissions of the University.

Curriculum in Agricultural Engineering

B. S. in Agricultural Engineering

FRESHMAN

First Semester					Second Semester			
	Course		*Sem. Hrs.*		*Course*		*Sem. Hrs.*
Engl.	229 100	English Composition I	3	Engl.	229 120	English Composition II	3
Chem.	221 210	Chemistry I	5	Chem.	221 230	Chemistry II	3
Math.	245 220	Anal. Geom. & Calc. I	4	M. E.	560 218	Graphical Comm. II	2
M. E.	560 213	Graphical Comm. I	3	Math.	245 221	Anal Geom. & Calc. II	4
Ph. Ed.	261 011	Physical Education	0	C. E.	525 213	Plane Surveying	3
G. E.	500 110	Engg. Lectures	0	Spch.	281 105	Oral Communication I	2
				Ph. Ed.	261 011	Physical Education	0
				G. E.	505 115	Engg. Assembly	0
Total			15	Total			17

SOPHOMORE

Math.	245 222	Anal. Geom. & Calc. III	4	Math.	245 240	Series & Diff. Equa.	4
Phys.	265 310	Engg. Physics I	5	Phys.	265 311	Engg. Physics II	5
Ag. E.	505 375	Agric. Hydrology	3	Ag. E.	505 310	Agric. Machinery	3
Bot.	217 210	General Botany	4	Ap. M.	510 305	Statics	3
G. E.	505 115	Engg. Assembly	0	G. E.	505 115	Engg. Assembly	0
Total			16	Total			15

JUNIOR

Ag. E.	505 440	Func. Req. Agr. Str.	3	Ag. E.	505 446	Tractors	3
Ap. M.	510 412	Dynamics	3	Ag. E.	505 500	Rural Electrification	3
E. E.	530 403	Elec. Cir. & Control	4	Ap. M.	510 415	Mech. of Materials	3
G. E.	500 350	Engg. Materials	2	Ap. M.	510 418	Mech. of Matls. Lab.	1
G. E.	500 351	Engg. Materials Lab.	1	Ap. M.	510 471	Fluid Mechanics	3
M. E.	560 412	Engg. Thermodynam.	4			Hum. or Soc. Sci. El.*	5
Engl.	229 090	English Proficiency	0	G. E.	505 115	Engg. Assembly	0
G. E.	505 115	Engg. Assembly	0				
Total			17	Total			18

SENIOR

Ag. E.	505 435	Design of Farm Mach.	3	Ag. E.	505 480	Soil & Water Cons.	3
Econ.	225 110	Economics I	3	Ag. E.	505 466	Anal. of Agric. Struc.	3
C. E.	525 422	Soil Mechanics I	3			Hum. or Soc. Sci. El.*	10
Agron.	015 200	Plant Science	4			Technical Elective	2
		Technical Elective	3	G. E.	505 115	Engg. Assembly	0
G. E.	505 115	Engg. Assembly	0				
Total			16	Total			18

Number of hours required for graduation, 132.†

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* Humanities and Social Science electives are to be selected from the list on page 270. Other electives must be chosen with the advice and approval of the department head and the dean.

† Any male student is allowed to apply at least four (4) hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

Curriculum in Chemical Engineering

B. S. in Chemical Engineering

FRESHMAN

First Semester					Second Semester			
		Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Engl.	229 100	English Composition I	3	Engl.	229 120	English Composition II	3
Chem.	221 210	Chemistry I	5	Chem.	221 230	Chemistry II	3
Math.	245 220	Anal. Geom. & Calc. I	4	Chem.	221 271	Ch. Eq. & Qual. Anal.	4
Econ.	225 110	Economics I	3	Math.	245 221	Anal. Geom. & Calc. II	4
Spch.	281 105	Oral Communication I	2			Elective*	3
Ph. Ed.	261 011	Physical Education	0	Ph. Ed.	261 011	Physical Education	0
G. E.	500 110	Engg. Lectures	0	G. E.	520 115	Engg. Assembly	0
Total			17	Total			17

SOPHOMORE

Math.	245 222	Anal. Geom. & Calc. III	4	Math.	245 240	Series & Diff. Equa.	4
Phys.	265 310	Engg. Physics I	5	Phys.	265 311	Engg. Physics II	5
Chem.	221 431	Organic Chem. I	3	Chem.	221 450	Organic Chem. II	3
Chem.	221 432	Organic Chem. I Lab.	2	Ch. E.	520 215	Intro. to Proc. Anal.	4
		Elective*	3	G. E.	520 115	Engg. Assembly	0
G. E.	520 115	Engg. Assembly	0				
Total			17	Total			16

JUNIOR

Chem.	221 585	Physical Chem. I	3	Chem.	221 595	Physical Chem. II	3
Chem.	221 586	Physical Chem. I Lab.	2	Ch. E.	520 430	Transport Phenomena	5
Ch. E.	520 415	Ch. E. Thermo.	5	Ch. E.	520 422	Ch. E. Lab. I	2
G. E.	500 350	Engg. Materials	2	Ap. M.	510 412	Dynamics	3
G. E.	500 351	Engg. Materials Lab.	1			Elective*	3
Ap. M.	510 305	English Proficiency	0	G. E.	520 115	Engg. Assembly	0
Engl.	229 090	Statics	3				
G. E.	520 115	Engg. Assembly	0				
Total			16	Total			16

SENIOR

Ch. E.	520 432	Chem. Engg. Lab. II	2	Ch. E.	520 442	Chem. Engg. Lab. III	2
Ch. E.	520 520	Process Anal. & Design	5	Ch. E.	520 540	Ch. E. Systems Design	5
Ch. E.	520 530	Process Optimization	3			Elective*	9
		Elective*	6	G. E.	520 115	Engg. Assembly	0
G. E.	520 115	Engg. Assembly	0				
Total			16	Total			16

Number of hours required for graduation, 131.†

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* Fifteen hours must be selected from the list of approved Social Science and Humanities electives on page 270. The remaining nine hours are technical electives of which at least six must be Engineering Sciences other than Chemical Engineering. Technical electives must be chosen with the advice and approval of the department head and the dean.

† Any male student is allowed to apply at least four (4) hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

Curriculum in Civil Engineering

B. S. in Civil Engineering

FRESHMAN

First Semester					Second Semester			
		Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Math.	245 220	Anal. Geom. & Calc. I	4	Math.	245 221	Anal. Geom. & Calc. II	4
Chem.	221 210	Chemistry I	5	Chem.	221 230	Chemistry II	3
Engl.	229 100	English Composition I	3	Engl.	229 120	English Composition II	3
Spch.	281 105	Oral Communication I	2	Econ.	225 110	Economics I	3
Arch.	105 107	Arch. Graphics I	2			Technical Elective** 2 or	3
Ph. Ed.	261 011	Physical Education	0	Ph. Ed.	261 011	Physical Education	0
G. E.	500 110	Engg. Lectures	0	C. E.	525 110	Civil Engg. Lecture	0
Total			16	Total			15 or 16

SOPHOMORE

Math.	245 222	Anal. Geom. & Calc. III	4	Math.	245 240	Series & Diff. Equa.	4
Phys.	265 310	Engg. Physics I	5	Phys.	265 311	Engg. Physics II	5
Ap. M.	510 305	Statics	3	Ap. M.	510 415	Mech. of Materials	3
Chem.	221 250	Chemistry II Lab.	2			Hum. or Soc. Sci. El.*	2
C. E.	525 213	Plane Surveying	3	C. E.	525 214	Route Surveying	3
G. E.	525 115	Engg. Assembly	0	G. E.	525 115	Engg. Assembly	0
Total			17	Total			17

JUNIOR

C. E.	525 331	Stat. Deter. Str.	3	C. E.	525 332	Stat. Indet. Str.	3
Ap. M.	510 412	Dynamics	3	Ap. M.	510 471	Fluid Mechanics	3
M. E.	560 400	Elem. of Thermodynam.	3	C. E.	525 463	Sanit. Engg. Fund.	3
Geol.	234 100	General Geology	3	C. E.	525 422	Soil Mechanics I	3
Ap. M.	510 418	Mech. of Matls. Lab.	1			Technical Elective**	3
		Technical Elective** 4 or	3			Hum. or Soc. Sci. El.*	2
Engl.	229 090	English Proficiency	0	G. E.	525 115	Engg. Assembly	0
G. E.	525 115	Engg. Assembly	0				
Total			17 or 16	Total			17

SENIOR

C. E.	525 443	Struc. Engg. in Metals	3	C. E.	525 444	Struc. Engg. in Concr.	3
C. E.	525 452	Hydraulic Engg.	3	C. E.	525 465	Sanit. Engg. Design	3
C. E.	525 411	Photogrammetry	3	C. E.	525 471	Transportation Engg.	3
C. E.	525 356	Hydrology	2	C. E.	525 426	Foundations	3
		Hum. or Soc. Sci. El.*	6			Hum. or Soc. Sci. El.*	4
G. E.	525 115	Engg. Assembly	0	C. E.	525 115	Engg. Assembly	0
Total			17	Total			16

Number of hours required for graduation, 132.†

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* Humanities and Social Science electives are to be selected from the list on page 270.

** Nine credit hours of technical electives are required. One course in computer programming or equivalent programming experience is required. The remaining hours of technical elective are to be selected from an approved list of science and engineering science courses. Other science or engineering science courses may be substituted on recommendation of the faculty adviser and approval of the department head and the dean.

† Any male student is allowed to apply at least four (4) hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

Curriculum in Electrical Engineering

B. S. in Electrical Engineering

FRESHMAN

First Semester					Second Semester				
			Course	*Sem. Hrs.*				*Course*	*Sem. Hrs.*
Engl.	229	100	English Composition I	3	Engl.	229	120	English Composition II	3
Chem.	221	210	Chemistry I	5	Chem.	221	230	Chemistry II	3
Math.	245	220	Anal. Geom. & Calc. I	4	Math.	245	221	Anal. Geom. & Calc. II	4
Econ.	225	110	Economics I	3	Spch.	281	105	Oral Comm. I	2
Ph. Ed.	261	011	Basic Phys. Educ.	0				Hum. or Soc. Sci. El.*	3
G. E.	500	110	Engg. Lectures	0	Ph. Ed.	261	011	Basic Phys. Educ.	0
					G. E.	530	115	Engg. Assembly	0
Total				15	Total				15

SOPHOMORE

Phys.	265	310	Engg. Physics I	5	Phys.	265	311	Engg. Physics II	5
Math.	245	222	Anal. Geom. & Calc. III	4	Math.	245	240	Series & Diff. Equa.	4
I. E.	550	372	Comp. & Data Proc.	2	E. E.	530	391	Circuit Theory I	3
G. E.	500	350	Engg. Materials	2	Ap. M.	510	305	Statics	3
			Hum. or Soc. Sci. El.*	3	M. E.	560	211	Engg. Graphics I	2
G. E.	530	115	Engg. Assembly	0	G. E.	530	115	Engg. Assembly	0
Total				16	Total				17

JUNIOR

E. E.	530	404	Circuit Theory II	4	E. E.	530	405	Circuit Theory III	3
E. E.	530	497	Electromag. Th. I	3	E. E.	530	416	Electronics II	3
E. E.	530	415	Electronics I	3	E. E.	530	501	Energy Conversion I	3
E. E.	530	431	Elec. Engg. Lab. I	2	E. E.	530	432	Elec. Engg. Lab. II	2
Ap. M.	510	412	Dynamics	3	E. E.	530	498	Electromag. Theory II	3
			Hum. or Soc. Sci. El.*	3				Hum. or Soc. Sci. El.*	3
Engl.	229	090	English Proficiency	0	G. E.	530	115	Engg. Assembly	0
G E.	530	115	Engg. Assembly	0					
Total				18	Total				17

SENIOR

M. E.	560	412	Engg. Thermodynamics	4	E. E.	530	520	Control Systems	3
E. E.	530	417	Electronics III	3	E. E.	530	530	E. E. Seminar	1
E. E.	530	502	Energy Conversion II	3	E. E.	530	434	Elec. Engg. Lab. IV	2
E. E.	530	433	Elec. Engg. Lab. III	2	M. E.	560	531	M. E. Lab. E	1
Phys.	265	560	Atomic Phys. or					Technical Elective**	6
N. E.	580	410	Intro. to Nucl. Engg.	3				Hum. or Soc. Sci. El.*	3
			Engg. Science El.*	3	G. E.	530	115	Engg. Assembly	0
G. E.	530	115	Engg. Assembly	0					
Total				18	Total				16

Number of hours required for graduation, 132.†

* Humanities and Social Science electives are to be selected from the list on page 270. Other electives must be chosen with the advice and approval of the department head and the dean.

** To be selected from Ap. M. 415, 471, and 615: I. E. 401; M. E. 590; N. E. 450 (not open to students with credit in N. E. 410).

† Any male student is allowed to apply at least four (4) hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

Curriculum in Industrial Engineering

B. S. in Industrial Engineering

FRESHMAN

First Semester					Second Semester			
			Course	*Sem. Hrs.*			*Course*	*Sem. Hrs.*
Engl.	229	100	English Composition I	3	Spch.	281	105 Oral Communication I .	2
Math.	245	220	Anal. Geom. & Calc. I ..	4	Engl.	229	120 English Composition II	3
Chem.	221	210	Chemistry I	5	Math.	245	221 Anal. Geom. & Calc. II	4
Econ.	225	110	Economics I	3	Chem.	221	230 Chemistry II	3
Ph. Ed.	261	011	Physical Education	0	M. E.	560	213 Graphical Comm. I	3
G. E.	500	110	Engg. Lectures	0	Ph. Ed.	261	011 Physical Education	0
					G. E.	550	115 Engg. Assembly	0
Total			.....	15	Total		.....	15

SOPHOMORE

Phys.	265	310	Engg. Physics I	5	Phys.	265	311 Engg. Physics II	5
Math.	245	222	Anal. Geom. & Calc. III	4	Math.	245	240 Series & Diff. Equa.	4
B. A.	305	273	Prin. of Accounting	3	Stat.	285	411 Intro. Prob. Stat. II ..	3
I. E.	550	221	Indus. Production	2	I. E.	550	401 Indus. Management I ..	3
Stat.	285	410	Intro. Prob. Stat. I	3	I. E.	550	372 Comput. & Data Proc.	2
G. E.	550	115	Engg. Assembly	0	G. E.	550	115 Engg. Assembly	0
Total			.....	17	Total		.....	17

JUNIOR

I. E.	550	451	Work Measurement	3	Ap. M.	510	415 Mech. of Materials	3
I. E.	550	471	Indus. Econ. Studies ..	3	I. E.	550	571 Intro. Oper. Res. I	3
G. E.	500	350	Engg. Materials	2	M. E.	560	400 Elem. of Thermodynam.	3
G. E.	500	351	Engg. Materials Lab. ..	1	E. E.	530	419 Elec. Circuits & Mach.	4
Ap. M.	510	305	Statics	3	I. E.	550	441 Engg. Relia. & Qual. Assur. I	3
			Hum. or Soc. Sci. El.*	6				
Engl.	229	090	English Proficiency	0	G. E.	550	115 Engg. Assembly	0
G. E.	550	115	Engg. Assembly	0	I. E.	550	481 Indus. Plant Studies	0
Total			.....	18	Total		.....	16

SENIOR

I. E.	550	552	Job Eval., Wage Incen.	2	I. E.	550	581 Ind. Fac. Layout, Des.	3
I. E.	550	511	Produc. & Inven. Cont.	2	I. E.	550	522 Tool Engineering	3
I. E.	550	502	Indus. Management II ..	2			Engg. Science Elective	3
I. E.	550	521	Metal Mach. & Forming	2			Technical Elective	2
E. E.	530	423	Electronics & Control ..	3			Hum. or Soc. Sci. El.*	6
E. E.	530	424	Electronics & Con. Lab.	1	G. E.	550	115 Engg. Assembly	0
Ap. M.	510	412	Dynamics	3				
			Hum. or Soc. Sci. El.*	3				
G. E.	550	115	Engg. Assembly	0				
Total			.....	18	Total		.....	17

Number of hours required for graduation, 133.†

* Humanities and Social Science electives are to be selected from the list on page 270. Other electives must be chosen with the advice and approval of the department head and the dean.

† Any male student is allowed to apply at least four (4) hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

Curriculum in Mechanical Engineering

B. S. in Mechanical Engineering

FRESHMAN

First Semester					Second Semester			
	Course		*Sem. Hrs.*			*Course*		*Sem. Hrs.*
Engl.	229	100 English Composition I	3		Engl.	229	120 English Composition II	3
Chem.	221	210 Chemistry I	5		Chem.	221	230 Chemistry II	3
M. E.	560	213 Graphical Comm. I	3		M. E.	560	218 Graphical Comm. II	2
Math.	245	220 Anal. Geom. & Calc. I	4		Math.	245	221 Anal. Geom. & Calc. II	4
Ph. Ed.	261	011 Physical Education	0				Hum. or Soc. Sci. El.*	3
G. E.	500	110 Engg. Lectures	0		Ph. Ed.	261	011 Physical Education	0
					G. E.	560	115 Engg. Assembly	0
Total			15		Total			15

SOPHOMORE

Phys.	265	310 Engg. Physics I	5		Phys.	265	311 Engg. Physics II	5
Math.	245	222 Anal. Geom. & Calc. III	4		Math.	245	240 Series & Diff. Equa.	4
Econ.	225	110 Economics I	3		Ap. M.	510	305 Statics	3
Spch.	281	105 Oral Communication I	2		G. E.	500	350 Engg. Materials	2
I. E.	550	221 Indus. Production	2				Hum. or Soc. Sci. El.*	3
G. E.	500	115 Engg. Assembly	0		G. E.	560	115 Engg. Assembly	0
Total			16		Total			17

JUNIOR

M. E.	560	412 Engg. Thermodynamics	4		M. E.	560	512 Thermo. of Ener. Conv.	4
E. E.	530	419 Elec. Circuits & Mach.	4		E. E.	530	423 Electronics & Control	3
G. E.	500	351 Engg. Materials Lab.	1		E. E.	530	424 Electronics & Con. Lab.	1
Ap. M.	510	412 Dynamics	3		M. E.	560	560 Engg. Economics	3
Ap. M.	510	415 Mech. of Materials	3		Ap. M.	510	471 Fluid Mechanics	3
		Hum. or Soc. Sci. El.*	3				Hum. or Soc. Sci. El.*	3
Engl.	229	090 English Proficiency	0		G. E.	560	115 Engg. Assembly	0
G. E.	560	115 Engg. Assembly	0					
Total			18		Total			17

SENIOR

M. E.	560	451 Machine Design I	5		M. E.	560	551 Machine Design II	3
M. E.	560	521 Heat Transfer	3		M. E.	560	583 Mech. Engg. Lab. II	2
		Technical Elective	6		M. E.	560	656 Mach. Vibration I or	
M. E.	560	535 Mech. Engg. Lab. I	3		M. E.	560	524 Environm'l Engg. I	3
G. E.	560	115 Engg. Assembly	0		Phys.	265	560 Atomic Physics or	
					N. E.	580	410 Intro. to Nuclear Engg.	3
							Hum. or Soc. Sci. El.*	3
							Technical Elective	3
					G. E.	560	115 Engg. Assembly	0
Total			17		Total			17

Number of hours required for graduation, 132.†

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* Humanities and Social Science electives are to be selected from the list on page 270. Other electives must be chosen with the advice and approval of the department head and the dean.

† Any male student is allowed to apply at least four (4) hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

Curriculum in Nuclear Engineering

B. S. in Nuclear Engineering

FRESHMAN

First Semester					Second Semester			
	Course		*Sem. Hrs.*			*Course*		*Sem. Hrs.*
Engl.	229	100 English Composition I	3		Engl.	229	120 English Composition II	3
Econ.	225	110 Economics I	3		Chem.	221	230 Chemistry II	3
Chem.	221	210 Chemistry I	5		Chem.	221	250 Chemistry II Lab.	2
Math.	245	220 Anal. Geom. & Calc. I	4		Math.	245	221 Anal. Geom. & Calc. II	4
Ph. Ed.	261	011 Basic Phys. Educ.	0		Phys.	265	310 Engg. Physics I	5
G. E.	500	110 Engg. Lectures	0		Ph. Ed.	261	011 Basic Phys. Educ.	0
					N. E.	580	115 Engg. Assembly	0
Total			15		Total			17

SOPHOMORE

Phys.	265	311 Engg. Physics II	5		Math.	245	240 Series & Diff. Equa.	4
Math.	245	222 Anal. Geom. & Calc. III	4				Hum. or Soc. Sci. El.*	3
		Hum. or Soc. Sci. El.*	3		N. E.	580	450 Elements Nucl. Engg.	3
Ap. M.	510	305 Statics	3		Ap. M.	510	412 Dynamics	3
N. E.	580	115 Engg. Assembly	0				Option	4, 4 or 3
					N. E.	580	115 Engg. Assembly	0
Total			15		Total			17, 17 or 16

JUNIOR

N. E.	580	611 Radioiso. Appli. Engg.	3		N. E.	580	500 Appl. N. E. Anal.	3
		Hum. or Soc. Sci. El.*	3				Hum. or Soc. Sci. El.*	3
		Option	11, 10 or 11				Option	11, 12 or 12
Engl.	229	090 English Proficiency	0		N. E.	580	115 Engg. Assembly	0
N. E.	580	115 Engg. Assembly	0					
Total			17, 16 or 17		Total			17, 18 or 18

SENIOR

N. E.	580	670 Nucl. Reactor Tech. I	3		N. E.	580	691 Nucl. Reactor Tech. II	3
N. E.	580	680 Neut. & Part. Inter.	3		N. E.	580	695 Nucl. Reac. Tech. Lab.	2
		Technical Elective	3		N. E.	580	606 Nucl. Engg. Materials	3
		Option	9, 9 or 8				Option	6, 6 or 7
N. E.	580	115 Engg. Assembly	0		N. E.	580	115 Engg. Assembly	0
Total			18, 18 or 17		Total			14, 14 or 15

Number of hours required for graduation, 130.†

Option I

SOPHOMORE

First Semester				Second Semester			
				Ch. E.	520 215	Intro. to Proc. Anal.	4

JUNIOR

E. E.	530 391	Circuit Theory I	3	Chem.	221 595	Phys. Chem. II Rec.	3
Chem.	221 585	Phys. Chem. I Rec.	3	Ch. E.	520 430	Transport Phenomena ..	5
Ch. E.	520 415	Ch. E. Thermodynamics	5			Hum. or Soc. Sci. El.*	3
Total		.....	11	Total		.....	11

SENIOR

N. E.	580 708	Fuel Proc. Lab.	1	Ap. M.	510 415	Mechanics of Matls.	3
Ch. E.	520 520	Process Anal. & Des. ..	5			Technical Elective	3
E. E.	530 415	Electronics I	3				
Total		.....	9	Total		.....	6

Option II

SOPHOMORE

				Ch. E.	520 215	Intro. to Proc. Anal. ..	4

JUNIOR

E. E.	530 391	Circuit Theory I	3	Ap. M.	510 415	Mechanics of Matls.	3
Chem.	221 585	Phys. Chem. I Rec.	3	M. E.	560 512	Thermo. of Ener. Conv.	4
M. E.	560 412	Engg. Thermodynamics	4	Ap. M.	510 471	Fluid Mechanics	3
						Technical Elective	2
Total		.....	10	Total		.....	12

SENIOR

M. E.	560 521	Heat Transfer	3	M. E.	560 656	Machine Vibrations I or	
E. E.	530 415	Electronics I	3	M. E.	560 715	Gas Dynamics I	3
M. E.	560 535	Mech. Engg. Lab. I	3			Hum. or Soc. Sci. El.*	3
Total		.....	9	Total		.....	6

Option III

SOPHOMORE

				E. E.	530 391	Circuit Theory I	3

JUNIOR

Ch. E.	520 215	Intro. to Proc. Anal. ..	4	Ch. E.	520 430	Transport Phenomena .	5
E. E.	530 404	Circuit Theory II	4	M. E.	560 412	Engg. Thermodynamics	4
E. E.	530 415	Electronics I	3			Hum. or Soc. Sci. El.*	3
Total		.....	11	Total		.....	12

SENIOR

N. E.	580 761	Radiation Det. & Meas.	3	N. E.	580 720	Nuclear Sys. Anal.	3
E. E.	530 416	Electronics II	3	N. E.	580 762	Nuclear Instr.	4
		Technical Elective	2				
Total		.....	8	Total		.....	7

* Humanities and Social Science electives are to be selected from the list on page 270. Other electives must be chosen with the advice and approval of the department head and the dean.

Dual Degree in Engineering and Business Administration

A student enrolled in engineering may secure two degrees, B. S. in his engineering field and B. S. in Business Administration, by completing the courses listed in his particular engineering curriculum and the courses listed below.* Ordinarily, the program must be commenced during a student's junior year.

		Course	*Credit Hours*			*Course*	*Credit Hours*
B. A.	305 272	Introd. Accounting	5	B. A.	305 400	Administration	3
B. A.	305 305	Managerial Accounting	3	B. A.	305 431	Personnel Admin.	3
Econ.	225 110	Economics I	3	B. A.	305 440	Marketing	3
Econ.	225 120	Economics II	3	B. A.	305 405	Business Finance	3
B. A.	305 325	Business Law I	3	B. A.	305 602	Business and Society	3
B. A.	305 326	Business Law II	3	B. A.	305 600	Business Policy	3

Business Electives, 6 hours, which must include at least one course offered by the Department of Economics:

Econ.	225 430	Money and Banking	(3)
Econ.	225 686	Business Fluctuations and Forecasting	(2)
Econ.	225 710	Intermediate Economic Analysis	(3)
Econ.	225 720	Income and Employment Theory	(3)

* Any courses shown above, which also appear in the approved list of Social Science electives, may be used to fulfill elective requirements in the Curriculum in Engineering. A minimum of 30 additional semester hours of credit is required for the second bachelor's degree.

† Any male student is allowed to apply at least four (4) hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

Approved Humanities and Social Science Electives for Students Enrolled in the College of Engineering

Department	*Courses*
Department of Art	Any course
Department of Economics	Any course above those required
Department of English	Any course above those required
Department of Geology and Geography	Any course in Geography
Department of History and Philosophy	Any course
Department of Modern Languages	Five hours
Department of Music	Any course
Department of Political Science	Any course, except Pol. Sci. 444
Department of Psychology	Any course
Department of Sociology and Anthropology	Any course
Department of Speech	Any course in "Theater and Interpretation"
College of Architecture and Design	Any course in history or appreciation of architecture
College of Commerce	Course No. 400—Administration Course No. 440—Marketing

Two areas should be chosen from those listed above. From each of these areas at least two courses should be taken; however, not more than three credit hours may be taken in applied music and/or applied art.

AGRICULTURAL ENGINEERING

GEORGE H. LARSON,* *Head of Department*

Professors Fairbanks, Hodges* and Larson;* Associate Professors Clark,* Lipper* and Stevenson;* Assistant Professors Baugher, Chung* and Manges; Instructors Anderson, McMillan, Mensch and TenEyck; Emeritus: Professor Fenton*

For Curriculum, See Page 261

Agricultural engineering is the application of the art and science of engineering principles to the agricultural industry. Agricultural engineering includes farm power and machinery, soil and water conservation, irrigation and drainage, farm structures, rural electrification, and processing of agricultural products.

Students completing this curriculum are prepared to do design, research, testing, sales promotion, teaching, and extension work in the various phases of engineering as applied to agriculture. Federal and state agencies, colleges and universities, machinery manufacturers, rural electric power suppliers, and the many enterprises involving agriculture desire and need the services of the agricultural engineer.

The curriculum includes all basic courses such as mathematics, physics, chemistry, and mechanics common to engineering curriculums, as well as engineering courses in each of the areas in the field of agricultural engineering.

Graduate Work:

Major work leading to the degree Master of Science in agricultural engineering is offered in the fields of farm power and machinery, farm structures, soil and water conservation, rural electrification and processing.

Prerequisite to major work in these fields requires the completion of an undergraduate curriculum in agricultural engineering substantially equivalent to that required of undergraduate students at this University.

Work leading to the degree Master of Science is also offered in the field of agricultural mechanization to those students who have completed a bachelor's degree in agriculture with the equivalent of a major in agricultural mechanization.

FOR UNDERGRADUATE CREDIT

505 310. Agricultural Machinery. (3) II. Selection, adjustment, operation, servicing, economics, and application of agricultural machines. Two hours rec. and three hours lab. a week. Pr.: Phys. 310 or equiv.

505 375. Agricultural Hydrology. (3) I. The hydrologic cycle, rainfall, runoff, soil and water relationships affecting crop production, drainage, irrigation, and erosion; watershed surveys. Two hours rec. and three hours lab. a week. Pr.: C. E. 213; Pr. or conc.: Phys. 310 or equiv.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

505 435. Design of Farm Machinery. (3) I. Functional requirements and principles of operation of farm machinery; analysis of the problems involved in the design and construction of farm machines. Two hours rec. and three hours lab. a week. Pr.: Phys. 311; Pr. or conc.: Ap. M. 415, Ag. E. 310.

505 440. Functional Requirements of Agricultural Structures. (3) I. Requirements for storage of agricultural products and for livestock production systems; selection and use of materials; control of environment; layout of production systems. Two hours rec. and three hours lab. a week. Pr.: Phys. 311, M. E. 213.

505 446. Tractors. (3) II. Theory, design, operation, and adjustment of the internal combustion engine and a comprehensive study of power and its relation to agriculture. Two hours rec. and three hours lab. a week. Pr.: Phys. 311, M. E. 412.

505 466. Analysis of Agricultural Structures. (3) II. Estimation of loads on agricultural structures; allowable unit stresses; structural systems

in agricultural buildings. Three hours rec. a week. Pr.: Ap. M. 415, Ag. E. 440.

505 480. Soil and Water Conservation. (3) II. Principles and methods of land drainage, soil and water conservation, and irrigation. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 471, Ag. E. 375, C. E. 422.

505 500. Rural Electrification. (3) II. Water supply, sewage disposal, lighting, heating, and ventilation of farm buildings; refrigeration; rural electrification. Two hours rec. and three hours lab. a week. Pr.: E. E. 403, Ap. M. 471, M. E. 412.

505 550. Agricultural Systems Engineering. (2) II. Development of plans and specifications for buildings, equipment and controls for selected systems of agricultural production. Six hours lab. a week. Pr.: Ag. E. 435, 466, 500.

505 580. Measurement Systems. (3) I. Theory and application of systems for measuring motion, temperature, radiation, humidity, moisture content, chemical composition, pressure, force and flow. Emphasis on environments and processes related to soils, plants and animals. Two hours rec. and three hours lab. a week. Pr.: E. E. 403 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

505 605. Irrigation and Drainage. (3) I, II. Design and operative problems involved in irrigation or drainage of agricultural land. Two hours rec. and three hours lab. a week. Pr.: C. E. 422, Ap. M. 471, Ag. E. 375.

505 620. Problems in Agricultural Engineering. Credit arranged. I, II, S. Problems in the design, construction, or application of machinery or power in agriculture, structures, modern conveniences, and rural electrification. Pr.: Approval of instructor.

505 700. Agricultural Process Engineering. (3) I, II. Theory, equipment, and techniques in processing farm products; application of mechanics, thermodynamics, fluid flow, and heat transfer to problems in size reduction, drying, refrigeration, conveying, and grading products. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 471, M. E. 412.

505 710. Advanced Farm Power and Machinery. (3) I, II. Analytical study of design, construction and operating characteristics of tractors and selected farm machines; application of testing instruments and experimental apparatus. Two hours rec. and three hours lab. a week. Pr.: Ag. E. 435, 446.

FOR GRADUATE CREDIT

505 810. Research in Agricultural Engineering. Credit arranged. I, II, S. The laboratories of the University are available for research in all areas of agricultural engineering. The results of such investigation may be incorporated in bulletins of the Agricultural Experiment Station and/or furnish material for the master's thesis. Pr.: Approval of department head.

COURSES FOR STUDENTS IN AGRICULTURE

FOR UNDERGRADUATE CREDIT

506 151. Agricultural Mechanics Practices. (2) I, II. Introduction to mechanic practices and techniques basic to the repair, maintenance and construction of agricultural facilities and equipment on farms, including oxyacetylene and arc welding, tool conditioning, reading machine drawings, thread cutting, soldering, pipe and tubing assembly, layout and taking measurements, power tool operation such as grinder, drill press and metal lathe. Six hours lab. a week.

506 251. Farm Power. (3) I, II. A study of the internal combustion engine and the farm tractor; emphasis upon ignition, injection, carburetion, fuels, lubricants, power transmission and control systems, performance testing, tune-up maintenance and field operation. One hour rec. and six hours lab. a week. Pr.: Math. 100.

506 300. Engineering in Agriculture. (4) I, II. Engineering principles as applied to farm power and machinery, soil and water conservation, irrigation, farm electrification, farm structures and the farmstead. Three hours rec. and three hours lab. a week. Pr.: Math. 100, 150; Phys. 211.

506 351. Agricultural Machinery Operation and Maintenance. (2) I, II. Introduction to basic farm machinery operation, adjustment and maintenance; understanding basic principles of power transmission, draft, alignment, timing and calibration of tillage, harvesting, planting, seedbed and insect and weed control equipment; emphasis upon shop and field machine operation and adjustment techniques. Six hours lab. a week. Pr.: Ag. E. 151 or equiv.

506 352. Agricultural Machinery Construction. (2) II. Advanced shop processes and techniques for constructing and maintaining working efficiency of agricultural machinery; advanced welding, hard-surfacing and metallurgy as applied to construction and maintenance; selection of power transmission equipment and materials of construction; development of class projects from working drawings. Six hours lab. a week. Pr.: Ag. E. 151 or equiv. and junior standing.

506 353. Farmstead Utilities I. (2) I, II. A study of the function and techniques of providing light, heat and power to facilities within the modern farmstead; emphasis upon means of utilization of electricity and gas as energy sources; farmstead wiring systems, motors and basic controls, and farmstead water systems. One hour rec. and three hours lab. a week. Pr.: Math. 100.

506 451. Planning and Management of Agricultural Buildings. (2) II. Requirements for livestock production systems and storage of agricultural products; control of environment, ventilation, temperature and humidity control equipment; layout of production systems and farmstead planning; waste disposal. Six hours lab. a week. Pr.: Phys. 112 or 211 and Math. 100.

506 452. Farm Building Construction. (2) I, II. Organization and construction practices related to buildings and materials used on the farm; special emphasis upon application of handbook procedures for design of concrete mixtures, framing and fastener requirements, and material selection; determination of bill of materials and cost estimation. Six hours lab. a week. Pr.: Math. 100.

506 455. Dairy Mechanics. (3) I, II. Installation, adjustment and operation of dairy plant equipment; boilers, engines, motors, pumps, refrigeration machinery, water supply and waste disposal. Two hours rec. and three hours lab. a week. Pr.: Junior standing.

506 457. Farmstead Utilities II. (2) I or II, S. A study of the function, selection and application of electric circuit and process controls: equipment for steam generation and utilization; sources of electromagnetic radiation; and refrigeration systems as applied to agricultural materials and processes. One hour rec. and three hours lab. a week. Pr.: Ag. E. 353, Phys. 212.

506 458. Conservation Surveying and Planning. (2) I, II. Agricultural surveying; layout and checking waterways, terraces and farm ponds; conservation planning from aerial photographs. Six hours lab. a week. Pr.: Math. 100.

506 459. Agricultural Mechanic Methods. (3) I, II. Methods of teaching agricultural mechanics in high school including the organization and equipment for school shop; preparation of job and instruction sheets; organization and presentation of demonstrations and class lessons. One hour rec. and six hours lab. a week. Pr.: Conc. enrollment in student teaching.

FOR UNDERGRADUATE AND GRADUATE CREDIT

506 600. Advanced Farm Mechanics. (3) S. For teachers of vocational agriculture and those concerned with teaching farm mechanics in high

school; advanced shop techniques, with special emphasis on welding, machine tool, mechanical drawing, sheet metal work, and farm carpentry. One hour rec. and six hours lab. a week. Pr.: Ag. E. 151, 459 or equiv., plus one year's teaching experience or approval of instructor.

506 603. Advanced Farm Power. (3) S. For teachers of vocational agriculture concerned with teaching farm mechanics in high school; techniques on problems concerning power units and tractor operation, service, repair and maintenance. Teaching aids and programs will be developed. One hour rec. and six hours lab. a week. Pr.: Ag. E. 251 or equiv.

506 615. Problems in Agricultural Mechanization. Credit arranged. I, II, S. Problems in the application of technical principles to agricultural mechanization, land development and farmstead mechanization. Pr.: Approval of instructor.

506 651. Mechanized Feed Handling and Storage. (3) I. Detailed analysis and development of mechanical systems associated with feed and care of livestock; farmstead arrangements, flow diagrams, selection of equipment, conditioning and maintaining quality of feed in storage. Two hours rec. and three hours lab. a week. Pr.: Ag. E. 451 and 353.

506 652. Soil and Water Conservaton Practices. (3) II. The hydrologic cycle; rainfall-runoff relationships; structural conservation practices for conserving water and controlling erosion; drainage of agricultural lands. Two hours rec. and three hours lab. a week. Pr.: Agron. 270, Ag. E. 458 or 300.

506 653. Irrigation Practices. (3) I. Principles and practices of irrigation involved in the setup and operation of various irrigation systems on the farm. Two hours rec. and three hours lab. a week. Pr.: Agron. 270, Ag. E. 300 or 458.

506 654. Agricultural Facilities and Machinery Management. (2) II. Analytic study of functional and economic feasibility when matching farm production operations and labor-saving facilities and equipment; special emphasis on selection of equipment. Six hours lab. a week. Pr.: Ag. Ec. 200 and Ag. E. 651.

APPLIED MECHANICS

PHILIP G. KIRMSER,* *Head of Department*

Professors Best, Haft,* Kirmser,* McCormick* and Taylor;* Associate Professors Huang and Lindly;* Assistant Professors Crary, Kipp* and Knostman;* Emeritus: Dean Seaton and Associate Professor Munger*

The Department of Applied Mechanics functions as a service department at the undergraduate level and does not administer a curriculum leading to a bachelor's degree. The undergraduate courses offered are concerned with fundamental subject matter of an interdisciplinary nature. Some of these courses are common to all undergraduate curriculums.

Graduate Work:

Major work leading to the degrees Master of Science and Doctor of Philosophy is offered in this department.

The completion of an undergraduate curriculum in engineering substantially equivalent to one of those offered at this University is prerequisite to advanced study. Students, at the doctorate level particularly, are expected to develop strength in the physical sciences and to this end are expected to augment their major studies by course work in mathematics, theoretical physics, and sometimes chemistry.

The facilities for advanced study are excellent in both theoretical and experimental fields. These include large-scale digital and analog computers for theoretical studies and data analysis, modern equipment for vibration and experimental stress analysis, and a well-equipped laboratory for materials testing.

FOR UNDERGRADUATE CREDIT

510 205. Applied Mechanics A. (3) I, II, S. Composition and resolution of forces; equilibrium of force systems; application of the principles of statics to problems, including force analyses of simple structures. Centroids; moments of inertia. Three hours rec. a week. Pr.: Phys. 211, Math. 220.

510 220. Strength of Materials A. (3) I, II, S. Behavior of materials subjected to tension, compression, shear, and bending; design of beams and columns. Three hours rec. a week. Pr.: Ap. M. 205.

510 224. Strength of Materials A Laboratory. (1) I, II. Tests to determine the physical properties of various structural materials, including steel, aluminum, wood, and concrete. Analysis and interpretation of test data. Three hours lab. a week. Pr. or conc.: Ap. M. 220.

510 305. Statics. (3) I, II, S. Composition and resolution of forces; equilibrium of force systems; application of general laws of statics to engineering problems, including use of vector algebra, friction and force analyses of simple structures, cables, and machine elements; centers of gravity; moments of inertia. Three hours rec. a week. Pr. or conc.: Math. 221.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

510 412. Dynamics. (3) I, II, S. Vector treatment of kinematics, Newton's Laws, work and energy, impulse and momentum, with applications to problems of particle and rigid body motion. Three hours rec. a week. Pr.: Ap. M. 305, Math. 222.

510 415. Mechanics of Materials. (3) I, II, S. Elementary theories of stress and strain, behavior of materials, and applications of these theories and their generalizations to the study of stress distribution, deformation, and instability in the simple structural forms which occur most frequently in engineering practice. Three hours rec. a week. Pr.: Ap. M. 305; Pr. or conc.: Math. 222.

510 418. Mechanics of Materials Laboratory. (1) I, II, S. Determination of selected mechanical properties of several engineering materials, including iron-carbon alloys, aluminum alloys, concrete, wood, and plastics; relationship between structure and mechanical properties of these materials; elementary problems in experimental stress analysis and structural behavior; test procedures, instrumentation, and interpretation of results. One hour lab. instruction and two hours lab. a week. Pr. or conc.: Ap. M. 415.

510 421. Highway and Airport Materials and Design. (2) I, II. Pavement thickness design and the examination and testing of materials used in the construction of highways and airports. One hour rec. and three hours lab. a week. Pr. or conc.: Ap. M. 418, or G. E. 351 and C. E. 422.

510 471. Fluid Mechanics. (3) I, II, S. Physical properties; fluid statics; dynamics of ideal and real fluids (for incompressible and compressible flow); impulse and momentum; laws of similitude; dimensional analysis; flow in pipes; flow in open channels; flow about immersed objects. Three hours rec. a week. Pr.: Ap. M. 412, M. E. 400 or 412.

510 491. Airplane Stress Analysis. (3) I. Analysis of stress and stability problems in the structural elements of airplanes. Three hours rec. a week. Pr.: Math. 240 or equiv., Ap. M. 415.

FOR UNDERGRADUATE AND GRADUATE CREDIT

510 601. Advanced Mechanics of Materials. (3) I, II. Introduction to advanced problems in the elastic regime. Biaxial stress and strain, theories of failure, flexure, torsion, membrane theory of shells, beams on elastic foundations, thick cylinders and rotating disks, energy methods and buckling. Three hours rec. a week. Pr.: Ap. M. 415, Math. 240 or equiv.

510 603. Bituminous Materials and Mixes. (3) II. Manufacture of bituminous materials; significance of specifications and tests; selection of

bituminous materials for various types of construction; aggregate for bituminous surfaces; design and control of bituminous mixes for highway and airport pavements. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 421.

510 604. Cement and Concrete Technology. (3) I. The raw materials and manufacturing processes of portland cement; cementing components; physical and chemical aspects of the hydration reaction; properties of cement paste; concrete aggregates; principles of design, mixing, and placing concrete; properties of hardened concrete. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 418, 421.

510 610. Experimental Stress Analysis. (3) I. Experimental methods of investigating stress distribution. Photoelastic models, photoelastic coatings, brittle coatings, and resistance strain gages applied to static and dynamic problems. Two hours rec. and three hours lab. a week. Pr. or conc.: Ap. M. 601 or approval of instructor.

510 612. Experimental Techniques in Mechanics. (1-3) I, II. Techniques and instrumentation for the experimental analysis of selected problems in vibrations, dynamics, fluid mechanics or engineering materials. Pr.: Senior standing in engineering and consent of instructor.

510 615. Intermediate Dynamics. (3) II. General vector principles of the dynamics of particles and rigid bodies; applications to orbital calculations, gyrodynamics and rocket performance; introduction to the energy methods of advanced dynamics. Three hours rec. a week. Pr.: Ap. M. 412, Math. 240 or equiv.

510 618. Introduction to the Theory of Continuous Media. (3) I. Analysis of strain, motion and stress; fundamental laws; constitutive equations; applications to fluid, elastic, and plastic media. Three hours rec. a week. Pr.: Ap. M. 412, Math. 240 or equiv.

510 620. Intermediate Fluid Mechanics. (3) I. An introduction to the general analytical relations of fluid flow, viscous flow, turbulence, boundary layer theory; applications. Three hours rec. a week. Pr.: Ap. M. 471, Math. 240 or equiv.

510 625. Plastics and Plastic Laminates. (3) II. Formation and structure of polymers; isomerism; relations between structure and engineering properties; modification of structure and properties by external causes; integral reinforcing and plastic concretions; applications. Three hours rec. a week. Pr.: Ap. M. 415; G. E. 350, 351; M. E. 412.

510 701. Energy Methods in Engineering Mechanics. (3) II. The principle of virtual work, minimum potential energy; theorem of complementary energy; Castigliano's theorems; application of statically determinate and indeterminate beams, curved beams, and frames; extension of energy principles of statics to dynamic problems. Three hours rec. a week. Pr.: Ap. M. 415.

510 710. Elastic Stability. (3) I. Bending of prismatic bars under simultaneous action of axial and lateral loads; buckling of centrally compressed bars; buckling of compressed rings and curved bars; lateral buckling of beams. Three hours rec. a week. Pr.: Ap. M. 415, Math. 240 or equiv.

510 714. Applied Elasticity. (3) II. Analysis of stress and strain at a point in an elastic medium; two-dimensional problems in rectangular and polar coordinates; torsion of bars; energy principles; numerical methods. Three hours rec. a week. Pr.: Ap. M. 601.

510 716. Applied Linear Analysis. (3)I. The application of linear analysis to engineering problems, including derivations of equations, exact and approximate solutions for systems representable by matrix algebraic, difference, differential, and integral equations. Concepts of characteristic, impedance, transfer and influence functions. Three hours rec. a week. Pr.: Math. 240.

510 721. Applied Nonlinear Analysis. (3) II. Study of mechanical or electrical systems governed by nonlinear equations, elliptic integrals, geometry of integral curves, the phase plane, Lienard's graphical con-

struction, Poincare's classification of singular points, stability and instability. Three hours rec. a week. Pr.: Math. 240 or equiv.

FOR GRADUATE CREDIT

510 806. Topics in Theoretical and Applied Mechanics. Credit arranged. I, II, S. Advanced study of special problems in the fields of mechanics. Each spring semester a course based on a previously announced, different, modern, technically advanced book concerning topics applicable to engineering problems will be offered under this course number. Pr.: Approval of instructor.

510 810. Research in Applied Mechanics. Credit arranged. I, II, S. Experimental and/or analytical investigations in the fields of materials of construction, mechanics of materials, fluid mechanics, soil mechanics, dynamics, and vibrations. The results of such investigations may furnish material for graduate theses or reports. Pr.: Approval of instructor.

510 822. Theory of Elasticity. (3) I. Stress, strain, equations of equilibrium and compatibility, strain-displacement relations for general coordinates; problems in plane stress and plane strain; applications to three-dimensional problems; propagation of elastic waves; complex variables and variational methods. Three hours rec. a week. Pr.: Ap. M. 618.

510 830. Thermoelasticity. (3) I. Theory and analysis of thermal stresses in elastic and inelastic systems. Pr.: Ap. M. 714 or 822 or consent of instructor.

510 842. Theory of Plates and Shells. (3) II. Equations for bending of thin plates, symmetrical bending of circular plates, simply supported rectangular plates; rectangular plates with various edge conditions, plates of various shapes. Introduction to analysis of bending of shells. Three hours rec. a week. Pr.: Ap. M. 601.

510 850. Vibration of Elastic Bodies. (3) I. Longitudinal, torsional, and lateral vibration of bars; testing of samples of materials by dynamic methods; the Ritz method; vibration of membranes and plates; waves in isotropic elastic mediums; vibration of pavement slabs. Three hours rec. a week. Pr.: M. E. 656; Pr. or conc.: Ap. M. 714 or 822.

510 862. Plasticity. (3) I in odd years. Elastic-plastic and fully plastic problems of trusses, beams, and bars in torsion; unrestricted and contained plane strain; limit analysis. Three hours rec. a week. Pr.: Ap. M. 601.

510 870. Transform Calculus Applied to Engineering Problems. (3) II. The Laplace, sine, cosine, Hankel, Legendre, Fourier, and Jacobi transforms applied to the solution of initial and boundary value problems in the ordinary and partial differential equations arising in engineering. Three hours rec. a week. Pr.: Math. 550 or equiv.

510 880. Advanced Fluid Mechanics. (3) II. Potential flow in three dimensions, vortex motion, the equations of viscous flow, hydrodynamic stability, turbulence. Three hours rec. a week. Pr.: Ap. M. 618 or 620, Math. 551.

CHEMICAL ENGINEERING

WILLIAM H. HONSTEAD,* *Head of Department*

Professors Bates, Fan,* Honstead* and Kyle;* Associate Professors Akins* and Erickson;* Assistant Professors Cheng, Hall* and Matthews**

For Curriculum, See Page 262

The chemical engineer has the responsibility for the development of new processes and plants for the chemical and allied industries. This involves a knowledge of chemistry, physics, mathematics, and chemical engineering science. The chemical engineer must know how chemical reactors are designed, how automatic controls are used to operate his

processes, how materials can be separated and purified by distillation, extraction, or other diffusional operations. He must know how to use computers, how to make material and energy balances, how to make valid engineering judgments based on economic considerations, and how to move liquids, gases and solids from one place to another.

The Chemical Engineering Curriculum is designed to give students the necessary breadth of knowledge and the necessary scientific tools to perform these functions. The first two years are devoted to basic chemistry, physics and mathematics, and the essential communication skills. The last two years are spent in learning the applications of these sciences through the study of transport processes, separation techniques, thermodynamics, kinetics, process dynamics and design. Technical and nontechnical electives are provided to allow the individual to broaden his education in such directions as he desires. The Chemical Engineering Curriculum is best suited to the highly motivated, intelligent student with strong interests in chemistry, physics, and mathematics. Our graduates are well trained for responsible positions in industry or for continuing their education through M. S. or Ph. D. degrees.

Graduate Work:

The Master of Science and Doctor of Philosophy degrees are offered. Research in transport phenomena, diffusional processes, thermodynamics, process dynamics, optimization techniques, and process development is regularly under way, and new fields of research are being developed. Support for this research comes from federal, state, and industrial sources. Laboratory space, equipment and instruments are available for this research. The department has shop facilities in which unusual equipment is built and repaired. A glass blower is available on the campus, and the College of Engineering and the University computing centers are used extensively by our graduate students.

FOR UNDERGRADUATE CREDIT

520 215. Introduction to Process Analysis. (4) I, II, S. An introduction to the basic concepts of chemical engineering. Three hours rec. and three hours lab. a week. Pr.: Chem. 230; Pr. or conc.: Math. 240 and Phys. 311.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

520 415. Chemical Engineering Thermodynamics. (5) I. Development and application of the principles of thermodynamics as applied to chemical engineering problems. Four hours rec. and three hours lab. a week. Pr.: Ch. E. 215.

520 422. Chemical Engineering Laboratory I. (2) I, II. Principles and techniques of physical measurements such as temperature, pressure and concentration; basic principles of momentum transfer, heat transfer, and mass transfer; experiments in classical unit operations, e. g., distillation, evaporation, drying, fluidization, and in chemical kinetics, thermodynamics and process dynamics. Six hours lab. a week. Pr.: Ch. E. 415; Pr. or conc.: Ch. E. 430.

520 430. Transport Phenomena. (5) II. Introduction to the basic principles of viscous flow, heat conduction, convection, radiation and diffusion in which the transport media are considered to be continuous. Four hours rec. and three hours lab. a week. Pr.: Ch. E. 215.

520 432. Chemical Engineering Laboratory II. (2) I, II. Cont. of Chemical Engineering Laboratory I. Six hours lab. a week. Pr.: Ch. E. 422.

520 442. Chemical Engineering Laboratory III. (2) I, II. Cont. of Chemical Engineering Laboratory II. Six hours lab. a week. Pr.: Ch. E. 432.

520 480. Problems in Chemical Engineering. Credit arranged. I, II, S. An introduction to chemical engineering research. Pr.: Approval of department head.

520 520. Process Analysis and Design. (5) I. The analysis and design of chemical process components, including chemical reactors and separa-

tion systems. Four hours rec. and three hours lab. a week. Pr.: Ch. E. 415 and 430.

520 530. Process Optimization. (3) I. The economic optimization of chemical processes, with emphasis on optimization methods and process economics and their application in design. Three hours rec. a week. Pr. or conc.: Ch. E. 520.

520 540. Chemical Engineering Systems Design. (5) II. The synthesis and design of process systems for chemical and allied industries. Emphasis will be placed on the design process and the development of optimal designs. Three hours rec. and six hours lab. a week. Pr.: Ch. E. 530.

FOR UNDERGRADUATE AND GRADUATE CREDIT

520 635. Chemical Engineering Analysis I. (3) I, II, S. The mathematical formulation of problems in chemical engineering using differential equations, partial differential equations, vector and tensor notation. Solution of these problems by graphical, numerical, and transform methods. Three hours rec. a week. Pr.: Math. 240, Ch. E. 430.

FOR GRADUATE CREDIT

520 810. Research in Chemical Engineering. Credit arranged. I, II, S. Original investigations in transport phenomena, unit operations, thermodynamics, process dynamics, applied chemical kinetics and process development. The results of these investigations may be used for the master's thesis or the doctoral dissertation.

520 815. Advanced Chemical Engineering Thermodynamics. (3) I, II, S. Advanced topics in thermodynamics, with emphasis on chemical and physical equilibria and the estimation of thermodynamic properties. Three hours rec. a week. Pr.: Graduate standing in chemical engineering.

520 822. Advanced Chemical Reaction Engineering. (3) I, II, S. Theory of kinetics and catalysis in homogeneous and heterogeneous systems, with applications in chemical reactor design and process development. Three hours rec. a week. Pr.: Ch. E. 540.

520 826. Advanced Unit Operations I. (3) I, II, S. Advanced study of mass transfer operations. Three hours rec. a week. Pr.: Ch. E. 540.

520 832. Advanced Unit Operations II. (3) I, II, S. Advanced study of the operations involving mechanical separation of materials. Three hours rec. a week. Pr.: Ch. E. 540.

520 850. Advanced Chemical Process Dynamics. (3) I, II, S. The dynamical behavior of chemical reaction systems and process equipment used in chemical plants. Control mechanisms for these systems. Three hours rec. a week. Pr.: Graduate standing in chemical engineering.

520 855. Chemical Engineering Analysis II. (3) I, II, S. Cont. of Ch. E. 635. Mathematical and statistical methods applied to chemical engineering problems. Three hours rec. a week. Pr.: Ch. E. 635.

520 862. Advanced Transport Phenomena I. (3) I, II, S. Advanced treatment of momentum, energy and mass transport, with emphasis on momentum transport in chemical engineering applications. Three hours rec. a week. Pr.: Ch. E. 635.

520 867. Advanced Transport Phenomena II. (3) I, II, S. Advanced treatment of momentum, energy and mass transport, with emphasis on energy and mass transport in chemical engineering applications. Three hours rec. a week. Pr.: Ch. E. 862.

520 871. Advanced Process Design and Optimization. (3) I, II, S. Advanced problems in the optimal design and economic evaluation of plant equipment and processes for the chemical and allied industries. Three hours rec. a week. Pr.: Ch. E. 540, 635.

520 875. Graduate Seminar in Chemical Engineering. (1) I, II. Discussion of current advances and research in chemical engineering and related fields.

520 901. Selected Topics in Reaction Engineering. (3) I, II, S. Advanced study in this field of such topics as complex reactions, catalysis, dispersion effects, fast reactions, reactions in fluidized beds. Three hours rec. a week. Pr.: Ch. E. 822 and one course in chemical engineering numbered 851 or higher.

520 910. Selected Topics in Transport Phenomena. (3) I, II, S. Subjects of current interest such as surface phenomena, turbulent transport, droplet mechanics, multi-component systems. Three hours rec. a week. Pr.: Ch. E. 867.

520 915. Selected Topics in Process Dynamics. (3) I, II, S. Study of the most recent methods for analysis of the dynamic behavior and control of complex systems and industrial processes. The use of Lyupanov theorems and the maximum principle are examples of the methods to be studied. Three hours rec. a week. Pr.: Ch. E. 850 and one graduate course in chemical engineering numbered 851 or higher.

520 920. Selected Topics in Unit Operations. (3) I, II, S. Study of such topics as zone melting, foam fractionation, membrane permeation, thermal diffusion, and unsteady state operations. Three hours rec. a week. Pr.: Ch. E. 826 or 832 and one course in chemical engineering numbered 851 or higher.

520 925. Selected Topics in Process Design and Optimization. (3) I, II, S. Study of advanced methods of process design and optimization, such as modern variational methods and dynamic programming. Applications to be chosen mainly from the chemical and allied industries and to include stochastic as well as deterministic problems. Three hours rec. a week. Pr.: Ch. E. 871.

520 930. Selected Topics in Thermodynamics. (3) I, II, S. Advanced study in this field of such topics as irreversible thermodynamics, solution theory, and surface phenomena. Three hours rec. a week. Pr.: Ch. E. 815 and one course in chemical engineering numbered 851 or higher.

CIVIL ENGINEERING

JACK B. BLACKBURN, *Head of Department*

Professors Blackburn, Smith* and Snell;* Associate Professors Cooper,* Rosebraugh* and Williams;* Assistant Professors Aguilar,* Funk, Haynie* and Schmid; Emeritus: Professors Crawford, Frazier and Morse*

For Curriculum, See Page 263

The civil engineer designs and builds structures, including buildings, bridges, tunnels, towers, air frames and space vehicles; transportation facilities, including highways, airports, waterways, railways and pipelines; water supply facilities, including treatment plants and distribution systems; waste disposal facilities, including treatment plants and collector systems; water resource facilities, including dams, canals and reservoirs; flood control facilities, including levees, dikes, retention basins and bank protection. The objectives of the Curriculum in Civil Engineering are to prepare the student for participating in, and ultimately assuming responsibility for, the planning, analysis, location and design of the above-named types of civil engineering works.

Graduate Work:

The Master of Science degree is conferred on those who complete the degree requirements in: Structural Analysis and Design; Soil Mechanics and Foundations; Hydraulic Engineering, Sanitary Engineering, Highway and Traffic Engineering; Transportation Planning; and Surveying and Mapping.

Laboratory facilities for advanced study and research are available in the areas of Structures, Soil Mechanics, Hydraulics, Sanitary Engineering, Transportation, Photogrammetry, Photo Interpretation, Surveying and Mapping.

FOR UNDERGRADUATE CREDIT

525 213. Plane Surveying. (3) I, II. Elements of plane surveying: Taping, transit, level, stadia, plane table, topographic surveying, public land surveys and elementary astronomical surveying. One hour rec. and six hours lab. a week. Pr.: Math. 150 or equiv.

525 214. Route Surveying. (3) I, II. Curves and earthwork; surveying pertaining to alignment of highways and railways. Two hours rec. and three hours lab. a week. Pr.: C. E. 213.

525 331. Analysis of Statically Determinate Structures. (3) I, II. Analysis of statically determinate beams, frames, and trusses; calculation of influence lines and deflections. Three hours rec. a week. Pr.: Ap. M. 415.

525 332. Analysis of Statically Indeterminate Structures. (3) I, II, S. Elastic analysis of statically indeterminate beams, frames, and trusses; introduction to force and displacement methods using matrix algebra. Three hours rec. a week. Pr.: C. E. 331.

525 356. Hydrology. (2) I, II. A study of the sources of supply and movement of underground and surface waters. Two hours rec. a week. Pr.: Ap. M. 471.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

525 411. Photogrammetry. (3) I, II. Principles of terrestrial and aerial photogrammetry; theory and use of stereoplotters; construction of mosaics, flight maps, and planimetric maps. Two hours rec. and three hours lab. a week. Pr.: C. E. 213; Pr. or conc.: C. E. 214.

525 422. Soil Mechanics I. (3) I, II. Identification, classification, and engineering properties of soils; compaction, theories of consolidation, slope stability, and ground water flow. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 415, G. E. 350, 351.

525 426. Foundations. (3) I, II. Subsoil investigation, lateral earth pressure and bearing capacity, shallow foundations, piles and pile foundations, and retaining structures. Two hours rec. and three hours lab. a week. Pr.: C. E. 422.

525 443. Structural Engineering in Metals. (3) I, II, S. Theoretical, experimental and practical bases for proportioning metal members and their connections; design of steel structures. Two hours rec. and three hours lab. a week. Pr.: C. E. 332.

525 444. Structural Engineering in Concrete. (3) I, II, S. A study of the theories of reinforced concrete and of its characteristics as a construction material; design of reinforced concrete structures. Two hours rec. and three hours lab. a week. Pr.: C. E. 332.

525 452. Hydraulic Engineering. (3) I, II. Application of the principles of fluid mechanics to control and utilization of water; river and flood control, dams, power development, pipe networks; laboratory—fluid measuring devices, hydraulic models, and flow in open channels. Two hours rec. and three hours lab. a week. Pr.: C. E. 356.

525 463. Sanitary Engineering Fundamentals. (3) I, II. Basic concepts from chemistry and microbiology and their applications to the determination and control of water quality and to the techniques employed in biological waste treatment. Two hours rec. and three hours lab. a week. Pr.: Chem. 250 or equiv.

525 465. Sanitary Engineering Design. (3) I, II. Design of water supply and waste treatment control facilities, including collection, storage, treatment, and distribution systems. Two hours rec. and three hours lab. a week. Pr.: C. E. 452, 463.

525 471. Transportation Engineering. (3) I, II. The development, economic feasibility, method of financing, location, geometric design, and operational analysis of transportation systems. Two hours rec. and three hours lab. a week. Pr.: C. E. 422; Pr. or conc.: C. E. 411.

525 485. Civil Engineering Project. (1-3) I, II. A laboratory design or

research project on a problem selected by the student. Requires a review of the literature; the preparation of a proposal which describes the project; the completion of the design or research; and the preparation of a report. Maximum credit hours: 3. May be substituted for a required senior design course on recommendation of instructor and approval of the department head.

FOR UNDERGRADUATE AND GRADUATE CREDIT

525 612. Land Surveying. (3) I. The Law of Evidence applied to land surveying; systems of describing and of transferring real property, rectangular public land system, simultaneous and sequence conveyances, reversion and riparian rights, and deed descriptions. Two hours rec. and three hours lab. a week. Pr.: C. E. 213 and senior standing.

525 614. Advanced Plane Surveying. (3) I. State coordinate system, control surveys, modern optical tachiometry, resection, trigonometric leveling, and hydrographic surveys. Two hours lec. and three hours lab. a week. Pr.: C. E. 213 and senior standing.

525 618. Engineering Photo Interpretation. (3) I. Photo interpretation techniques, types of aerial photographic film and their uses; applications in land use studies, land surveying, site selection, rainfall runoff and stream flow, location of construction materials, and in the determination of soil properties; other applications. Two hours rec. and three hours lab. a week. Pr.: Senior standing and consent of instructor.

525 622. Soil Mechanics II. (3) I. Review of identification, classification, and engineering properties of soil; advanced study of theories of consolidation, lateral earth pressure, bearing capacity, stability of slopes, and ground water flow. Two hours rec. and three hours lab. a week. Pr.: C. E. 422.

525 626. Advanced Foundation Engineering. (3) II. Methods of subsoil investigations; design of sheeting and bracing systems, shallow foundations, piles and pile foundations, bridge abutments, and coffer dams; underpinning, external equilibrium of retaining walls, and control of ground water. Three hours rec. a week. Pr.: C. E. 622.

525 632. Advanced Structural Analysis I. (3) I, II. Application of matrix methods of analysis to complex structures; selected topics in structural analysis. Three hours rec. a week. Pr.: C. E. 332.

525 633. Experimental Structural Analysis. (3) II. Application of Muller-Breslau's Principle and Betti's Law to structural models; principles of similitude. One hour rec. and six hours lab. a week. Pr.: C. E. 332.

525 643. Advanced Reinforced Concrete Theory. (3) I. Advanced theories and methods of design and analysis of reinforced concrete structures. Three hours rec. a week. Pr.: C. E. 444.

525 670. Geometric Design of Highways. (3) II. Criteria controlling geometric design of highways, vehicle requirements, speed volume, capacity safe grades, alignment, and cross-section; intersections and interchanges. Two hours rec. and three hours lab. a week. Pr.: C. E. 471.

525 675. Airport Design. (3) I. On demand. Problems encountered in planning, design, construction, and maintenance of large airports. Two hours rec. and three hours lab. a week. Pr.: C. E. 471.

525 711. Advanced Photogrammetry. (3) II. Photogrammetric optics and camera calibrations; distortions, basic analytic photogrammetry, and advanced instrumentation; analytical orientation techniques for vertical and convergent photography over flat and mountainous terrain; aerial triangulation. Two hours rec. and three hours lab. a week. Pr.: C. E. 411, 614.

525 712. Aerial Surveying Planning and Estimating. (2) S. Techniques, specifications, ground control and photographic mission planning, restitution and map production, cost estimating and scheduling; cadastral applications. One hour rec. and three hours lab. a week. Pr.: C. E. 711.

525 751. Hydraulics of Open Channels I. (3) I. Description and classification of open channel flow; properties of open channels, types of open channels, velocity distribution, and pressure distribution; energy and momentum principles; critical and uniform flow and gradually varying flow; design of channels for uniform flow. Three hours rec. a week. Pr.: C. E. 452.

525 762. Water Supply and Quality Control. (3) I. An in-depth study of the basic physical, chemical, and biological factors and their application in the design of water supply and water quality control systems. Three hours rec. a week. Pr.: C. E. 465 or equiv.

525 766. Waste Treatment Systems. (3) II. A study of waste treatment systems applied to domestic and industrial wastes. Emphasis is placed on the basic physical, chemical, and biological concepts applicable to the design of conventional and advanced waste treatment systems. Three hours rec. a week. Pr.: C. E. 465 or equiv.

525 771. Urban Transportation Analysis I. (3) I. Origin-destination surveys, land-use inventories, parking and transit studies; arterial street standards and operating characteristics; coordination of city planning. Two hours rec. and three hours lab. a week. Pr.: C. E. 471 or consent of instructor.

525 774. Pavement Design. (3) II. On demand. Methods of evaluating the load-carrying capacity of soil subgrade, sub-base, and base courses; critical analysis of the methods of design for flexible and rigid pavements; methods of increasing the load-carrying capacity of highway and airport pavements. Two hours rec. and three hours lab. a week. Pr.: C. E. 422.

525 775. Traffic Engineering I. (3) I. Driver, vehicle and roadway characteristics; speed and volume studies, congestion and accident studies; signs, signals, and pavement marking as traffic control devices; parking studies, screenline and corridor analyses; highway and intersection capacity. Two hours rec. and three hours lab. a week. Pr.: C. E. 471 or consent of instructor.

525 780. Economics of Design and Construction. (3) I. Selection of alternative engineering design and construction solutions through study of unit cost determination, cost estimating and financing procedures; introduction to construction scheduling. Three weeks rec. a week. Pr.: Senior standing in engineering or graduate standing for non-engineering majors.

525 786. Regional Planning Engineering. (3) I. Engineering problems involved in regional planning; the design and location of streets and highways, water supply and sanitary facilities, drainage and public utilities; rights of way and easement. Two hours rec. and three hours lab. a week. For graduate students in regional planning other than civil engineers.

525 790. Problems in Civil Engineering. Credit arranged. I, II, S. Pr.: Approval of instructor.

FOR GRADUATE CREDIT

525 810. Research in Civil Engineering. Credit arranged. I, II, S. Original investigation or advanced study in some field related to the practice of civil engineering. Pr.: Approval of department head.

525 813. Geodetic Surveying. (3) II. Elements of geometrical geodesy and the universal rectangular coordinate system; geodetic triangulation and position computation, vertical datum and geodetic leveling, and elementary geodetic astronomy. Two hours rec. and three hours lab. a week. Pr.: C. E. 614.

525 817. Electronic Surveying. (2) S. Electronic surveying systems, data reduction, geodetic applications, planning and estimating. One hour rec. and three hours lab. a week. Pr.: C. E. 614.

525 818. Adjustment of Surveys. (3) II. Accidental error theory, error forecasting, adjustment of independent direct observations, principle

of least squares, adjustment of unobserved independent parameters, solution of normal equations, matrices in surveying data adjustment. Two hours rec. and three hours lab. a week. Pr. or conc.: C. E. 813 or consent of instructor.

525 824. Soil Mechanics Applied to Highway Engineering. (3) I. On demand. Application of soil mechanics to highway design; subgrade sampling; stability of natural and cut slopes; stability and settlement of embankments and of embankment foundations. Two hours rec. and three hours lab. a week. Pr.: C. E. 622.

525 825. Advanced Soil Testing for Engineering Purposes. (3) II. On demand. Subsurface exploration; unconfined, triaxial, and direct shear tests; permeability, consolidation, and field load bearing tests. One hour rec. and six hours lab. a week. Pr.: C. E. 622.

525 831. Advanced Structural Theory. (3) I. On demand. Current and developing topics in advanced structural theory. Three hours rec. a week. Pr.: Approval of instructor.

525 832. Advanced Structural Analysis II. (3) II. Influence lines for statically indeterminate structural systems such as continuous beams, trusses, arches, and continuous arches; introduction to the analysis of shell structures. Three hours rec. a week. Pr.: C. E. 632.

525 834. Numerical Solution of Advanced Structural Systems. (3) II. Numerical methods of calculating deflections, moments, and eigenvalues; analysis of advanced structural systems by finite difference techniques. Three hours rec. a week. Pr.: C. E. 632, Math 551 or 761.

525 835. Structural Dynamics. (3) II. Analysis of structures subjected to dynamic loading. Three hours rec. a week. Pr.: C. E. 834.

525 843. Prestressed Concrete Design. (3) II. The study of prestressing methods and their application to the design of concrete structures. Three hours rec. a week. Pr.: C. E. 444.

525 844. Plastic Design of Steel Structures. (3) I. Fundamental principles of plastic design, methods of analysis of steel structures for ultimate load; influence of axial force and shear force on the plastic moment; stability problems in plastic design; design of the more common continuous structures. Three hours rec. a week. Pr.: C. E. 443.

525 845. Analysis and Design of Folded Plate Structures. (3) I. Theoretical foundation of folded plate analysis; bending theory for prismatic folded plate structures; matrix formulation; folded plates with non-symmetric loading; continuous folded plate structures; prismatoidal and triangular plate structures. Three hours rec. a week. Pr.: C. E. 632, Ap. M. 601.

525 848. Advanced Structural Design. (3) II. On demand. The design of complex steel and/or reinforced concrete structures; individual projects. Three hours rec. a week. Pr.: C. E. 632; minimum of nine hours graduate credit in structures and approval of instructor.

525 849. Design of Shell Structures. (3) I. The design of reinforced conceret shells of single and double curvature. Three hours rec. a week. Pr.: C. E. 832.

525 851. Hydraulics of Open Channels II. (3) II. Rapidly varied flow; flow over spillways, hydraulic jump, flow in channels with non-linear alignment and non-prismatic cross section; gradually and rapidly varying unsteady flow; flood routing. Three hours rec. a week. Pr.: C. E. 751.

525 854. Analysis of Ground Water Flow. (3) I. Hydraulics of steady state and transient flow into wells; well discharge and drawdown; artesian, free aquifer; pumping head; combination of wells; method of images; parallel drains; seepage flow through and under earth dams. Three hours rec. a week. Pr.: C. E. 422, 452; Math. 550 or equiv.

525 855. Analysis and Design of Large Dams. (3) II. Site selection and preliminary investigations; types of large dams and their uses; stability

and stress analyses of gravity, arch, and buttress dams; problems related to earth dams. Three hours rec. a week. Pr.: C. E. 632, Ap. M. 601.

525 863. Advanced Topics in Sanitary Engineering. (1-3) On demand. For graduate students in sanitary engineering. The course provides a forum for the discussion of advanced topics in sanitary engineering. Research being conducted at this and other institutions is analyzed critically. Pr.: Minimum of nine hours of graduate credit toward advanced degree.

525 871. Urban Transportation Analysis II. (3) II. Trip forecasting, trip generation, trip distribution and trip assignment; accuracy checks; planning parking facilities; study of models used in transportation planning; transportation systems and plans evaluation. Two hours rec. and three hours lab. a week. Pr.: C. E. 771.

525 872. Highway Planning and Economics. (3) II. Methods of determining highway travel patterns, highway classification, and highway needs; estimating future highway needs; economic analysis of planned improvements; highway finance and administration. Two hours rec. and three hours lab. a week. Pr.: C. E. 775.

525 875. Traffic Engineering II. (3) II. Theory of traffic flow; design of traffic control devices and signal systems; application of statistical methods to traffic engineering problems. Two hours rec. and three hours lab. a week. Pr.: C. E. 775.

ELECTRICAL ENGINEERING

WELLINGTON W. KOEPSEL,* *Head of Department*

Professors Hunt, Koepsel,* Sitz* and Ward, Jr.;* Associate Professor Wirtz;* Assistant Professors Cottom,* Harris,* Hechtl,* Johnson,* Kaufman and Lenhert;* Instructors Dollar, Gray, Hegler, Hightower, Krishen, Riedl, Sutton, Velez, Wakabayashi and Ward III; Emeritus: Professors Jorgenson, Kerchner and Kloeffler*

For Curriculum, See Page 264

The program of study in electrical engineering is designed to prepare a student for the profession of electrical engineering with career opportunities in research, development, design, operation, technical sales, teaching, consulting, and management. Emphasis is placed on a fundamental understanding of the science and the art of electrical engineering. The first two years of the curriculum are oriented toward mathematics and the physical sciences, while the third year emphasizes principles of analysis and a development of depth of understanding in electrical engineering. The final year broadens the student's understanding of engineering and introduces him to various aspects of design.

Electives in the final year permit an individual to specialize in a particular area for work in such fields as communication systems, solid-state electronics, control systems, radar, power systems, energy conversion, computer systems, microwaves and many others.

Graduate Work:

The Department of Electrical Engineering offers programs of study leading to the Master of Science and Doctor of Philosophy degrees. Areas available for graduate study and research are circuit theory, electromagnetic field theory, communication theory, systems and computer technology. Laboratory facilities and equipment, as well as space, are provided for conducting original research in any of these areas.

Analog and digital computing facilities are available in the department. Students also use the digital computing facilities in the College of Engineering and the University computing centers.

Prerequisite to graduate study in the department is the completion of a program of study substantially equivalent to that required of undergraduate students in electrical engineering at this institution.

FOR UNDERGRADUATE CREDIT

530 391. Circuit Theory I. (3) I, II, S. An introduction to linear circuit theory; analysis of resistive circuits; natural, step, and impulse response of circuits containing resistive, inductive, and capacitive elements. Pr.: Math. 222; Pr. or conc.: Phys. 311.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

530 403. Electric Circuits and Control. (4) I, II. Principles of direct-current circuits and machines, alternating-current circuits and machines, electronics, and application to instrumentation and control. Four hours rec. a week. Pr.: Phys. 311.

530 404. Circuit Theory II. (4) I, II, S. Steady-state and transient analysis of electric circuits using the Laplace transform algorithm and the j omega formalism. Three hours rec. a week and a three-hour calculating period a week. Pr.: Math. 240, E. E. 391.

530 405. Circuit Theory III. (3) I, II, S. Two-terminal network theory, four-terminal network theory, transmission lines, and filters. Three hours rec. a week. Pr.: E. E. 404.

530 406. Illumination A. (2) I, II. Systems, calculations, and specifications of interior wiring; principles of illumination. Two hours rec. a week. Pr.: Phys. 211 or 311.

530 415. Electronics I. (3) I, II, S. Fundamentals of electronic devices. Three hours rec. a week. Pr. or conc.: E. E. 404 or Pr.: E. E. 391, N. E. 500.

530 416. Electronics II. (3) I, II, S. Analysis and design of electronic circuits. Three hours rec. a week. Pr.: E. E. 415; Pr. or conc.: E. E. 405. N. E. majors: Pr.: N. E. 500, E. E. 404, 415.

530 417. Electronics III. (3) I, II. Cont. of Electronics II. Three hours rec. a week. Pr.: E. E. 416.

530 419. Electric Circuits and Machines. (4) I, II, S. Theory of magnetic circuits, direct-current circuits and machines, and alternating-current circuits and machines. Four hours rec. a week. Pr.: Phys. 311; Pr. or conc.: Math. 222 or 232.

530 420. Electric Circuits and Machines Laboratory. (1) I, II, S. Experiments on subject matter in E. E. 419. Three hours lab. a week. Pr. or conc.: E. E. 419.

530 423. Electronics and Control. (3) I, II. Theory and application of electronic rectifiers, amplifiers, oscillators, and control circuits. Three hours rec. a week. Pr.: E. E. 419.

530 424. Electronics and Control Laboratory. (1) I, II. Experiments on the subjects in E. E. 423. Three hours lab. a week. Pr. or conc.: E. E. 423.

530 431. Electrical Engineering Laboratory I. (2) I, II. Electrical engineering laboratory experiments on topics selected from and correlated with the concurrent or prerequisite courses. Three hours lab. a week. Pr. or conc.: E. E. 404, 415, 497.

530 432. Electrical Engineering Laboratory II. (2) I, II, S. Cont. of Electrical Engineering Laboratory I. Three hours lab. a week. Pr.: E. E. 431; Pr. or conc.: E. E. 405, 416, 501.

530 433. Electrical Engineering Laboratory III. (2) I, II. Cont. of Electrical Engineering Laboratory II. Three hours lab. a week. Pr.: E. E. 432; Pr. or conc.: E. E. 417, 498, 502.

530 434. Electrical Engineering Laboratory IV. (2) I, II, S. Cont. of Electrical Engineering Laboratory III. Three hours lab. a week. Pr.: E. E. 433; Pr. or conc.: E. E. 520.

530 497. Electromagnetic Theory I. (3) I, II. Vector analysis, electrostatics, magnetostatics, Maxwell's equations, and applications. Three hours rec. a week. Pr.: Phys. 311, Math. 240; Pr. or conc.: E. E. 391.

530 498. Electromagnetic Theory II. (3) I, II. Cont. of Electromagnetic

Theory I. Three hours rec. a week. Pr.: E. E. 497; Pr. or conc.: E. E. 404.

530 501. Energy Conversion I. (3) I, II, S. Energy conversion principles and their application to electric energy converters operating in the static and the dynamic mode. Three hours rec. a week. Pr.: E. E. 404; Pr. or conc.: E. E. 498.

530 502. Energy Conversion II. (3) I, II, S. Cont. of Energy Conversion I. Three hours rec. a week. Pr.: E. E. 501.

530 520. Control Systems. (3) I, II. An introduction to the analysis and design of feedback control systems. Three hours rec. a week. Pr.: E. E. 501; Pr. or conc.: E. E. 417.

530 530. Electrical Engineering Seminar. (1) I, II. Preparation and oral presentation of a written technical report. One hour rec. a week. Pr.: Senior standing in electrical engineering.

FOR UNDERGRADUATE AND GRADUATE CREDIT

530 608. Wave Guides, Antennas and Propagation. (3) I, II. Applications of Maxwell's equations to boundary value problems, guided transmission, cavities, radiation and propagation. Three hours rec. a week. Pr.: E. E. 405, 498.

530 610. Problems in Electrical Engineering. Credit arranged. I, II, S.

530 620. Analog Computation. (3) II. Use of analog computers; solution of linear and non-linear algebraic and differential equations—scaling problems into machine units. Two hours rec. and three hours lab. a week. Pr.: Math. 240 or equiv., Phys. 212 or 311, E. E. 416 or consent of instructor.

530 630. Transistor Circuitry. (3) II. A study of transistor circuits. Three hours rec. a week. Pr.: E. E. 417.

530 640. Design of Switching Circuits. (3) I. Boolean algebra applied to design of switching networks, digital calculating circuits, codes, and translating circuits; sequential relay circuits. Three hours rec. a week. Pr.: E. E. 416.

530 645. Introduction to Communication Theory. (3) I, II. An introduction to information, modulation, transmission, demodulation, noise, and communication systems. Three hours rec. a week. Pr.: E. E. 417.

530 650. Operational Circuit Analysis. (3) I. Unit function, transforms, and other methods of Heaviside and Bromwich applied to electric circuits. Three hours rec. a week. Pr.: E. E. 404.

530 665. Pulse Techniques. (3) II. A study of basic pulse circuits and their applications leading to an understanding of radar display circuits, computer components, and pulse modulation methods. Three hours rec. a week. Pr.: E. E. 417.

530 680. Power System Stability. (3) II. The stability problem, physical and analytical concepts, characteristics of power system apparatus from the standpoint of stability, and calculation of steady-state and transient stability. Three hours rec. a week. Pr.: E. E. 502.

530 690. Solid-State Engineering. (3) I, II. Elastic thermal, electric and magnetic properties of crystals and metals; conduction in metals and semiconductors. Three hours rec. a week. Pr.: E. E. 498; Phys. 560 or N. E. 410 or 450.

530 751. Digital Techniques I. (3) II. Combinational and sequential circuits, counters, adders, accumulators, memory devices, digital differential analyzers, and programming of computers. Three hours rec. a week. Pr.: E. E. 416.

FOR GRADUATE CREDIT

530 801. Digital Techniques II. (3) I. The organization and assembly of computer units into a general purpose computer. Three hours rec. a week. Pr.: E. E. 751.

530 805. Advanced Feedback Control Systems. (3) II. Design by pole-

zero methods, sensitivity factors, analysis of control systems with delays, samplers, and essential non-linearities, and approximation of linear and non-linear systems on a digital computer. Three hours rec. a week. Pr.: E. E. 520.

530 806. Sampled-data Control Systems. (3) On sufficient demand. Analysis and design of sampled-data control system using Z-transforms; study of digital computer controlled systems. Three hours rec. a week. Pr.: E. E. 520.

530 808. Optimal Control Systems. (3) On sufficient demand. A study of the methods of the optimization of feedback control systems, with particular emphasis placed on Pontryagin's maximum principle and Bellman's functional analysis. Three hours rec. a week. Pr.: E. E. 805.

530 810. Research in Electrical Engineering. Credit arranged. I, II, S. Special investigation adapted to the needs of individual students. The laboratory work is correlated with the work of the Engineering Experiment Station and may be used as the basis for a master's thesis. Pr.: E. E. 417.

530 815. Information Theory. (3) II. The discrete noiseless channel, the discrete noisy channel, continuous signals theory, and modulation theory from the standpoint of information theory. Three hours rec. a week. Pr.: E. E. 645.

530 821. Noise Theory. (3) I. A study of noise phenomena and measurement; the representation of noise by statistical parameters, the noise factor of undesired noise sources, and the measurement applications of noise generators. Three hours rec. a week. Pr.: E. E. 645.

530 831. Modulation Theory. (3) II in alt. years. A study of the most widely used modulation systems, with particular emphasis on the evaluation of their performances in modern communication systems. Three hours rec. a week. Pr.: E. E. 821.

530 836. Network Synthesis I. (3) I. Methods of synthesizing networks to yield specified characteristics. Three hours rec. a week. Pr.: E. E. 405 or consent of instructor.

530 837. Network Synthesis II. (3) II. Synthesis of driving point impedances, transfer functions, transfer impedances, and the synthesis of distributed parameter systems. Three hours rec. a week. Pr.: E. E. 836.

530 855. Advanced Electromagnetic Theory I. (3) I. Mathematical development of electromagnetic wave theory. Three hours rec. a week. Pr.: E. E. 607.

530 856. Advanced Electromagnetic Theory II. (3) II. Plane waves in unlimited isotropic media, cylindrical waves, spherical waves, radiation, and boundary value problems. Three hours rec. a week. Pr.: E. E. 855.

530 857. Microwave Theory. (3) On sufficient demand. Wave equation and its solution for rectangular and cylindrical wave guides, wave guide discontinuities and equivalent impedance representation, periodic structures, surface wave guides, microwave resonators, millimeter waves. Three hours rec. a week. Pr.: E. E. 855.

530 858. Antenna Theory. (3) On sufficient demand. Principles of radiation, directivity, and other characteristics of antenna systems; linear, short-wave beam end fire, omnidirectional, wide-band, slot, horn, and parabolic antennas; reflectors and lenses. Three hours rec. a week. Pr.: E. E. 855.

530 859. Radar Systems. (3) On sufficient demand. A study of radar systems including radar cross section, noise in target detection, doppler radar, scanning systems, propagation effects and error analysis; radar transmitters, receivers, antennas, and displays. Three hours rec. a week. Pr.: E. E. 855.

530 860. Matrix Methods Applied to Electrical Engineering. (3) I. Ap-

plication of matrices to lumped and distributed parameter networks, carrier-frequency servomechanisms, and radar mapping. Three hours rec. a week. Pr.: E. E. 405.

530 865. Advanced Information Theory Seminar. (3) II. Discussion and study of the most recent developments in the field of communication, encompassing noise, modulation, smoothing filters and adaptive systems, and other allied topics. Three hours rec. a week. Pr.: E. E. 815, 821.

530 880. Advanced Electrical Theory. Credit arranged. I, II. Pr.: E. E. 417.

GENERAL ENGINEERING

RALPH G. NEVINS, *Dean*

500 110. Engineering Lectures. (0) I. Designed to acquaint freshman engineers with fundamental principles of their profession and to give a general survey of career opportunities in engineering. One hour of lecture a month. The dean, other members of the faculty, and visiting practicing engineers will present the lectures.

500 115. Engineering Assembly. (0) I, II. Presentation by students of abstracts and reviews of articles in the journals of their respective societies or in the technical press of their profession, and reports of engineering projects, industrial experiences, and original investigations conducted by the student branches of the professional engineering societies. Occasionally two or more of these individual groups unite for lectures by practicing engineers and by members of the engineering and university faculties. One hour of lecture a week, sophomore, junior, and senior years. Members of the engineering faculty.

500 150. Introduction to Engineering. (1) I. History and scope of the engineering profession; educational requisites; fundamentals of engineering methodology; opportunities and challenges. One hour rec. a week.

500 200. Kansas State Engineer Journalism. (1) I, II. Editorial and business staff work on the Kansas State Engineer. Pr.: Junior classification and consent of dean.

550 325. Cooperative Work Experience. (1) I, II, S. Industrial assignment on Engineering Work-Study Program. May not be taken for more than four sessions for credit. Pr.: Approval of program coordinator.

500 350. Engineering Materials. (2) I, II. Engineering requirements of materials; arrangements of atoms in materials; metallic and ceramic phases and their properties; polymers; multiphase equilibrium and non-equilibrium relationships; modification of properties through changes in microstructure; stability under service stresses, thermal behavior in service; corrosion; behavior in electromagnetic fields; effect of radiation on materials. Two hours rec. a week. Pr.: Chem. 230; Pr. or conc.: Phys. 310.

500 351. Engineering Materials Laboratory. (1) I, II. Laboratory experiments supplementing G. E. 350. Pr. or conc.: G. E. 350.

500 399. Honors Seminar in Engineering. (1) I, II. Selected topics of general interest. Open to sophomores in the Engineering Honors Program for two semesters.

500 499. Honors Colloquium in Engineering. (1) I, II. Selected topics of general interest. Open to juniors in the Engineering Honors Program for two semesters.

500 599. Honors Research in Engineering. (1) I, II. Individual research problem selected with approval of faculty adviser. Open to seniors in the Engineering Honors Program for two semesters. Written report is presented at end of second semester.

INDUSTRIAL ENGINEERING

FRANK A. TILLMAN,* *Head of Department*

Professors Hostetter and Smaltz;* Associate Professors Clifton,* Grosh,* Hwang,* Konz,* Lee,* Tillman* and Woodard; Assistant Professors Ashour,* Byers, Hansen, McDermott and Roth; Instructors Hearn and Nelson; Emeritus: Professors Darby and Dietrich*

For Curriculum, See Page 265

The Curriculum in Industrial Engineering emphasizes the design, improvement, and installation of integrated systems of men, materials, and equipment. Studies in mathematical, physical, and social sciences are united with a modern approach to principles of engineering analysis and design to specify, predict and evaluate the results of any industrial system. In addition, strong consideration is given to the economic and human factors involved in industrial operations.

Industrial engineers find opportunities in all types of businesses and industries and in many different activities. Graduates may be engaged in staff positions in work study, work flow design, safety engineering, economic analysis, process design, process control, cost control, operations research, and many other areas. In addition, their unique background makes them unusually well fitted for positions in manufacturing management. Managers need factual information arranged to define different alternatives and their consequences to help recognize and solve existing problems. Industrial engineering collects, analyzes and arranges this information in such a way as to fulfill this need, at the same time continuing to search for better ways to do the job at less financial and human cost.

The remarkable strides made by the industrial engineering profession during the past several years are reflected in the courses and curriculum. The use of newly developed techniques and fresh interpretations of more traditional approaches to industry's problems helps to keep the offerings current.

Graduate Work:

The Department of Industrial Engineering offers advanced work leading to the degrees of Master of Science and Doctor of Philosophy. Special emphasis is placed on the modern, quantitative approach to industrial engineering problems, as well as on the more traditional areas of specialization. Course work and opportunities for research are offered in operations research and analysis, engineering reliability and quality assurance, production and methods engineering, metallurgy and engineering materials, industrial economics and economic design, computer programming and industrial systems analysis, metal forming and machining, and human factors engineering.

Prerequisite to graduate work in these fields is the completion of an undergraduate curriculum in engineering or science encompassing the major areas of study provided in the undergraduate curriculum in industrial engineering offered at this institution.

Several very strong minor fields are available in the University, including other departments in the College of Engineering, the Human Engineering group in the Department of Psychology, the Business Management group in the College of Commerce, the Labor Economics group in the Department of Economics and Sociology, and the Department of Statistics and Computer Science.

The facilities for advanced work and research in the Department of Industrial Engineering include extensive libraries, excellent laboratory facilities, and complete shops for the construction and calibration of research apparatus and instrumentation. Modern research equipment and instrumentation in the form of analog computers, strain and temperature measuring devices, decade counters, cameras and projectors, card-punch and tape-punch program preparation devices, tape-read devices, and audio-visual, preprogrammed learning devices are available within the department. Majors in the department will have access to digital computers in both College of Engineering and University computing centers. Industrial

cooperation is excellent, and makes a valuable contribution to the research effort in the field.

FOR UNDERGRADUATE CREDIT

550 221. Industrial Production. (2) I, II. Technical aspects of modern industrial processes employed in the transformation of engineering materials; basic mechanics of metal machining and geometry of chip formation; flow and solidification of molten alloys; cold and hot forming processes; joining; welding and heat treatment. One hour rec. and three hours lab. a week.

550 372. Computers and Data Processing. (2) I, II, S. The use of computers in the solution of engineering and management problems. One hour rec. and three hours lab. a week. Pr.: Math. 221 or equiv.

FOR UNDERGRADUATE AND GRADUATE CREDIT

550 401. Industrial Management I. (3) I, II, S. Basic functions in an industrial organization and their interrelationships; management considerations involving product, process, plant and personnel. Three hours rec. a week. Pr.: Sophomore standing in engineering or consent of instructor.

550 441. Engineering Reliability and Quality Assurance I. (3) II. Quantitative and qualitative controls required by manufacturing industries, with special emphasis on controlling process quality and costs. Three hours rec. a week. Pr.: Stat. 410.

550 451. Work Measurement. (3) I, II. Motion and time study; process analysis and charting; principles of motion economy affecting the design of products, processes or services; micro-motion analysis and an introduction to standard data systems. Two hours rec. and three hours lab. a week. Pr.: I. E. 221; Pr. or conc.: Stat. 410.

550 471. Industrial Economy Studies. (3) I. Analysis of cost and productivity factors in an industrial production system; determination of production alternatives; conceptual models for cost minimization; linear programming. Three hours rec. a week. Pr.: Math. 222, Stat. 410.

550 481. Industrial Plant Studies. (0) II. Trip to industrial centers for study of facilities of special interest to industrial engineering students. Pr.: Junior standing in industrial engineering.

550 502. Industrial Management II. (2) I. Theory and practice of industrial management planning, execution and evaluation as a basis for coordination of the factors of an industrial system. Two hours rec. a week. Pr.: I. E. 401.

550 511. Production and Inventory Control. (2) I. Principles, techniques and applications of production planning and control, and inventory control. Two hours rec. a week. Pr.: I. E. 451; Pr. or conc.: I. E. 372.

550 521. Principles of Metal Machining and Forming. (2) I. The physical science of metal machining and forming; mechanics and geometry of chip formation; heat and temperature in machining metals; tool life; analysis of high-speed metal removal processes; ultra-sonic, electric discharge and chemical machining processes. One hour rec. and three hours lab. a week. Pr.: Ap. M. 415.

550 522. Tool Engineering. (3) II. Engineering analysis and design of industrial tooling devices, with special attention to problems of economics, dimensional planning, metal forming and shearing tools; introduction to automation and numerically controlled machine tools. Two hours rec. and three hours lab. a week. Pr.: I. E. 521.

550 552. Job Evaluation and Wage Incentives. (2) I. Work measurement as a basis for industrial wage systems; a consideration of work factor analysis, job evaluation and wage incentives for production workers. Two hours rec. a week. Pr.: I. E. 451.

550 571. Introduction to Operations Research I. (3) I, II, S. Objectives and methods for engineering research; operation analysis; evaluating

alternatives in decision making; optimal allocations of resources. Three hours rec. a week. Pr.: Math. 222 or equiv.

550 572. Introduction to Operations Research II. (3) II. More advanced treatment of topics covered in I. E. 571 as well as related topics not covered which include stochastic models. Three hours rec. a week. Pr.: I. E. 571, 575, Stat. 410.

550 575. Quantitative Techniques in Industrial Engineering. (3) I, II, S. Problem formulation and conceptual models; application of finite mathematics and other techniques to problems of industrial engineering and management. Three hours rec. a week. Pr.: Math. 222.

550 581. Industrial Facilities Layout and Design. (3) II. Comprehensive design of an industrial production system; application of undergraduate industrial engineering sequence. Two hours rec. and three hours lab. a week. Pr.: I. E. 511.

550 603. Topics in Industrial Engineering. Credit arranged. I, II, S. Case studies of industrial firms and recent developments in the fields of industrial engineering and management. Two hours rec. a week. Pr.: I. E. 401, 571, or consent of instructor.

550 625. The Man-Environment System. (3) II. Basic structure and performance of the human; viewed as a component in information processing and control systems; effect of environment. (Cross listed with M. E. 625) Pr.: Senior standing in engineering.

550 651. Standard Data Systems. (3) I. Microscopic and macroscopic standard data systems; commercial versions; company-developed plans; programmed standard data systems. Three hours rec. a week. Pr.: I. E. 372, 552.

550 660. Material Imperfections. (3) II. The nature of a crystal and the structures of materials; X-ray methods involved in the study of materials; preferred orientation and fiber textures; defects in crystals; phase transformation in the solid state; the effects of physical treatments on the crystal lattice of metals; defects in crystals. Two hours rec. and three hours lab. a week. Pr.: Phys. 311, G. E. 350.

550 661. Industrial Metallurgy. (3) II. The physical behavior of metals while undergoing various industrial fabrication processes; responses involving plastic flow allotropic transformations, recrystallization, grain growth, diffusion, mechanical and crystallographic fibering, solid-state solution and precipitation. Two hours rec. and three hours lab. a week. Pr.: I. E. 221, G. E. 350, 351.

550 663. Internal Structures of Metals. (2) I. Studies of internal structural phenomena of ferrous and non-ferrous alloys using metallographic and microphysical analyses. One hour rec. and three hours lab. a week. Pr.: G. E. 350, 351.

550 664. Electrochemical Behavior of Metals. (3) I. The electrochemical processes involved in corrosion of metals and the basic factors determining the nature and rate of attack; consideration of corrosion problems and methods of combating corrosion. Two hours rec. and three hours lab. a week. Pr.: Chem. 210 and 230, Phys. 310.

550 671. Structure of Engineering Materials. (2) I. The physical theories of the structure of solids; binding forces in molecular and crystalline materials; crystallography; thermodynamic stability of matter; equilibrium diagrams and the phase rule; rate theory and kinetics of solid-state transformations. Two hours rec. a week. Pr.: G. E. 350, 351.

550 672. Mechanical Behavior of Engineering Materials. (2) II. The theoretical consideration of the mechanical behavior of solids; stress and strain; elastic and plastic deformation; dislocations; strength of solid materials; recovery, creep and flow; fracture mechanisms. Two hours rec. a week. Pr.: I. E. 671.

550 701. Engineering Administration. (3) I. Engineering project administration; organization dynamics; quantitative factors in decision making; application of computerized and non-computerized games. Two

hours rec. and three hours lab. a week. Pr.: I. E. 502 or consent of instructor.

550 711. Advanced Production and Inventory Control. (3) II. Analytical and mathematical methods for making decisions on production, inventories, human resources, and shipping in modern industrial plants. Three hours rec. a week. Pr.: I. E. 511.

550 721. Numerical Control of Machine Tools. (3) II. Translation of information on engineering drawings through programming to tape preparation; application of computer programs to simplify control operations. Two hours rec. and three hours lab. a week. Pr.: I. E. 372, 522.

550 742. Engineering Reliability and Quality Assurance II. (3) II. Design and management of reliability programs and quality assurance systems; mathematics of reliability, case studies of reliability evaluation programs. Three hours rec. a week. Pr.: I. E. 441 or consent of instructor.

550 762. Advanced Metallurgy. Credit arranged. II. Studies in specialized phases and current concepts of metallurgy. Pr.: G. E. 350, 351.

550 766. Powder Metallurgy. (3) II. Production of powders by mechanical and chemical methods; theoretical concepts associated with consolidation, heat treating and internal structural changes of parts produced from powder metals and cermets. Two hours rec. and three hours lab. a week. Pr.: I. E. 663.

550 771. Advanced Industrial Economy Studies. (3) I. The problems of model construction for industrial forecasting. The methods utilized are least squares, regression, exponential smoothing and adaptive fitting. Three hours rec. a week. Pr.: Consent of instructor.

550 781. Problems in Industrial Engineering. Credit arranged. I, II, S. Pr.: Senior or graduate standing in industrial engineering.

FOR GRADUATE CREDIT

550 850. Human Engineering I. (3) I. Human factors affecting work; focus on man; energy requirements, lighting, noise, monotony and fatigue, learning, simultaneous vs. sequential tasks; experimental evaluation of concepts. Two hours rec. and three hours lab. a week. Pr. or conc.: Psych. 625.

550 852. Human Engineering II. (3) II. Focus on man in system: man-man and man-machine communication; design and arrangement of controls and displays; experimental evaluation of concepts. Two hours rec. and three hours lab. a week. Pr.: Psych. 625.

550 865. Simulation of Industrial and Management Systems. (3) II, S. This course is concerned with simulating industrial management systems on computers utilizing Monte Carlo techniques and simulation languages. Numerical methods related to simulation are to be covered. Three hours rec. a week. Pr. or conc.: Stat. 610 or consent of instructor.

550 871. Industrial Queuing Processes. (3) II. Introduction to the queuing process and theory of queues; analysis of single and multistation queues; application to production, materials handling, inventory and maintenance systems. Three hours rec. a week. Pr.: Stat. 610 or equiv.

550 873. Industrial Systems Analysis. (3) II. Analysis and synthesis of automatic control systems, with application to machines and processes and industrial management systems; a study of optimal control, stability, and sensibility of industrial management systems. Three hours rec. a week. Pr. or conc.: I. E. 575 or equiv.

550 874. Operations Research I. (3) I. A study of the methods of operations research including formulation of models and derivation of solutions by various optimization techniques; introduction to deterministic models and techniques, including optimization techniques, sequencing and replacement, linear programming, geometric programming and dy-

namic programming. Three hours rec. a week. Pr. or conc.: I. E. 575 or equiv.

550 875. Operations Research II. (3) II, S. Cont. of I. E. 874. Inroduction to stochastic models and techniques including queuing theory, simulation, non-linear programming, calculus of variations, maximum principle and forecasting. Three hours rec. a week. Pr.: I. E. 874, Stat. 610.

550 881. Linear Programming. (3) II. Development of the theory of linear programming and related topics including simplex method, duality theory, integer programming, transportation methods and stochastic linear programming. Application to industrial problems and the use of computer solutions are emphasized. Three hours a rec. a week. Pr.: I. E. 575 or equiv.

550 882. Non-linear Programming. (3) I. Study of non-linear models and their solution. Topics covered are non-linear programming, including Kuhn-Tucker theory, quadratic programming, separable programming, geometric programming, gradient and search methods, quasi-linearization and invariant embedding. Three hours rec. a week. Pr.: I. E. 875.

550 883. Dynamic Programming. (3) II. A study of the optimization of multistage decision processes based on the application of the principle of optimality. Stochastic and deterministic models are developed. Three hours rec. a week. Pr.: I. E. 874, Stat. 610.

550 885. The Application of the Maximum Principle to Industrial Systems. (3) I. A study of multistage systems optimization by the discrete maximum principle and a study of optimal decision and optimal control of continuous systems by the continuous maximum principle. Application to production scheduling, inventory controls, transportation problems, economic systems and other industrial management problems. Three hours rec. a week. Pr. or conc.: I. E. 874.

550 890. Advanced Topics in Operations Research. Variable credit (6 hours maximum) I, II, S. Study of topics related to operations research not covered in other courses. Selected according to the interests and needs of graduate students. Pr.: Consent of instructor.

550 892. Graduate Seminar in Industrial Engineering. (1) I, II. Max. total: three credit hours. Presentation and discussion of papers on industrial engineering subjects. One two-hour seminar a week.

550 896. Research in Industrial Engineering. Credit arranged. I, II, S. Investigations forming the basis for the master's thesis. Topics selected with approval of major professor and department head.

MECHANICAL ENGINEERING

PRESTON E. MCNALL,* *Head of Department*

Professors Appl, Bowyer,* Duncan,* Flinner,* McNall,* Nevins,* Rohles,* Tripp* and Wood; Associate Professors Azer,* Besch,* Crank,* Lindholm,* Messenheimer, Miller* and Walker;* Assistant Professors Gorton,* Gowdy,* Pauli, Sprague,* Swearingen* and Turnquist;* Instructors Annis,* Ball, Bell, Potts and Ward; Emeritus: Dean Durland; Professors Brainard, Helander and Smutz*

For Curriculum, See Page 266

Mechanical engineering graduates render professional services that vary from theoretical work in research and development to industrial applications such as design, production, management, sales and operation. The fields in which these services are performed range from energy utilization and conversion to the design and development of machines and the manufacture of goods. Mechanical engineers are found in aircraft, missile, electronics, power, petroleum and atomic energy industries, to name but a few. To provide the mechanical engineer with a broad fundamental base, the first half of the curriculum centers on the basic sciences of mathematics, physics, chemistry, and mechanics, which gives a thorough grounding in fundamentals and develops analytical thinking. The later

years include basic courses in thermodynamics, heat transfer, electricity and electronics, fluid mechanics, and strength of materials. The principles developed in these courses are then applied to courses which introduce the student to the concepts of design, including the principles of economic design, and to advanced theories applicable to engineering analysis and design. Selected programs of advanced courses in the senior year provide a degree of specialization in the areas of aerospace engineering, petroleum production, design, propulsion, automatic controls, energy conversion, etc.

Graduate Work:

The Department of Mechanical Engineering offers major work leading to the degrees Master of Science and Doctor of Philosophy. Prerequisite to major graduate work in the field of mechanical engineering is the completion of a four-year curriculum substantially equivalent to that required of undergraduates in mechanical engineering at Kansas State University. A student, particularly at the doctorate level, in addition to his major studies, is expected to develop strength in the physical sciences and mathematics by taking course work in those fields deemed appropriate by his supervisory committee.

Advanced work and research are offered in the areas of heat transfer, thermodynamics, air conditioning, energy conversion, automatic control, fluid and gas dynamics, aerodynamics, environmental engineering, biomedical engineering, propulsion systems, engineering design, kinematics and vibrations. Laboratory facilities and basic instrumentation are available for experimental work in these areas. Graduate students also have access to the college's digital and analog computers, and the various engineering laboratories and shops.

FOR UNDERGRADUATE CREDIT

560 211. Engineering Graphics. (2) I, II. Engineering lettering; use of drawing instruments; geometrical constructions; sketching; theory of projections of points, lines, and planes; orthographic projections of solids on conventional projection planes and auxiliary planes; conventional sections; pictorial representations. Six hours lab. a week. Pr.: Plane geometry.

560 213. Graphical Communications I. (3) I, II, S. Introduction to lettering, use of instruments, and alphabet of lines; freehand and instrument pictorials; basic principles of projective geometry; multiview drawing, including conventional sections and auxiliaries; functional dimensioning; reading and interpreting working drawings; and creative design. Five hours lab. and one hour rec.-lec. a week. Pr.: Plane geometry.

560 218. Graphical Communications II. (2) I, II, S. Cont. of the study of projective geometry; detail and assembly layouts, principally by freehand sketching; functional dimensioning; charts and graphs. Four hours lab. a week. Pr.: M. E. 213.

560 230. Elementary Aeronautics. (3) I, II. Elementary theory of flight, navigation, meteorology, civil air regulations, general discussions of commercial and business flying. Three hours rec. a week.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

560 400. Elements of Thermodynamics. (3) I, II. Thermodynamic principles and introduction to engineering applications. Three hours rec. a week. Pr.: Phys. 310, Math. 222 or 232.

560 406. Air Conditioning A. (3) I, II. Principles of heating, cooling, and ventilating; heat transmission; equipment used for heating, cooling, and ventilating. Three hours rec. a week. Primarily for students who have not had engineering thermodynamics. Pr.: Phys. 210 or 310.

560 412. Engineering Thermodynamics. (4) I, II, S. Laws of conversion of heat energy into mechanical energy; properties of fluids, gases and vapors; flow and non-flow processes; thermodynamic availability. Four hours rec. a week. Pr.: Math. 222 or 232, Phys. 310.

560 451. Machine Design I. (5) I, II, S. Displacement, velocity, and acceleration analyses of machine elements: statics and dynamic forces;

design of cam, gear, and intermittent motion mechanisms. Three hours rec. and six hours lab. a week. Pr.: Ap. M. 412.

560 466. Patents and Inventions. (3) II. A brief consideration of the fundamental principles of U. S. patents and their relationship to the engineer; the inception and development of inventions. Three hours rec. a week. Pr.: Junior standing.

560 512. Thermodynamics of Energy Conversion. (4) I, II, S. Power and refrigeration cycles; combustion and equilibrium; analysis of direct energy conversion. Four hours rec. a week. Pr.: M. E. 412.

560 521. Heat Transfer. (3) I, II. Fundamentals of conduction, convection, and radiation; principles of heat exchanger design and dimensional analysis. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 471, Math. 240 or equiv.

560 528. Aerodynamics I. (4) II. A general introduction to aerodynamics; operation of wind tunnel. Three hours rec. and three hours lab. a week. Pr.: Ap. M. 471, Math. 240 or equiv.

560 531. Mechanical Engineering Laboratory E. (1) I, II. Laboratory course in mechanical equipment for non-mechanical engineering students. Three hours lab. a week. Pr.: M. E. 412.

560 535. Mechanical Engineering Laboratory I. (3) I, II, S. Theory and application of mechanical engineering instrumentation and measurements. One hour rec. and six hours lab. a week. Pr.: M. E. 412, E. E. 424.

560 551. Machine Design II. (3) I, II, S. Design and analysis of machine elements, such as shafting, springs, screws, belts, brakes, clutches, gears, and bearings, with emphasis on strength, rigidity, and wear qualities. Three hours rec. a week. Pr.: Ap. M. 415, M. E. 451.

560 560. Engineering Economics. (3) I, II. Economic analysis of problems as applied in engineering. Three hours rec. a week. Pr.: Econ. 110, M. E. 412.

560 571. Petroleum Production. (3) I. Engineering problems in drilling and completion of wells; principles of drainage; production methods; and secondary recovery. Three hours rec. a week. Pr.: Senior standing in Department of Mechanical Engineering or approval of department head.

560 580. Professional Development. (1) I, II. The social and professional aspect of engineering. One hour rec. a week. Pr.: Senior standing.

560 583. Mechanical Engineering Laboratory II. (2) I, II, S. Analysis of heat transfer and fluid flow processes, mechanical systems, automatic control; instrumentation, design of experiments. Six hours lab. a week. Pr.: M. E. 535.

560 590. Intermediate Thermodynamics. (3) II. Systems involving electromagnetic, chemical, thermal, and mechanical energies; reactive systems of engineering interest; thermodynamic properties and relations among properties. Three hours rec. a week. Pr.: M. E. 412. (Not open to graduate students majoring in mechanical engineering.)

FOR UNDERGRADUATE AND GRADUATE CREDIT

560 608. Advanced Experimental Methods. (3) I. Principles of instrumentation and measurement, methods of experimental procedure, data checking and analysis of experimental results. Two hours rec. a week. Pr.: Math. 240, M. E. 535, or consent of instructor.

560 612. Systems Dynamics. (3) I. Analysis of the dynamic behavior of mechanical, thermal, fluid and electrical elements using the basic physical laws, with emphasis on the analogies. Derivation of the steady-state and transient responses of systems composed of linear elements using Laplace transforms and block diagrams. Three hours rec. a week. Pr.: Math. 240, E. E. 419; Pr. or conc.: Ap. M. 471.

560 618. Advanced Graphics. (3) S. Advanced problems in charts, graphs,

nomography and graphical mathematics. One hour rec. and four hours lab. a week. Pr.: M. E. 218 or equiv.

560 620. Internal Combustion Engines. (3) II. Analysis of cycles, design and performance characteristics. Three hours rec. a week. Pr.: M. E. 512.

560 622. Environmental Engineering I. (3) I, II. Psychrometry; heat transmission; air-conditioning equipment and systems; design problems. Two hours rec. and three hours lab. a week. Pr.: M. E. 521.

560 625. The Man-Environment System. (3) II. Basic structure and performance of the human; viewed as a component in information processing and control systems; effect of environment. Three hours rec. a week. (Cross listed with I. E. 625) Pr.: Senior standing in engineering.

560 628. Aerodynamics II. (4) I. Compressibility phenomena, power requirements, airplane performance; stability and control. Three hours rec. and three hours lab. a week. Pr.: M. E. 528.

560 631. Aircraft and Missile Propulsion. (3) II. Analysis of aircraft and missile propulsion systems; fundamentals of jet propulsion including rocket engines. Three hours rec. a week. Pr.: M. E. 512, Ap. M. 471, Math. 240 or equiv.

560 642. Fine Particle Technology. (3) II. Definition, theory and measurement of particle properties, particle dynamics, size distributions and characteristics of powders encountered in particle transport, gas cleaning, air pollution sampling and particle processing; the physics of air ion generation, transport and decay; and requisites of accurate sampling of airborne contaminants. Three hours rec. a week. Pr.: Ap. M. 471 and one course in statistics or consent of instructor.

560 651. Mechanical Engineering Design. (3) II. Professional-type problems involving thermal, thermodynamic, electrical, mechanical, and economic factors. One hour rec. and six hours lab. a week. Pr.: M. E. 521, 551.

560 656. Machine Vibrations I. (3) I, II. A general consideration of free and forced vibration in machines for various degrees of freedom; critical speed; vibration isolation. Three hours rec. a week. Pr.: Ap. M. 412, Math. 240 or equiv.

560 657. Kinematics. (3) I. Geometry of constrained motion applied to point paths, specific input-output relations, function generators, kinematic synthesis. Three hours rec. a week. Pr.: M. E. 451.

560 660. Engineering Analysis I. (3) I. Methods of analysis employed in the solution of problems selected from various branches of engineering. Emphasis is placed on discrete systems. Three hours rec. a week. Pr.: Math. 240 or equiv. and senior standing in engineering.

560 666. Aeronautical Engineering Design. (2) I. Design problems related to aircraft, missiles, and space vehicles. Six hours lab. a week. Pr.: M. E. 521, 628, 631.

560 671. Reservoir Engineering. (3) II. Reservoir fluid properties, forces, and energies; mechanics of fluid flow in porous media; control of reservoir performance. Two hours rec. and three hours lab. a week. Pr.: M. E. 571, Math. 240 or equiv., Ap. M. 471.

560 675. Problems in Mechanical Engineering. Credit arranged. I, II, S. Pr.: Approval of department head.

560 711. Advanced Thermodynamics I. (3) I. Application of the laws of thermodynamics to unsteady-flow processes; processes involving friction; available and unavailable portions of various forms of energy; the concept of flux of mass, energy, available energy, and entropy. Three hours rec. a week. Pr.: M. E. 512, Ap. M. 471, Math. 240 or equiv.

560 715. Gas Dynamics I. (3) II. Properties of compressible fluids, subsonic and supersonic flow, steady and non-steady motion, with emphasis on one-dimensional flow. Three hours rec. a week. Pr.: Math. 240 or equiv., M. E. 512, Ap. M. 471.

560 722. Environmental Engineering II. (3) II. Study and analysis of environmental factors and man's response to these factors; air pollution, air cleaning, biological heat transfer; factors affecting comfort, health, learning and productivity. Two hours rec. and three hours lab. a week. Pr.: Eight hours biological science; Pr. or conc.: M. E. 622.

560 725. Combustion. (3) I. Dynamics and thermodynamics of combustion processes; solid, liquid, and gaseous fuels. Three hours rec. a week. Pr.: M. E. 521.

560 731. Automatic Controls. (3) II. Design and application of control devices, hydraulic, pneumatic and electronic systems, computer control systems. Two hours rec. and three hours lab. a week. Pr.: M. E. 612 or consent of instructor.

560 733. Automatic Controls Laboratory. (3) II. Experimental methods for automatic control systems and components. Six hours lab. a week. Pr. or conc.: M. E. 731.

560 735. Fluid Control Systems. (3) II. Analysis and design of control devices and systems which utilize gases or liquids as the working media; formulation of non-linear and linearized mathematical models; laboratory projects applying analytical and experimental design techniques. Two hours rec. and three hours lab. a week. Pr.: M. E. 612.

560 756. Machine Vibrations II. (3) II. Advanced consideration of systems having free and forced vibrations, with particular reference to several degrees of freedom, distributed mass, generalized coordinates, and non-linear forms. Three hours rec. a week. Pr.: M. E. 656.

560 757. Mechanics of Machines. (3) II. Analysis of inertia effects in rotating discs, gyroscopes, cams and gear trains. Three hours rec. a week. Pr.: M. E. 451.

560 760. Engineering Analysis II. (3) II. Cont. of Engineering Analysis I. Emphasis placed on continuous systems. Three hours rec. a week. Pr.: M. E. 660 or consent of instructor.

FOR GRADUATE CREDIT

560 810. Research in Mechanical Engineering. Credit arranged. I, II, S. The laboratory work is correlated with the work of the Engineering Experiment Station. Research in any field pertinent to subjects taught in the Mechanical Engineering Department. Pr.: Approval of department head.

560 812. Laboratory Investigations in Thermodynamics, Heat Transfer, Fluid Flow, or Combustion. Credit arranged. I, II, S. Pr.: Basic undergraduate courses in the area selected and approval of department head.

560 814. Laboratory Investigations in Machine Design. Credit arranged. I, II, S. Pr.: Basic undergraduate courses in machine design and approval of department head.

560 816. Advanced Topics in Mechanical Engineering. Variable credit. I, II, S. A course reserved for study of current topics in mechanical engineering. Topics announced when offered. Pr.: Consent of instructor.

560 818. Advanced Thermodynamics II. (3) II. Cont. of Advanced Thermodynamics I. Three hours rec. a week. Pr.: M. E. 711.

560 822. Advanced Air Conditioning. (3) I. Advanced psychrometric analysis; physiological factors; biotechnology and heat transfer. Two hours rec. a week. Pr.: M. E. 622.

560 825. Advanced Machine Design. Credit arranged. I, II. At the option of the student this course may include a study of some advanced subject related to courses in this area. Pr.: Approval of department head.

560 830. Gas Dynamics II. (3) I. An extension of Gas Dynamics I, with emphasis on two- and three-dimensional problems, shock waves. Three hours rec. a week. Pr.: M. E. 715, Math. 621 or equiv.

560 831. Boundary Layer Theory I. (3) I. The development and solution of various laminar boundary layer problems involving momentum, heat,

and mass transfer for a compressible viscous fluid. Three hours rec. a week. Pr.: M. E. 521.

560 832. Boundary Layer Theory I. (3) II. Study of boundary layer transition; the development and solution of various turbulent boundary layer problems involving momentum, heat, and mass transfer and chemical reactions for a compressible viscous fluid. Three hours rec. a week. Pr.: M. E. 831.

560 835. Heat Conduction in Solids. (3) I. General differential equation of heat conduction and methods of solution for two-dimensional steady-state, transient heat flow, periodic heat flow, and internal heat sources. Three hours rec. a week. Pr.: M. E. 521.

560 836. Advanced Topics in Heat Transfer. (3) I. A study of current literature in heat transfer, with particular emphasis on transpiration cooling, aerodynamic heating, thermal stresses, and liquid metal heat transfer. Three hours rec. a week. Pr.: M. E. 835.

560 840. Research Methodology. (2) I. Principles and techniques of engineering research. Two hours rec. a week.

560 842. Convection Heat Transfer. (3) II. Energy and momentum equations in convective heat transfer, laminar and turbulent thermal boundary layers, steady and non-steady convection problems. Three hours rec. a week. Pr.: M. E. 521.

560 843. Radiation Heat Transfer. (3) I. Basic theories of thermal radiation, shape factors; exact and approximate solutions of integral equations for radiation heat transfer between solid surfaces with absorbing or non-absorbing medium. Three hours rec. a week. Pr.: M. E. 521.

560 845. Dimensional Analysis and Theory of Models. (2) II. Basic methods of dimensional analysis, with applications to the theory of models and the planning of experiments; similarity and model laws, dimensional analysis applied to problems in stress analysis, fluid mechanics, heat transfer, electrical engineering. Two hours rec. a week. Pr.: Approval of department head.

560 850. Advanced Power Plant Engineering. Credit arranged. I. An advanced course in the economic problems met with in the design of power plants and in the generation of power; selection of equipment, choice of station heat balances, generation of by-product power in industries, and interconnections between utilities and industrial plants for the economical interchange of power. Pr.: M. E. 651.

560 860. Adaptive Control Processes. (3) II in alt. years. Feedback control and the calculus of variations; dynamical systems and transformations; computational aspects of dynamic programming; two-point boundary value problems; uncertainty and random processes; adaptive control processes; successive approximation. Three hours rec. a week. Pr.: M. E. 731, 732.

560 865. Approximate Methods of Higher Analysis. (3) II in alt. years. Approximate procedures for solving differential and integral equations encountered in engineering analysis; emphasis on continuous and discrete methods of approximation, convergence and error analysis. Three hours rec. a week. Pr.: Math. 622.

NUCLEAR ENGINEERING

WILLIAM R. KIMEL,* *Head of Department*

Professors Faw, Kimel,* Meyer* and Mingle;* Associate Professor Donnert;* Assistant Professors Clack,* Merklin* and Robinson;* Visiting Associate Professor Kladnik;* Instructors Eckhoff, Hightower and Timmons*

For Curriculum, See Page 267

The Curriculum in Nuclear Engineering is designed to prepare students for professional positions in industry, government, and education in the

nuclear field and in related areas such as the aerospace field. The student may elect an option with special emphasis on the mechanical or the chemical aspects of the nuclear field or on nuclear instrumentation.

As a profession, nuclear engineering requires understanding and competence in many and diverse disciplines. Hence, the undergraduate nuclear engineering student at Kansas State University takes courses in physical chemistry, chemical process principles, thermodynamics, fluid mechanics, electronics, heat transfer, differential equations, analog and digital computer technology, and economics. With background established in these courses, the able student will then be prepared for course work in the Department of Nuclear Engineering, involving reactor theory and analysis, neutron and charged particle interactions, nuclear radiation detection, radiation shielding, radiation effects on materials, nuclear fuel processing, metallurgy of nuclear systems, industrial isotope applications, reactor instrumentation, reactor heat transfer, thermodynamics, radiation safety, and such topics as nuclear energy systems for both terrestrial and aerospace applications, the latter involving both primary and auxiliary power systems. This curriculum is of particular rigor and is recommended only for the able, well-motivated student.

Graduate Work:

The Department offers graduate programs leading to the degrees Master of Science and Doctor of Philosophy.

Applicants for graduate status are expected to have completed preparation equivalent to the required undergraduate program in nuclear engineering at this University. Students majoring in other related fields will also be considered for admission, but preparatory courses without graduate credit may be required if preparation is inadequate. Programs of study will be modified as far as possible to meet the needs of individual students but subject to requirements necessary to insure a proper balance of subject matter. Graduate students in nuclear engineering may select minor courses from such areas as mathematics, physics, chemistry, applied mechanics and other branches of engineering.

Nuclear engineering courses may be selected as a minor in Ph. D. programs in major fields such as mechanics, physics, and electrical, chemical and mechanical engineering.

Laboratory facilities include a 0.25-megawatt TRIGA Mark II reactor, with a pulsing capability to two hundred and fifty million watts, the Kansas State University Nuclear Engineering Shielding Facility located on a 160-acre remote site, experimental shielding structures, 100-curie pumped source for simulating fallout radiation fields, many cobalt-60 sources ranging in source strength from 100 curies down to the millicurie level, a positive ion accelerator-type neutron source, an auto- and cross-correlation noise analysis system, a low-level liquid scintillation counting system, a graphite subcritical reactor, a water-moderated subcritical assembly, a multiparameter pulse-height analysis system and four multichannel analyzers with pulse-height, time-of-flight, pulsed-neutron and multiscaler logics, a 4,000-curie cobalt-60 gamma irradiation facility, three analog computers with a total of 60 operational amplifiers and a pressurized water heat transfer loop. Other miscellaneous items include scalers, ratemeters, high-voltage power supplies, scintillation detectors, oscilloscopes, BF_3 detectors, survey meters, calibration sources, gas-flow proportional detectors, ion chambers, proton recoil detectors and strip-chart recorders, and a wide range of chemical analysis instruments.

FOR UNDERGRADUATE CREDIT

580 200. Fundamentals of Nuclear Defense Planning. (2) I. Effects of nuclear weapons—blast, thermal radiation, initial nuclear radiation and fallout; attenuation, detection and biological effects of nuclear radiation; structure of matter and radioactivity; structure shielding against fallout radiation; shelters and environmental engineering; probabilities of destruction from nuclear weapons; chemical and biological warfare considerations. Two hours rec. a week. Pr.: Sophomore standing.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

580 410. Introduction to Nuclear Engineering. (3) I, II. A course to acquaint non-nuclear engineers with introductory aspects of nuclear engineering; a study of nuclear reactions, reactor core calculations, reactor dynamics, shielding, fuels, waste disposal, heat transfer and radioisotopes applications engineering. Three hours rec. a week. Pr.: Phys. 311, Math. 240 or equiv.

580 450. Elements of Nuclear Engineering. (3) II. Nuclear reactions, energy releases, ionizing radiation, radiation attenuation, neutron lifetime, fission product poisoning and introduction to reactor instrumentation and control; standards for protection against radiation, health physics, nuclear safety, licensing, survey and monitoring instrumentation, instrument calibration, calculation of dose, dose rates, determination of maximum permissible concentrations and body burdens. Pr. or conc.: Math. 240.

580 500. Applied Nuclear Engineering Analysis. (3) II. Methods and applications of analytical, statistical, and numerical analysis as applied to nuclear engineering, including computer programming. Three hours rec. a week. Pr.: Math. 240, Phys. 311.

580 510. Neutron Activation Analysis. (3) II. Basic nuclear properties, neutron flux characteristics, non-reactor neutron sources, radiochemical separations, radiation detectors and counting statistics, gamma-ray spectroscopy, analysis of gamma-ray spectroscopic data, case studies. Two hours rec. and three hours lab. a week. Pr.: Chem. 535 or N. E. 410 or 450.

FOR UNDERGRADUATE AND GRADUATE CREDIT

580 606. Nuclear Engineering Materials. (3) II. Investigation of the nuclear properties, metallurgy and processing of nuclear engineering materials. Three hours rec. a week. Pr.: N. E. 450.

580 611. Radioisotope Applications Engineering. (3) I. A course in the use of radioisotopes and measurement of radiation for industrial, medical and agricultural applications. Material includes operating characteristics of G-M tubes, proportional counters, scintillation detectors, ratemeters, counting statistics, beta backscatter, elements of analog and digital simulation as applied to system design. One hour rec. and six hours lab. a week. Pr.: N. E. 450 or 410.

580 620. Problems in Nuclear Engineering. Credit arranged. I, II, S. Specific studies in current and advanced problems in various phases of nuclear engineering. Pr.: Consult head of department.

580 640. Reactor Operations Planning. (2) I. Siting, licensing, radiation safety and nuclear safety for personnel programs, indemnity, waste disposal, fuel transport and state-federal relations. Two hours rec. a week. Pr. or conc.: N. E. 670.

580 670. Nuclear Reactor Technology I. (3) I. Mathematical methods in reactor physics, including computer applications, diffusion and slowing down of neutrons; theory of subcritical reactors, criticality conditions and reactor heat transfer. Three hours rec. a week. Pr.: N. E. 450, 500.

580 680. Neutron and Particle Interactions. (3) II. Engineering approach to the mechanics of the interactions of neutrons and other radiation with matter; production and detection of neutrons and other types of radiation. Three hours rec. a week. Pr.: N. E. 450, 500.

580 691. Nuclear Reactor Technology II. (3) II. Basic theory and problems associated with design, construction, and operation of research and power reactors. Three hours rec. a week. Pr.: N. E. 670.

580 695. Nuclear Reactor Technology Laboratory. (2) II. Nuclear electronics, and experiments related to subcritical reactors, including cadmium ratio, diffusion length, Fermi Age, approach to criticality and critical size, neutron diffraction, pulsed neutron experiment and/or fuel fabrication, and heat transfer. Six hours lab. a week. Pr. or conc.: N. E. 691.

580 705. Principles of Nuclear Reactor Analysis. (3) I. Theories of neutron diffusion, slowing down, time dependency, multigroup methods, heterogeneous assemblies, kinetics, perturbation and applications of computers to reactor physics calculations. Three hours rec. a week. Pr.: N. E. 691.

580 708. Nuclear Fuel Processing Laboratory. (1) II. Experimental investigation of the methods and principles of separation and purification as they apply to the production and recovery of nuclear fuel and materials. Three hours lab. a week. Pr. or conc.: Ch. E. 430.

580 710. Nuclear Fuel Processing. (3) I. Application of unit operations to production and reprocessing of nuclear materials such as uranium, plutonium, graphite, and heavy water. Three hours rec. a week. Pr.: N. E. 606, Ch. E. 430.

580 715. Radiation Shielding I. (3) II. Introduction to important sources of radiation, kernel concepts, and application of diffusion and ray theory to shielding calculations; applications principally in the field of stationary nuclear reactor shielding. Three hours rec. a week. Pr.: N. E. 670.

580 720. Nuclear Systems Analysis. (3) II. Introduction to nuclear reactor kinetics and simulation; linear stability of reactor systems; noise analysis; application of hybrid computers to nuclear systems analysis. Three hours rec. a week. Pr.: N. E. 670.

580 750. Direct Energy Conversion. (3) II. Principles and analysis of direct conversion phenomena, with special emphasis on direct conversion of nuclear energy, including thermoelectric, thermionic, photovoltaic, magnetohydrodynamic and electrochemical processes. Three hours rec. a week. Pr.: N. E. 670, Chem. 595.

580 761. Radiation Detection and Measurement. (3) I. Theory of detection of nuclear radiation; measurement devices and systems; application to radiation dosimetry and spectroscopy, and instrumentation systems for nuclear reactors. Three hours rec. a week. Pr.: N. E. 611 or consent of instructor.

580 762. Nuclear Instrumentation. (4) II. Design and analysis of nuclear instrumentation; application to nuclear reactor control, radiation dosimetry and nuclear spectroscopy. Three hours rec. and three hours lab. a week. Pr.: E. E. 416 or consent of instructor.

580 765. Numerical Engineering Analysis. (3) I. Engineering analysis approached from the viewpoint of those numerical analysis procedures especially useful with large-capacity computer facilities. Three hours rec. a week. Pr.: Ap. M. 716 or Math. 761 or consent of instructor.

580 772. Radiation Effects on Materials I. (3) I. General theory of radiation damage to solids; specific effects of radiation on nuclear reactor components and materials of construction; application to nuclear reactor design. Three hours rec. a week. Pr.: N. E. 680.

580 774. Radiation Effects on Materials II. (3) II. General theory of radiation effects on liquids and gases; principles of radiation chemistry, photochemistry, and biophysics; medical, agricultural and industrial applications. Three hours rec. a week. Pr.: N. E. 680, Chem. 595, or consent of instructor.

FOR GRADUATE CREDIT

580 810. Research in Nuclear Engineering. Credit arranged. I, II, S. Independent investigation of an advanced nuclear engineering problem preparatory to writing a thesis. Pr.: Approval of department head.

580 815. Advanced Nuclear Reactor Heat Transfer. (3) II. Temperature distributions throughout nuclear reactors; hot channel factors; numerical methods in heat transfer design; interaction of heat transfer and nuclear parameters. Three hours rec. a week. Pr.: N. E. 691.

580 820. Control of Nuclear Reactors. (3) I. Fundamental concepts of nuclear reactor kinetics; linear and non-linear stability; neutron wave

propagation; spatially dependent nuclear reactor kinetics. Three hours rec. a week. Pr.: N. E. 705, 720.

580 834. Radiation Effects on Materials Laboratory. (2) II. Experimental investigations of the mechanisms of radiation effects; techniques of dosimetry and principles of radiation processing. Six hours lab. a week. Pr. or conc.: N. E. 832 or consent of instructor.

580 835. Slow Neutron Scattering. (3) II, S. Classical and quantum theory of slow neutron scattering in gases, liquids and crystalline materials; time-dependent correlation functions and neutron scattering; theories of liquid structure. Three hours rec. a week. Pr.: N. E. 680 or Phys. 640.

580 840. Advanced Nuclear Reactor Theory. (3) II. Solutions and applications of the neutron transport equation; integral transport theory; energy-dependent theory; Monte Carlo methods; small source theory and fast reactor theory. Three hours rec. a week. Pr.: N. E. 705.

580 845. Radiation Shielding II. (3) I. Solutions and applications of the transport equation as applied to neutrons, gamma rays and charged particles; applications principally in the field of fallout and space shielding. Three hours rec. a week. Pr.: N. E. 715; Pr. or conc.: N. E. 705.

580 851. Nuclear Engineering Laboratory. (2) I, S. Reactor kinetics, reactor noise analysis determinations of β/l, reactor power calibration, auto- and cross-correlation techniques, pulsed-neutron measurement, radiation shielding, radiation effects, activation analysis, neutron diffraction, and heat transfer. Six hours lab. a week. Pr. or conc.: N. E. 705.

580 855. Computational Methods in Nuclear Engineering. (3) II. An analysis of the algorithms utilized in nuclear engineering computations; requirements of generalized computational programs; design of a typical program. Three hours rec. a week. Pr.: N. E. 815, 840, 845.

580 860. Advanced Topics in Nuclear Engineering. Variable credit. I, II, S. A presentation of various special topics covering advanced nuclear engineering specialties. Pr.: Consent of instructor.

580 870. The Interaction of Radiation with Matter. (3) I. Classical and quantum theories of the interaction of radiation with matter; energy and charge transfer processes; application to nuclear reactor theory, radiation shielding, and nuclear instrumentation. Three hours rec. a week. Pr.: N. E. 680.

580 890. Nuclear Engineering Colloquium. (1) I, II. Presentation and discussion of progress reports on research, special problems, and outstanding publications in nuclear engineering and related fields. Pr.: Graduate standing in nuclear engineering.

580 891. Controlled Thermonuclear Reactions I. (3) I. Basic principles of plasma theory and controlled thermonuclear processes based on treatment of Boltzmann equation; plasma phenomena, including confinement, radiation, and stability; energy balance and materials problems. Three hours rec. a week. Pr.: N. E. 705, 870 or consent of instructor.

580 893. Controlled Thermonuclear Reactions II. (3) II. Cont. of N. E. 891; collisionless plasmas; plasma waves and instabilities; plasma diagnostics, experimental approaches. Other topics of current interest. Three hours rec. a week. Pr.: N. E. 891.

580 895. Nuclear Systems Design. (3) I, S. Design analysis of nuclear power reactor systems, including criticality determinations, heat transfer, shielding, change in reactivity with fuel irradiation, fuel cycles, power plant thermodynamics, and economics of nuclear power. Three hours rec. a week. Pr.: N. E. 715, 815, 820.

Engineering Experiment Station

Ralph G. Nevins, *Dean*
Leland S. Hobson, *Director*
Dwight A. Nesmith, *Assistant Director*

In the dynamic state that engineering finds itself today, there is no way to separate research activity and teaching activity. Thus, the significance of the Engineering Experiment Station's work cannot be measured solely on the basis of increased research support or publications of research results—teaching and research are so intermingled as to be virtually inseparable. The growth of outside sponsorship of our engineering research is extremely encouraging, since it reflects greater support for both undergraduate and graduate students, considerable support for faculty research, and frequently provides resources for equipment and facilities which find use in both the academic and research functions.

The Engineering Experiment Station is the division of the College of Engineering responsible for the administration of research. It was established March 24, 1910, by the Board of Regents for the purpose of undertaking research of engineering and manufacturing value to the State of Kansas, and for collecting and presenting technical information for the use of industry and the people of the state. The staff of the Engineering Experiment Station is composed of members of all departments in the College of Engineering except Agricultural Engineering, and is supplemented by staff in other departments of the University who work with staff members on joint projects.

In the past five years engineering research has grown from a modest program involving a handful of staff members to a significant part of the College effort, currently contributing more than a million dollars annually. Research now being carried out in the Engineering Experiment Station includes the following:

Desalination of sea water, including new methods, refinements of traditional methods, and optimization of the resulting system designs;

The development of mathematical models for use in planning highways and urban traffic networks;

Microwave Radiometry studies relative to orbiting research laboratories, primarily directed toward mapping of the earth and studying terrain on other planets;

Environmental studies including such things as the effect of floor temperature on comfort, and flow and heat transfer characteristics which affect the design of equipment for heating and air conditioning;

The scattering of fallout from the ceilings of shelters, and the more positive aspects of nuclear energy, including the studies of radiation effects on materials, including the development of new materials;

The use of lasers as a tool for chemical engineering analysis and research;

Phenomena contributing to head loss in water distribution systems;

Human physiological responses to survival shelter environments, including the effects of temperature, humidity, and exercise; and

A study of preservative coatings for concrete which will inhibit surface damage due to freezing and thawing.

A complete list of the Engineering Experiment Station research projects and a brief description of each are published in an annual report. A copy of the most recent report will be sent free of charge on request.

Institute for Environmental Research

RALPH G. NEVINS, *Dean and Director*
PRESTON E. MCNALL, JR., *Associate Director*
FREDERICK H. ROHLES, JR., *Associate Director*

Objectives:

1. Provide a focal point for interdisciplinary research relevant to the effect of normal and altered environments on man including living and working conditions under the ocean and in space.

2. Determine response of human and other organisms to environmental factors affecting health, comfort, affectivity, productivity and learning, including but not limited to thermal factors, air composition, sound, light, color, and spatial relationships.

3. Investigate methods of environmental control and modification including cost studies for optimum system performance.

4. Provide opportunities and facilities for M. S. and Ph. D. research projects and specialized graduate level courses and seminars.

5. Collect and disseminate data and provide research and service to industry and governmental agencies interested in environmental problems.

Organization:

The Institute for Environmental Research is organized to provide opportunities and facilities for research into man's relation and response to environmental factors. University staff and graduate students can carry out projects and research using the facilities of the Institute and with the assistance of the Institute staff. The Institute is attached, administratively, to the Department of Mechanical Engineering, College of Engineering, and its research is administered through the Engineering Experiment Station.

The Institute is composed of a Director, two Associate Directors, a Policy Board, participating faculty, graduate research assistants, technicians and clerical workers. The Policy Board is an interdisciplinary group appointed from members of the participating staff and Directors which formulates policy and procedures, initiates and directs research, and advises faculty and graduate students who associate with the Institute for special projects. The participating faculty are also members of their respective major departments throughout the University and members of the graduate faculty.

Interested faculty from the areas of mechanical, electrical and industrial engineering, psychology, physiology, pathology, public health, architecture, child development, clothing and textiles, and education are participating members of the Institute staff. The Institute is organized so that faculty members or students from any department can carry out sponsored research in the Institute within its stated objectives.

Institute for Systems Design and Optimization

Ralph G. Nevins, *Dean*
L. T. Fan, *Director*
F. A. Tillman, *Associate Director*

The Institute for Systems Design and Optimization at Kansas State University, to promote interdisciplinary research, teaching and communications in systems engineering, was approved June 26, 1967, by the Kansas Board of Regents.

The Institute is administered through the College of Engineering and the Engineering Experiment Station and provides channels of communications between disciplines throughout Kansas State University in the area of engineering systems design.

Specific objectives of the Institute include the promotion of interdisciplinary research, the development of opportunities for interdisciplinary communication in systems engineering through seminars and conferences; preparation of research proposals, and providing assistance in recruitment of graduate students, post-doctoral students, and faculty in systems design.

Engineering Computing Center

RALPH G. NEVINS, *Dean*
J. J. SMALTZ, *Director*

The College of Engineering provides an Engineering Computing Center under the direction of the Department of Industrial Engineering. The digital computer used is an I. B. M. 1620 with one-disk drive and supporting peripheral equipment. It is available to students on an open-shop, hands-on basis, 24 hours per day, seven days per week. FORTRAN II-D, FORGO, SPS, AMTRAN, COGO, and ECAP are on disk for immediate use. Other processors and many scientific subroutines are available in the Engineering Computing Center library. Formal course work is offered in the application and use of these facilities. Basic information is disseminated at the departmental level for the necessary operating capabilities required to solve the many problems in each particular engineering discipline.

The College of Engineering maintains a very amiable working relationship with the University Computing Center. Their computer is an I. B. M. 360/50 with much greater capacity and higher operating speeds than are available at the Engineering Computing Center.

Kansas Industrial Extension Service

Kansas State University serves as the headquarters for the Kansas Industrial Extension Service, an arm of the Extension Commission of the Board of Regents, which administers and operates the State Technical Services Program of the Department of Commerce. The staff of the Industrial Extension Service is composed of the director, a full-time professor, a full-time director of information, an information representative, and clerical and stenographic staff.

The Kansas Industrial Extension Service furnishes a technical information service and is developing a program of continuing education and technical assistance for business, industry, and commerce in Kansas. A Kansas Industrial Extension Journal is published bimonthly and mailed free of charge to qualified persons in business and industry, as well as engineers, bankers, and other groups or individuals in commerce and industry. The Journal contains information on latest technological advances, results of research and development projects performed by the state and federal government, and announces a wide variety of classes and short courses that are available to business and industry in Kansas. Additional materials, including Industrial Extension technical bulletins, and a regular Newsletter, are also periodically published.

The Kansas Industrial Extension Service supervises the Industrial Liaison Representative Program in which representatives of individual companies are invited to inform the Industrial Extension Service of their company's interests and desires for technical information and continuing education. Faculty members of the various state universities and colleges are appointed to maintain a personal relationship with these manufacturing representatives for the purpose of keeping up to date on mutual interests and programs.

A program of continuing education for engineers and manufacturing employees is administered. Short courses, seminars, workshops, forums, and a wide variety of educational opportunities are being made available. Facilities of the universities and colleges are used wherever possible and qualified consultants from outside the state are brought in wherever appropriate.

The Kansas Industrial Extension Service cooperates with the Cooperative Extension Service at Kansas State University as well as the extension activities of each individual school in order to furnish a total extension program. In particular, project activities are coordinated with the Cooperative Extension Service for the purpose of developing agriculturally related industrial operations. Particular emphasis is being placed on the development of manufacturing industries for rural areas.

The Industrial Extension Service operates the State Technical Services Program of the Office of State Technical Services of the U. S. Department of Commerce. The results of all federal research and development are made available to business and industry in Kansas, including a wide variety of publications, reports, documents, and computer surveys. Information on these services is published regularly in the Kansas Industrial Extension Journal.

By virtue of its location at Kansas State University, a quick response to inquiries is assured, since the K-State faculty is immediately available to develop special programs as requested. Business and industry in the state of Kansas are invited to participate in the program of the Kansas Industrial Extension Service. Requests should be submitted to the Director, Kansas Industrial Extension Service, 125 Seaton Hall, Kansas State University, Manhattan, Kansas 66502.

The College of Home Economics

Doretta Schlaphoff Hoffman,* *Dean*
Ruth Hoeflin,* *Associate Dean*
Jean Reehling, *Assistant Dean*

The objective of the College of Home Economics is for each student to become a well-informed person ready to take advantage of the expanding opportunities for home economists in our world of accelerated change. A degree in home economics provides a broad, liberal education along with a specialty to prepare young people for tomorrow's world. The degree equips graduates to be "professional" consumers and prepares them for expanding career opportunities for immediate use or in the future. The home economics degree enables graduates to earn above-average salaries. Positions of leadership are open to home economists in industry, business, education, and in government.

The Honors Program in the College of Home Economics is planned for those students with a potential for unusual scholastic attainment. To be eligible, students must have an excellent high school record and rank in the upper 10 percent of their university class in the entrance examinations. Students participating in the Honors Program plan individual programs of study including special sections or advanced courses. The aim of the Honors Program in Home Economics is to emphasize enrichment, breadth and depth in each student's program of higher education.

The Home Economics Master's Degree Project identifies potential graduate students early in their college careers. Each semester, students with a minimum of a "B" average are invited to join the project. A student who volunteers to participate in the Master's Degree Project has an adviser who is a member of the graduate faculty who will help her outline her academic program and make plans for graduate study in the future.

Programs of study leading to the degree Bachelor of Science can be planned within the four curriculums offered in the College of Home Economics. These curriculums are designed to meet the needs of students with varying interests. They are listed below and described on the following pages.

1. Curriculum in Home Economics with Options
   - Home Economics Education—Vocational Teaching
   - Extension
   - Radio and Television
   - Clothing and Retailing
   - Textile Research
   - Fashion Design
   - Interior Design
   - Community Services
   - Early Childhood Education
   - Consumer Interest
   - Housing and Equipment
   - Foods and Nutrition in Business
   - Foods and Nutrition Research
   - Dietetics and Institutional Management
2. Curriculum in Home Economics and Journalism
3. Curriculum in Home Economics with Liberal Arts
4. Curriculum in Restaurant Management

Each student has a faculty adviser under whose guidance a program is planned that will prepare the student for such professional careers as teacher, home economics agent, interior designer, home economist in business or in social welfare, nursery school supervisor, specialist in housing or home management, women's page editor, textile chemist, clothing designer, food and equipment demonstrator, nutritionist, dietitian, restaurant manager, or research technician. The course requirements for the first year are much the same, so the student has time to

study possibilities in all areas in home economics before choosing the one best suited to her individual needs and interests. The Bachelor of Science degree is earned by fulfilling the requirements in the curriculum chosen by the student.

The home economics student takes courses offered by many departments over the entire campus at Kansas State University. Home economics courses are offered by the five departments in the College of Home Economics: Clothing, Textiles and Interior Design, Family and Child Development, Foods and Nutrition, Family Economics, and Institutional Management. Courses in Home Economics Education are offered by the College of Education.

An excellent foundation for graduate study is provided for the student who wishes to continue beyond the bachelor's degree. Courses are offered which lead to the Master of Science and Doctor of Philosophy degrees.

TRANSFER STUDENTS

Careful planning enables a student to transfer to the College of Home Economics at Kansas State University without loss of credit. Potential transfer students should write for a list of required courses in the selected major. Any student who plans to transfer for the junior year should write for suggestions or preferably come for a conference before the start of the sophomore year.

The courses listed below can be transferred to the College of Home Economics, and a degree earned in two years from Kansas State University by capable students with good academic records.

Two-Year Program without Home Economics Courses

FRESHMAN YEAR

Courses	*Semester credit hours**
English Composition	6
Speech	2
General Psychology	3
General and Elem. Organic Chemistry**	10
American Govt. or Political Science	3-6
Sociology	3-6
Civilization or World History	3-6
Electives to bring total to 62 hours	

SOPHOMORE YEAR

Courses	*Semester credit hours*
General Zoology or Biology (Lab.)	4-5
Economics	3
Modern Language	5
Literature	6
Elementary Design (with lab.)	2
American History or Government	3
Educational Psychology or Child and Adolescent Psychology (if in education)	3
Art Appreciation	3

Two-Year Program with Home Economics Courses

FRESHMAN YEAR

English Composition	6
Speech	2
General and Elem. Organic Chemistry**	10
General Psychology	3
American Govt. or Political Science	3-6
Elementary Design (with lab.)	2
Foods or Nutrition	3
Electives to bring total to 62 hours	

SOPHOMORE YEAR

General Zoology or Biology (Lab.)	4-5
Modern Language	5
Literature	6
Economics	3
Sociology	3-6
Clothing Construction (if education or clothing and textiles major)	3
Educational Psychology or Child and Adolescent Psychology (if in education)	3
Human or Family Relations	2
Art Appreciation	3

*** The credit hours given above apply to courses at Kansas State University. Some transfer courses have more or less hours; substitutions or readjustments can usually be made for the difference in credit hours. Up to 62 hours may be transferred from a junior college; 124 hours are required for graduation by the College of Home Economics at Kansas State University.**

**** Three options, Textile Research, Foods and Nutrition Research, and Housing and Equipment, require Chemistry I and II (10 credits of General Chemistry) and 5 hours of Organic Chemistry. Eight hours of physical science may be taken in place of General and Organic Chemistry in the following majors: Clothing Retailing, Fashion Design, and Home Economics with Liberal Arts. Only four hours of physical science are required for Interior Design majors.**

Curriculum in Home Economics with Options

B. S. in Home Economics

This curriculum is designed primarily for preparation in professional home economics fields. Courses are included for general education and home economics together with those needed for specialization. Options, or courses needed for professional proficiency in various areas, are listed on the following pages.

Sufficient flexibility is provided to permit combinations suited to individual needs. Electives may be used to build strong combinations with other fields of interest.

LIBERAL-GENERAL EDUCATION COURSES				34 Hours
COMMUNICATIONS			8	
Engl.	229 100	English Compositon I	3	
Engl.	229 120	English Composition II	3	
Engl.	229 090	English Proficiency	0	
Spch.	281 105	Oral Communication I	2	
SOCIAL SCIENCE			6	
Econ.	225 110	Economics I	3	
Psych.	273 110	General Psychology	3	
ADDITIONAL REQUIREMENTS			20	
Four disciplines of Humanities, Social, Biological, and Physical Sciences shall be represented in Liberal-General Education and/or Supporting Courses. (One discipline, not represented in Supporting Courses, shall include 8-12 credit hours, with two courses in sequence plus one additonal course.)				
HOME ECONOMICS CORE				12 Hours
I. Des.	611 101	Design for Contemporary Living	3	
F. C. Dev.	620 250	Human Relations	2	
F. Ec.	630 300	Family Economics	3	
F. & N.	640 133	Food for Man	2	
Gn. H. E.	650 110	Introduction to Home Economics	1	
Gn. H. E.	650 300	Home Economics Seminar	1	
PROFESSIONAL AND SUPPORTING COURSES (See specific option)				58 to 66 Hours
UNRESTRICTED ELECTIVES (See specific option)				12 to 20 Hours
For men who take Air or Military Science, the credits will be accepted in lieu of unrestricted electives.				
OTHER				
Physical Education (2 semesters)				0
Total for Graduation				124 Hours

Option in Radio and Television

National broadcasting stations are requesting qualified radio and television personnel who understand the viewpoint of homemakers. This option provides opportunities for a specialty in home economics and courses in radio and television.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.
Spch.	281 152	Radio-TV Speech Procedures	3
Spch.	281 160	Survey of Broadcasting	2
Spch.	281 225	Radio-TV Continuity	3
Spch.	281 326	Intro. to Television	2
Spch.	281 660	TV Production	3
Spch.	281 745	Broadcasting of Women's Programs	3

	Sem. Hrs.
Home Economics Courses*	24
Area of Concentration	(14)
Courses selected from two areas other than concentration	(10)
Basic Disciplines*	10
Courses selected to support home economics areas	
Speech and/or Social Scineces**	12
Option Requirements	62
Unrestricted Electives	16
Curriculum Requirements	46
Total	124

* Selected in consultation with home economics faculty adviser.

** Selected in consultation with Radio-TV faculty adviser.

Option in Home Economics Education—Vocational Teaching

This option prepares the student for teaching home economics in Kansas secondary schools. With a B. S. degree, the student is eligible for a secondary three-year certificate to teach home economics in any Kansas junior or senior high school and for approval to teach in a vocational homemaking department.

Refer to page 245 for admission requirements to teacher education.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.				*Sem. Hrs.*
Bact.	213 200	Public Health Bact.	3	C. & T.	610 131	Socio-Econ. of Clothing	2
Chem.	221 110	General Chemistry	5	C. & T.	610 210	Pattern Study and Garment Construction	3
Chem.	221 190	El. Org. Chemistry	3				
Chem.	221 191	El. Org. Chem. Lab.	2	C. & T.	610 260	Textiles	3
Educ.	405 202	Educ. Psychology I	3	F. C. Dev.	620 325	The Preschool Child	3
Educ.	405 400	Educ. Psychology II	3	F. C. Dev.	620 475	The Adolescent	3
Educ.	405 450	Prin. of Sec. Educ.	3	F. Ec.	630 320	The House	3
Educ.	405 550	Meth. of Tchg. H. E.	2	F. Ec.	630 360	Home Management	2
Educ.	405 750	Curriculum in H. E.	3	F. Ec.	630 365	Home Management Lab.	2
Educ.	405 477	Tchg. Part. in Sec. Sch.	6	F. & N.	640 601	Food Science	3
Zool.	293 205	Gen. Zoology	4	F. & N.	640 602	Principles of Nutrition	3
				I. Des.	611 215	Interior Design Ia	2

Option Requirements	66
Unrestricted Electives	12
Curriculum Requirements*	46
Total	124

* Under Liberal-General Education Additional Requirements, take P. Sci. 220 (freshmen and sophomores) or P. Sci. 444 (juniors and seniors); six hours of sociology in sequence; six hours of literature or nine hours of language; and Art 100.

Option in Clothing and Retailing (C. & T.)

Courses prepare students for careers in fashion merchandising in department stores and specialty shops.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.				*Sem. Hrs.*
Art	209 100	Design I	2	C. & T.	610 131	Socio-Econ. of Cloth.	2
B. A.	305 273	Prin. of Acctg. or	3	C. & T.	610 210	Pattern Study and Garment Construction	3
Math.	245 100	College Algebra					
B. A.	305 400	Administration	3	C. & T.	610 230	Fashion Merchandising I	3
B. A.	305 440	Marketing	3				
B. A.	305 540	Retailing	3	C. & T.	610 260	Textiles	3
Chem.	221 110	Gen. Chemistry and	5	C. & T.	610 395	Window Display	3
Chem.	221 190	El. Org. Chemistry or	3	C. & T.	610 525	Fashion Store Ser. Lab.	5
Phys.	265 101	Man's Phys. Wld. I	(3)	C. & T.	610 630	Clothing Economics	3
				C. & T.	610 635	Fashion Merchandising II	3
Phys.	265 102	Man's Phys. Wld. II	(3)	C. & T.	610 650	Intermediate Textiles	3
Phys.	265 103	Man's Phys. Wld. I Lab.	(1)	C. & T.	610 730	History of Costume	3
				I. Des.	611 215	Interior Design Ia or	2
Phys.	265 104	Man's Phys. Wld. II Lab.	(1)	C. & T.	610 220	Costume Design I	
Engl.	229 451	Mod. Engl. Grammar or	3				
Engl.	229 200	English Composition III					

Option Requirements	58
Unrestricted Electives	20
Curriculum Requirements*	46
Total	124

* Under Liberal-General Education Additional Requirements, take Hist. 111 and Psych. 505 or 515.

Option in Textile Research (C. & T.)

Courses in science, mathematics, textile testing, and research are combined with those providing a comprehensive background in home economics to prepare students for textile testing and as assistants in textile research. Career opportunities are found in the laboratories of colleges and universities, commercial firms, or government agencies.

PROFESSIONAL AND SUPPORTING COURSES

				Sem. Hrs.					*Sem. Hrs.*
Art	209	100	Design I	2	C. & T.	610	131	Socio-Econ. of Clothing	2
Chem.	221	190	El. Org. Chemistry	3	C. & T.	610	210	Pattern Study and Garment Construction	3
Chem.	221	191	El. Org. Chem. Lab.	2					
Chem.	221	210	Chemistry I	5	C. & T.	610	220	Costume Design I or	
Chem.	221	230	Chemistry II	3	I. Des.	610	240	Interior Design I	2
Chem.	221	250	Chemistry II Lab.	2	C. & T.	610	260	Textiles	3
Chem.	221		Chemistry (Quant.		C. & T.	610	630	Clothing Economics	3
			Anal.) or	4	C. & T.	610	650	Intermediate Textiles	3
Biochem.	020	420	Gen. Biochemistry (5)		C. & T.	610	655	Advanced Textiles	3
Math.	245	100	College Algebra	3	F. Ec.	630	320	The House or	3
Phys.	265	112	Descriptive Physics or		F. Ec.	630	605	Consumers and the Mkt.	
Phys.	265	121	Physics for Med. Tech.	4	F. & N.	640	245	Food Science	3
Stat.	285	320	Elements of Statistics	3					
Mod. L.	253		Modern Language	6					

Option Requirements	62
Unrestricted Electives	16
Curriculum Requirements	46
Total	124

Option in Fashion Design (C. & T.)

This option provides students with a working knowledge of color, line and sources of fashion inspiration together with experience in sketching, designing and creating garments in suitable fabrics.

PROFESSIONAL AND SUPPORTING COURSES

				Sem. Hrs.					*Sem. Hrs.*
Art	209	100	Design I	2	C. & T.	610	220	Costume Design I	2
Art	209	190	Drawing I	2	C. & T.	610	260	Textiles	3
Art	209	195	Survey of Art History I	3	C. & T.	610	310	Tailoring	3
Art	209	196	Survey of Art Hist. II	3	C. & T.	610	315	Costume Illustration	2
Art	209	200	Design II	2	C. & T.	610	320	Costume Design II	3
Art	209	210	Drawing II	2	C. & T.	610	325	Fashion Life Sketch.	2
Art	209	222	Water Color I	2	C. & T.	610	395	Window Display	3
Art	209	224	Figure Drawing I	2	C. & T.	610	610	Flat Pattern Design	3
Mod. L.	253	131	French I	5	C. & T.	610	615	Design by Draping	3
C. & T.	610	131	Socio-Econ. of Clothing	2	C. & T.	610	620	Costume Design III	3
C. & T.	610	210	Pattern Study and		C. & T.	610	730	History of Costume	3
			Garment Construction	3	I. Des.	611	740	History of Fabric Design	3

Option Requirements	61
Unrestricted Electives	17
Curriculum Requirements*	46
Total	124

* Under Liberal-General Education Additional Requirements, take Hist. 111 and 212 or 631; Soc. 220; Chem. 110 and 190, or Phys. 101-104; and at least three hours of biological science.

Option in Interior Design (I. Des.)

This option is designed for students who wish preparation for careers as interior designers.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.
Arch.	105 207	Arch. Graphics I	2
Arch.	105 208	Arch. Graphics II	2
Arch.	105 231	Design Analysis	4
Art	209 100	Design I	2
Art	209 190	Drawing I	2
Art	209 195	Survey of Art History I	3
Art	209 196	Survey of Art Hist. II	3
Art	209 200	Design II	2
Art	209 210	Drawing II or	
Art	209 222	Water Color I	2
Art	209 230	Sculpture I	2
Art	209 260	Design in the Crafts	2
Art	209 265	Ceramics I	2
Art	209 290	Lettering or	
Art	209 605	Comm. Illustration	2
Mod. L.	253 131	French I	5
C. & T.	610 260	Textiles	3
C. & T.	610 365	Weaving I	2
I. Des.	611 240	Interior Design I	2
I. Des.	611 245	Contemporary Homes	3
I. Des.	611 340	Interior Design II	3
I. Des.	611 345	Interior Des. Practicum	2
I. Des.	611 600	Advanced Design	2
I. Des.	611 640	Interior Design III	3
I. Des.	611 645	Historic Furn. Design	3
I. Des.	611 740	Historic Fabric Design	3

Option Requirements	61
Unrestricted Electives	17
Curriculum Requirements*	46
Total	124

* Under Liberal-General Education Additional Requirements, take four hours of physical science.

Option in Early Childhood Education (F. C. Dev.)

This option is for the student who wishes to work in a pre-kindergarten education program in an administrative or teaching position.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.
Anthro.	278 200	Intro. to Cultural Anthropology	3
P. Sci.†	269 220	American Government	3
Psych.	273 405	Abnormal Psychology or	3
Psych.	273 420	Personality Devel. or	
Psych.	273 440	Psych. Individual Diff.	
Psych.	273 435	Social Psychology or	3
Soc.	277 460	Social Problems	
Soc.	277 211	Intro. to Sociology	3
Soc.	277 440	Social Organ. and Instit. or	3
Soc.	277 530	Comm. Organ. and Leadership	
Spch.	281 632	Spch. and Lang. Devel.	3
Spch.	281 410	Persuasion or	3
Spch.	281 616	Group Discussion Methods	
C. & T.	610 131	Socio-Econ. of Cloth. or	2
C. & T.	610 660	Socio-Psych. Aspects of Cloth. (3)	
F. C. Dev.	620 325	The Preschool Child	3
F. C. Dev.	620 330	Creative Experiences for Presch. Child	3
F. C. Dev.	620 350	Family Relationships	2
F. C. Dev.	620 360	Middle Childhood	3
F. C. Dev.	620 375	Family Health	2
F. C. Dev.	620 670	Dir. Exper. Early Childhood Education	6
F. C. Dev.	620 660	The Family	3
F. C. Dev.	620 675	Parent Education	3
F. C. Dev.	620 650	Advanced Study of Child	3
F. C. Dev.	620 780	Problem in Fam. and Child Devel.	1
F. & N.	640 132	Basic Nutrition	3
F. & N.	640 603	Child Nutrition	3
		Professional Elective*	3

Option Requirements	64-65
Unrestricted Electives	13-14
Curriculum Requirements**	46
Total	124

† Or P. Sci. 444 (juniors and seniors).

* Selected in consultation with faculty adviser.

** Under Liberal-General Education Additional Requirements, take Zool. 205 and 425. Six hours of literature.

Option in Community Services (F. C. Dev.)

This option appeals to students who are interested in family life programs, child welfare with community agencies, or youth leadership in organized groups.

PROFESSIONAL AND SUPPORTING COURSES

				Sem. Hrs.
P. Sci.†	269	220	American Government	3
Psych.	273	405	Abnormal Psych. or	3
Psych.	273	420	Personality Develop. or	
Psych.	273	440	Psych. Individual Differences	
Soc.	277	211	Intro. to Sociology	3
Soc.	277	460	Social Problems or	3
Soc.	277	531	Urban Sociology	
Soc.	277	440	Social Organ. and Instit. or	3
Soc.	277	530	Comm. Organ. and Leadership	
Spch.	281	410	Persuasion or	3
Spch.	281	616	Group Discussion Methods	
C. & T.	610	131	Socio-Econ. of Cloth. or	2
C. & T.	610	660	Socio-Psych. Aspects of Cloth. (3)	
F. C. Dev.	620	325	The Preschool Child	3
F. C. Dev.	620	350	Family Relationships	2
F. C. Dev.	620	360	Middle Childhood	3
F. C. Dev.	620	375	Family Health	2
F. C. Dev.	620	475	The Adolescent	3
F. C. Dev.	620	660	The Family	3
F. C. Dev.	620	675	Parent Education	3
F. & N.	640	132	Basic Nutrition	3

(Choose One Area)

SOCIAL WELFARE

Soc.	277	260	Intro. to Social Work	3
Soc.	277	450	Group Behavior and Prim. Interaction or	3
Psych.	273	435	Social Psychology	
Soc.	277	510	Social Welfare as a Social Institution	3
Soc.	277	741	Social Differentiation or	3
Soc.	277	750	Social Control or	
Soc.	277	751	Social Change	
F. Ec.	630	305	Family Finance	2
F. Ec.	630	340	Household Equip. or	2
F. Ec.	630	360	Home Management	
F. Ec.	630	600	Fam. Amer. Econ. or	3
F. Ec.	630	605	Consumers and the Market	
F. & N.	640	300	Meal Management	3

YOUTH WORK

Engl.	229	470	Children's Literature	3
Journ.	289	306	Reporting I	2
Journ.	289	310	Reporting I Lab. or	1
Spch.	281	152	Radio-TV Spch. Proced. (3) or	
Spch.	281	225	Radio-TV Continuity	
Journ.	289	235	Survey Mass Media or	3
Journ.	289	626	Formation of Public Opinion or	
Journ.	289	635	Public Relations	
Ph. Ed.	262	320	Recreational Leadership or	2
Ph. Ed.	261	615	Community Recreation	
Ph. Ed.	262	382	Camp Counseling	2
Soc.	277	660	Juvenile Delinquency	3
Spch.	281	472	Storytelling or	3
Spch.	281	611	Children's Theater or	
Spch.	281	526	Oral Inter. of Literature	

Option Requirements	61-65
Unrestricted Electives	13-17
Curriculum Requirements*	46
Total	124

† Or P. Sci. 444 (juniors and seniors).

* Under Liberal-General Education Additional Requirements, take Zool. 205 and 425.

Option in Extension

This option is designed for the student who wishes to become a County Extension Home Economist. On graduation the student is prepared to join the Extension service for work in a county in Kansas or another state.

PROFESSIONAL AND SUPPORTING COURSES

				Sem. Hrs.					*Sem. Hrs.*
Educ.	405	605	Exten. Organ. & Policies	3	Spch.	281	152	Radio-TV Spch. Proced. or	3
Educ.	405	752	Meth. of Exten. Tchg.	3	Spch.	281	225	Radio-TV Continuity or	
Journ.	289	306	Reporting I	2	Spch.	281	745	Broadcasting of Women's Programs	
Journ.	289	310	Reporting I Lab. or	1	Spch.	281	410	Persuasion or	3
Journ.	289	350	Agric. Journalism (3)		Spch.	281	616	Group Discussion Methods	
P. Sci.†	269	220	American Govt.	3	C. & T.	610	131	Socio-Econ. of Cloth. or	2
Psych.	273	405	Abnormal Psychology or	3	C. & T.	610	660	Socio-Psych. Aspects of Cloth. (3)	
Psych.	273	420	Personality Development or		F. C. Dev.	620	325	The Preschool Child	3
Psych.	273	440	Psych. Individual Differences		F. C. Dev.	620	350	Family Relationships	2
Soc.	277	211	Intro. to Sociology	3	F. C. Dev.	620	360	Middle Childhood	3
Soc.	277	440	Social Organ. and Instit. or	3	F. C. Dev.	620	375	Family Health	2
Soc.	277	530	Comm. Organ. and Leadership		F. C. Dev.	620	475	The Adolescent	3
Soc.	277	460	Social Problems or	3	F. C. Dev.	620	660	The Family	3
Soc.	277	531	Urban Sociology		F. C. Dev.	620	675	Parent Education	3
Soc.	277	741	Social Differentiation or	3	F. Ec.	630	305	Family Finance	2
Soc.	277	750	Social Control or		F. Ec.	630	600	Fam. Amer. Econ. or	3
Soc.	277	751	Social Change		F. Ec.	630	605	Consumers and the Mkt.	
					F. & N.	640	132	Basic Nutrition	3

Option Requirements	62
Unrestricted Electives	16
Curriculum Requirements*	46
Total	124

† Or P. Sci. 444 (juniors and seniors).

* Under Liberal-General Education Additional Requirements, take Zool. 205 and 425.

Consumer Interest Option (F. Ec.)

This option prepares students for work as family financial consultants and as consumer education specialists in adult education with commercial companies, in social welfare, or work in areas of government related to family living and consumption.

PROFESSIONAL AND SUPPORTING COURSES

				Sem. Hrs.					*Sem. Hrs.*
Econ.	225	120	Economics II	3	F. Ec.	630	200	Family Finance	2
P. Sci.‡	269	220	American Government	3	F. Ec.	630	320	The House	3
Soc.	277	211	Intro. to Sociology	3	F. Ec.	630	340	Household Equipment	2
			Soc. Sci. Electives	9	F. Ec.	630	360	Home Management	2
C. & T.	610	131	Socio-Econ. of Cloth. or	2	F. Ec.	630	365	Home Management Lab.	2
C. & T.	610	260	Textiles (3)		F. Ec.	630	600	Fam. in Amer. Econ.	3
F. C. Dev.	620	325	Preschool Child or		F. Ec.	630	605	Consumers and the Mkt.	3
F. C. Dev.	620	660	The Family	3	F. & N.	640	132	Basic Nutrition	3
								Prof. Electives*	18-19

Option Requirements	62
Unrestricted Electives (if F. C. Dev. 620 660 is elected, take F. C. Dev. 620 350)	16
Curriculum Requirements†	46
Total	124

‡ Or P. Sci. 269 444 (juniors and seniors).

* Selected in consultation with faculty adviser.

† Under Liberal-General Education Additional Requirements, take Math. 100 and Stat. 320.

Housing and Equipment Option (F. Ec.)

The required courses are basic. Electives allow for further specialization: in **equipment** for those interested in design, evaluation, and education; in **housing** for those interested in house planning, kitchen designing, or research; and in **home management** for those interested in social work, in developing homemaker services and home management aides for urban renewal and poverty programs, in positions as "home adviser" with commercial companies or press, radio, and TV. This option also provides basic training for those who wish to prepare for research.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.
Chem.	221 210	Chemistry I	5
Chem.	221 231	Chemistry II	3
Chem.	221 250	Chem. II Lab.	2
Math.	245 100	College Algebra	3
Phys.	265 211	Physics I and	4
Phys.	265 212	Physics II	4
		or	
Phys.	265 115	Household Physics	4
Stat.	285 320	Elem. of Stat. or	
Math.	245 150	Plane Trig.	3
C. & T.	610 260	Textiles	3
F. C. Dev.	620 660	The Family or	
Soc.	277 646	Sociology of the Family	3
F. Ec.	630 200	Family Finance	2
F. Ec.	630 320	The House	3
F. Ec.	630 340	Household Equipment ..	2
F. Ec.	630 360	Home Management	2
F. Ec.	630 605	Consumers and the Mkt.	3
F. Ec.	630 620	Housing Requirements of Families	2
F. Ec.	630 640	Adv. Household Equip.	3
F. & N.	640 245	Food Science	3
		Prof. Electives*	9-17

Option Requirements	68
Unrestricted Electives (if F. C. Dev. 620 660 is elected, take F. C. Dev. 620 350)	10
Curriculum Requirements†	46
Total	124

* Selected in consultation with faculty adviser.

† Under Liberal-General Education Additional Requirements, take Zool. 205; Zool. 425 or Bot. 121 and Bact. 220; Soc. 211.

Option in Foods and Nutrition in Business (F. & N.)

Students take positions with food processors, food promotional agencies, utility companies and other business organizations. Home economists in these positions do educational work, giving demonstrations and illustrated talks, writing food columns for newspapers, and taking part in radio and television programs.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.
A. H.	005 280	Meat Selec. and Util., H. E.	2
Bact.	213 220	General Microbiology ..	4
Biol.	215 198	Prin. of Biol.	5
Chem.	221 110	General Chemistry	5
Chem.	221 190	El. Org. Chemistry	3
Chem.	221 191	El. Org. Chem. Lab.	2
Journ.	289 306	Reporting I	2
Journ.	289 310	Reporting Laboratory ..	1
Journ.	289 610	Family Page	3
Phys.	265 112	Descriptive Physics or	
Phys.	265 121	Physics for Med. Tech.	4
C. & T.	610 260	Textiles	3
F. Ec.	630 340	Household Equipment ..	2
F. Ec.	630 605	Consumers and the Mkt.	3
F. Ec.	630 640	Adv. Hshld. Equipment	3
F. & N.	640 601	Food Science	3
F. & N.	640 602	Principles of Nutrition	3
F. & N.	640 300	Meal Management	3
F. & N.	640 410	Prin. of Food Demon.	2
F. & N.	640 605	Food Research Techniques	3
F. & N.	640 680	Sem. in Foods and Nutr.	2
Ins. M.	660 600	Quantity Foods	3

Option Requirements	60-61
Unrestricted Electives	14-15
Curriculum Requirements†	49
Total	124

† Under Liberal-General Education Additional Requirements, take Spch. 225; two courses in sequence in humanities (six hours); and an additional six hours social science including Soc. 220.

Option in Foods and Nutrition Research (F. & N.)

Students prepare for positions as assistants or technologists in university or government research laboratories, as home economists in test kitchens, food product development laboratories, or food promotional agencies, or as nutritionists in business or governmental agencies. Many research positions offer opportunity for graduate study.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.				*Sem. Hrs.*
Bact.	213 220	General Microbiology ..	4	Zool.	293 425	Human Physiology	4
Biochem.	020 421	General Biochemistry .	5	F. & N.	640 601	Food Science	3
Biol.	215 198	Prin. of Biology	5	F. & N.	640 602	Principles of Nutrition	3
Chem.	221 210	Chemistry I	5	F. & N.	640 300	Meal Management	3
Chem.	221 230	Chemistry II	3	F. & N.	640 605	Food Res. Techniques .	3
Chem.	221 250	Chemistry II Lab.	2	F. & N.	640 680	Seminar in Foods and Nutrition	2
Chem.	221 350	Gen. Org. Chemistry ..	3				
Chem.	221 351	Gen. Org. Chem. Lab. ..	2	F. & N.	640 710	Nutr. Throughout Life Cycle	3
Math.	245 100	College Algebra	3			Foods and Nutr. Elec.	3
Phys.	265 112	Descriptive Physics or				Home Ec. Elective	3
Phys.	265 121	Physics for Med. Tech.	4				

Option Requirements	63
Unrestricted Electives	15
Curriculum Requirements*	46
Total	124

Under Liberal-General Education Additional Requirements, take five hours modern language and four hours humanities; and an additional six hours social science.

Option in Dietetics and Institutional Management (Ins. M.)

Opportunities are increasing for dietitians or directors of food services in hospitals, college residence halls, school lunch rooms, and cafeterias. Graduates may accept appointments to internships that are accredited by the American Dietetic Association and which lead to membership in that professional organization.

PROFESSIONAL AND SUPPORTING COURSES

			Sem. Hrs.				*Sem. Hrs.*
A. H.	005 280	Meat Sel. and Util., H. E.	2	F. & N.	640 300	Meal Management	3
				F. & N.	640 601	Food Science	3
B. A.	305 431	Personnel Administration or	3	F. & N.	640 602	Principles of Nutrition	3
				F. & N.	640 605	Food Research Tech. ..	3
Psych.	273 515	Personnel Psychology		Ins. M.	660 600	Quantity Foods	3
Bact.	213 200	Pub. Health Bacteriology or	3	Ins. M.	660 605	Food Production Mngt.	4
				Ins. M.	660 625	Quan. Food Pur. & Control	2
Bact.	213 220	Gen. Microbiology (4)					
Biol.	215 198	Principles of Biology ..	5	Ins. M.	660 635	Food Serv. Equip. & Layout	2
Chem.	221 110	General Chemistry	5				
Chem.	221 190	El. Org. Chemistry	3	Ins. M.	660 640	Org. & Mngt. of Food Services	3
Chem.	221 191	El. Org. Chem. Lab.	2				
Zool.	293 425	Human Physiology	4				

(Choose One Area)

HOSPITAL DIETETICS				SCHOOL AND UNIVERSITY FOOD SERVICE			
Biochem.	020 200	Elem. Biochemistry	5	B. A.	305 273	Prin. of Accounting	3
Educ.	405 551	Meth. of Tchg. for Diet. Stu.	3	B. A.	305 305	Managerial Accounting	3
				B. A.	305 400	Administration	3
F. & N.	640 710	Nutr. Life Cycle	3	Psych.	273 505	Consumer Psychology ..	3
F. & N.	640 712	Diet. Therapy	3				

Option Requirements	61-64
Unrestricted Electives	14-17
Curriculum Requirements*	46
Total	124

* See page 311.

Curriculum in Home Economics and Journalism

B. S. in Home Economics and Journalism

Opportunities for graduates in this curriculum include writing for national magazines, editing home pages on newspapers, or writing promotional material for businesses and other organizations. The curriculum includes technical journalism courses as well as a concentration in one field of home economics.

LIBERAL-GENERAL EDUCATION COURSES — 34 Hours

Communications — 8

Engl.	229	100	English Composition I	3
Engl.	229	120	English Composition II	3
Engl.	229	090	English Proficiency	0
Spch.	281	105	Oral Communication	2

Social Science — 6

Econ.	225	110	Economics I	3
Psych.	273	110	General Psychology	3

Additional Requirements — 20

Four disciplines of Humanities, Social, Biological, and Physical Sciences shall be represented in Liberal-General Education and/or Supporting Courses. (One discipline, not represented in Supporting Courses, shall include two courses in sequence plus one additional course 8-12.)

HOME ECONOMICS CORE — 12 Hours

I. Des.	611	101	Design for Contemporary Living	3
F. C. Dev.	620	250	Human Relations	2
F. Ec.	630	300	Family Economics	3
F. & N.	640	133	Food for Man	2
Gn. H. E.	650	110	Intro. to Home Economics	1
Gn. H. E.	650	300	Home Economics Seminar	1

PROFESSIONAL AND SUPPORTING COURSES — 62 Hours

Journ.	289	105	Graphic Arts Survey	1
Journ.	289	300	Typography Lab.	1
Journ.	289	306	Reporting I	2
Journ.	289	311	Reporting Lab. (H. E.)	1
Journ.	289	316	Reporting II	3
Journ.	289	320	Prin. of Advertising	3
Journ.	289	330	Editing	2
Journ.	289	335	Photojournalism I	2
Spch.	281	152	Radio-TV Speech Procedures	3
Journ.	289	610	The Family Page	3
Journ.	289	050	Tech. Journalism Lec. (four semesters)	0

Home Economics Courses* Area of Concentration (14) Courses selected from two areas other than concentration (10)	24
Basic Disciplines* Courses selected to support home economics areas	9
Journalism Electives**	8

* Selected in consultation with Home Economics faculty adviser.

** Selected in consultation with Technical Journalism faculty adviser.

UNRESTRICTED ELECTIVES — 16 Hours

For men who take Air or Military Science, the credits will be accepted in lieu of unrestricted electives.

OTHER

Physical Education (two semesters) 0

Total for Graduation 124

Curriculum in Home Economics with Liberal Arts

B. S. in Home Economics

This curriculum is for the student who wishes to combine a broad cultural education with home economics essentials. Maximum flexibility is provided for the selection of courses best suited to her abilities and interests. The student in consultation with a faculty adviser selects a sequence of courses for concentration in one or more of her chosen academic areas. This curriculum provides excellent backgrounds for professional careers, for graduate study, and for the responsibilities of citizenship and homemaking.

LIBERAL-GENERAL EDUCATION COURSES					65-68 Hours
Communications					8
Engl.	229	100	English Composition I	3	
Engl.	229	120	English Composition II	3	
Engl.	229	090	English Proficiency	0	
Spch.	281	105	Oral Communication I	2	
Social Science					12
Econ.	225	110	Economics I	3	
Psych.	273	110	General Psychology	3	
Electives in Econ., Soc., Anthro., Govt.				6	
Humanities					17-18
Philosophy, Mathematics, Logic				3	
Literature or History				6	
Electives in Humanities				8-9	
Physical Science					8-10
Biological Science					8
Concentration in one subject matter area.*					12
HOME ECONOMICS					33 Hours
I. Des.	611	101	Design for Contem. Living	3	
F. C. Dev.	620	250	Human Relations	2	
F. Ec.	630	300	Family Economics	3	
F. & N.	640	133	Food for Man	2	
Gn. H. E.	650	110	Intro. to Home Economics	1	
Gn. H. E.	650	300	Home Economics Seminar	1	
Courses in Home Economics in one of the following areas of concentration.				21	
UNRESTRICTED ELECTIVES					24-27 Hours
For men who take Air or Military Science, the credits will be accepted in lieu of unrestricted electives.					
OTHER					
Physical Education (two semesters)					0
Total for Graduation					124

A. Clothing and Textiles: C. & T. 131 (2), C. & T. 260 (3) courses in fashion and interior design, construction and related areas in home economics (16).

B. Family and Child Development: F. C. Dev. 325 (3), F. C. Dev. 350 (2), F. C. Dev. 660 (3), courses in Family and Child Development and related areas in home economics (13).

C. Family Economics: F. Ec. 305 (2), F. Ec. 360 (2), F. Ec. 605 (3), courses in Family Economics and related areas in home economics (14).

D. General Home Economics: F. & N. 132 (3), F. Ec. 360 (2), F. C. Dev. 325 (3) and selected home economics courses (13).

*Selected in consultation with faculty adviser.

Curriculum in Restaurant Management

B. S. in Restaurant Management

Qualified men and women fill administrative positions in commercial and industrial food services, such as restaurants, hotels, coffee shops, cafeterias, and tea rooms. Summer experience under approved conditions is advised throughout the time students are enrolled in this curriculum.

LIBERAL-GENERAL EDUCATION COURSES — 47 Hours

Communications — 11

Engl.	229 100	English Composition I	3
Engl.	229 120	English Composition II	3
Engl.	229 090	English Proficiency	0
Spch.	281 105	Oral Communication I	2
		Communications Elective	3

Humanities Electives — Minimum 3

Social Science — 12

Econ.	225 110	Economics I	3
Econ.	225 120	Economics II	3
Psych.	265 110	General Psychology	3
Soc.	277 211	Intro. to Sociology	3

Biological Science — 5

Biol.	215 198	Principles of Biology	5

Physical Science — 10

Chem.	221 110	General Chemistry	5
Chem.	221 190	El. Org. Chem.	3
Chem.	221 191	El. Org. Chem. Lab.	2

PROFESSIONAL AND SUPPORTING COURSES — 56-57 Hours

A. H.	005 280	Meat Sel. and Util., H. E.	2
B. A.	305 273	Principles of Accounting	3
B. A.	305 305	Managerial Accounting	3
B. A.	305 325	Business Law I	3
B. A.	305 400	Administration	3
B. A.	305 431	Personnel Administration	3
B. A.	305 440	Marketing	3
Bact.	213 200	Public Health Bacteriology	3
I. Des.	611 101	Design for Contem. Living	3
F. & N.	640 132	Basic Nutrition or	3
F. & N.	640 133	Food for Man	(2)
F. & N.	640 601	Food Science	3
Ins. M.	660 600	Quantity Foods	3
Ins. M.	660 605	Food Production Management	4
Ins. M.	660 625	Quan. Food Pur. and Control	2
Ins. M.	660 635	Food Serv. Equip. and Layout	2
Ins. M.	660 640	Org. and Mngt. of Food Serv.	3
Ins. M.	660 780	Prob. in Inst. Mngt.	3

CHOOSE THREE COURSES:

B. A.	305 302	Data Processing	2
B. A.	305 350	Small Business Operation	3
B. A.	305 405	Business Finance	3
B. A.	305 540	Retailing	3
B. A.	305 631	Org. Behavior and Admin.	3
Journ.	289 635	Public Relations	3
Psych.	273 505	Consumer Psychology	3

UNRESTRICTED ELECTIVES — 20-21 Hours

For men who take Air or Military Science, the credits will be accepted in lieu of unrestricted electives.

OTHER

Physical Education (two semesters) 0

Total for Graduation ..... 124 Hours

CLOTHING, TEXTILES, AND INTERIOR DESIGN

JESSIE A. WARDEN,* *Head of Department*

Professor Warden; Associate Professors Cormany* and Hill;* Assistant Professors Craigie,* Hefter, Ott and Stewart; Instructors McCracken, Newby and O'Shea; Emeritus: Professors Barfoot* and Latzke;* Associate Professors Hess,* Howe* and Lienkaemper**

The Department of Clothing, Textiles and Interior Design offers opportunities for study in socio-economics of clothing, textiles, clothing construction, history of costume, and design of interiors. Four options leading to a Bachelor of Science degree are provided for students: (1) retailing, (2) fashion design, (3) textile research, and (4) interior design. Major sequences leading to the Master of Science degree in the field of clothing, textiles and interior design may be selected according to the individual's choice.

Facilities include an extensive University Library, well-equipped studios, laboratories, and equipment for physical and chemical analysis of textiles.

FOR UNDERGRADUATE CREDIT

610 131. Socio-Economics of Clothing. (2) I, II, alt. S. Clothing needs and practices of individuals and social groups; wardrobe planning and buying procedures. Pr.: Not open to juniors and seniors without the consent of department head.

610 210. Pattern Study and Garment Construction. (3) I, II. Selection and fitting of commercial patterns; development of construction techniques using various fabrics. Six hours lab. a week.

610 220. Costume Design I. (2) I, II. Exploration and application of the principles and problems of costume design. Function form and color studies applied to costume art. One hour rec. and three hours lab. a week. Pr.: Art 100, I. Des. 101.

610 230. Fashion Merchandising I. (3) II. Factors which influence the merchandising of fashion goods.

610 260. Textiles. (3) I, II, alt. S. Fundamentals of textiles as related to the problems of the consumer. Two hours rec. and two hours lab. a week. Pr.: Sophomore standing.

610 310. Tailoring. (3) I, II, and alt. S. Tailoring techniques; construction of a coat or suit based on a commercial pattern using the "dressmaker method." Six hours lab. a week. Pr.: C. & T. 210 or consent of instructor.

610 315. Costume Illustration. (3) II. The changing fashion figure and fashion renderings; fundamental fashion layout. Pr.: Art 224, C. & T. 220, or consent of instructor.

610 320. Costume Design II. (3) I. Design by illustration, with emphasis on functional and original design solutions; fashion sources. Pr.: C. & T. 315 or consent of instructor.

610 365. Weaving I. (2) I, II, S. Principles of design, color, and texture applied to textile construction. Pr.: Art 100 or consent of instructor.

610 395. Window Display. (3) II. Designing and executing displays for windows and interior cases. Actual experience through the cooperation of the local stores. Pr.: Art 100.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

610 520. Fashion Life Sketch. (2) II. Fashion drawing from the model, both sketches and finished work from life. Pr.: Art 224 or consent of instructor.

610 525. Fashion Store Service Laboratory. (5) I. Observation and supervised experience in merchandising procedures in a retail establishment. One credit rec. and four credits of supervised experience. Pr.: C. & T. 230 and B. A. 440.

FOR UNDERGRADUATE AND GRADUATE CREDIT

610 610. Flat Pattern Designing. (3) I, II, alt. S. Application of design in creating dress. Principles of flat pattern designing as applied to various problems. Pr.: C. & T. 210, 220; C. & T. 260 recommended.

610 615. Designing by Draping. (3) II, alt. S. Social significance of fashion; application of design principles to dress. Designs draped in muslin and then completed in suitable fabrics. Six hours lab. a week. Pr.: C & T. 610.

610 620. Costume Design III. (3) alt. years. Design orientation for market size range. Pr.: C. & T. 320 or consent of instructor.

610 625. Fashion Promotion. (3) II alt. years. Procedures involved in promotion of fashion merchandise: budgeting, planning, selecting merchandise, and other promotional activities. Pr.: C. & T. 230, or consent of instructor, and B. A. 540.

610 630. Clothing Economics. (3) I, alt. S. The organization of textile industries and markets; consumer problems in relation to market conditions. Pr.: Econ. 110.

610 635. Fashion Merchandising II. (3) I. The processes involved in planning and controlling the operation of fashion departments. Pr.: C. & T. 230 and Econ. 440 or consent of instructor.

610 650. Intermediate Textiles. (3) I, alt. S. Characteristics of fibers and current developments in textiles. Two hours rec. and two hours lab. a week. Pr.: C. & T. 260, Chem. 190 or Phys. 101-104.

610 655. Advanced Textiles. (3) II, alt. S. Physical, chemical, and optical testing of textiles; emphasis placed on research techniques. One hour rec. and six hours lab. a week. Pr.: C. & T. 260, Chem. 190, 191.

610 660. Socio-Psychological Aspects of Clothing. (3) I, alt. S. Sociological and psychological concepts and theories applied to clothing behavior of individuals and groups. Pr.: Soc. 211 and Psych. 110.

610 680. Clothing and Textiles Seminar. Credit arranged. II, alt. S. Discussion of current developments in the field. May be taken more than one semester with consent of student's advisory committee. Pr.: Eight hours credit basic to field involved.

610 710. Advanced Tailoring. (3) II, alt. S. Development of a design for a coat or suit; techniques of custom tailoring; construction of a coat or suit. Six hours lab. a week. Pr.: C. & T. 610 or 615 or consent of instructor.

610 730. History of Costume. (3) II, alt. S. Aspects of the culture of various countries and periods of history as reflected in costume. Pr.: Hist. 111.

610 750. Experimental Textiles. Credit arranged. I, II, S. Pr.: C. & T. 655.

610 780. Problems in Clothing and Textiles. Credit arranged. I, II, S. Work is offered in garment designing, textiles, history of costume, clothing economics. Pr.: Senior or graduate standing; consent of instructor.

610 785. Problems in Costume Design. Credit arranged. I, II, S. Problems planned with the student to meet particular needs. Pr.: C. & T. 320 or consent of instructor.

FOR GRADUATE CREDIT

610 800. Master's Report. (1 or 2) I, II, S. Written report required of students adopting Plan II for meeting the requirements for the degree Master of Science in clothing and textiles. Subject chosen in consultation with major instructor. Pr.: Consent of department head.

610 830. Advances in Clothing. (2) Alt. S. Recent developments related to production, distribution, and use of clothing. Pr.: Six hours of clothing and textiles, three hours economics or equivalent, and consent of department head.

610 840. Clothing Consuetude. (3) II in alt years. Costume as a reflection of cultural change upon non-western peoples. Pr.: Anthro. 200, C. & T. 730 or consent of instructor.

610 850. Advances in Textiles. (2) Alt. S. Recent developments in research related to fibers, yarns and finishes. Pr.: Eight hours of clothing and textiles, eight hours of physical science, and consent of department head.

610 870. Case Studies in the Fashion Industry. (3) On sufficient demand. Independent and creative solutions to typical problems in the fashion industry by means of case study method. Pr.: B. A. 540, C. & T. 630, or consent of instructor.

610 980. Research in Clothing and Textiles. Credit arranged. I, II, S. Research in clothing or in textiles which may form the basis for the master's thesis. Pr.: Graduate standing.

INTERIOR DESIGN

Concentration in interior design prepares students for professional work in this field. The curriculum follows closely the proposed degree course of the national organizations: National Society of Interior Designers and the American Institute of Interior Designers.

Work leading to the master's degree is offered. Graduate students may become teachers, color consultants, or designers of interiors and furnishings.

Prerequisite to graduate work is the completion of an undergraduate curriculum substantially equivalent to that in interior design. Commercial experience is desirable.

FOR UNDERGRADUATE CREDIT

611 101. Design for Contemporary Living. (3) I, II, S. Development of critical awareness of the application of principles of design in contemporary living.

611 215. Interior Design Ia. (2) I, II, S. Artistic and social aspects of the home and its furnishings; laboratory experience in selection and arrangement of furnishings. Not open to interior design majors. One hour rec. and three hours lab. a week. Pr.: Art 100.

611 240. Interior Design I. (2) I, II, alt. S. Designing of interiors for homes today. One hour rec. and three hours lab. a week. Pr.: Art 100, 190, or consent of instructor.

611 245. Contemporary Homes. (3) II. The design of the contemporary home as an art expression of the family in relation to everyday living. Three rec. periods a week. Pr.: Art 100 or equiv.

611 340. Interior Design II. (3) I. The design of interiors; scale drawings in elevation and perspective. Pr.: I. Des. 240.

611 345. Interior Design Practicum. (2) I. Refinishing, restyling, upholstering and/or slipcovering furniture; also designing and making draperies and lamp shades. Pr.: I. Des. 240.

FOR UNDERGRADUATE AND GRADUATE CREDIT

611 600. Advanced Design. (2) II, S. Special emphasis on art structure; designs for textiles using modern commercial repeats. Pr.: Art 600.

611 640. Interior Design III. (3) II, alt. S. Creative design of furnishings; introduction to markets and selling; decorator-client relationships; qualifications of the professional decorator. Pr.: I. Des. 340.

611 645. Historic Furniture Design. (3) II, alt. S. Design expressed in furniture in each of the great art periods. Pr.: I. Des. 240 or consent of instructor.

611 720. Readings in Interior Design. (2) I, II, S. Directed study in current problems of interior design. Pr.: I. Des. 340 or consent of instructor.

611 740. Historic Fabric Design. (3) I, alt. S. Design employed in fabrics

in each of the great art periods. Pr.: Art 100, C. & T. 260 or consent of instructor.

611 782. Problems in Interior Design. Credit arranged. I, II, S. Problems planned with the student to meet particular needs. Pr.: I. Des. 640 or consent of instructor.

FOR GRADUATE CREDIT

611 980. Research in Interior Design. Credit arranged. I, II, S. Research which may form the basis for the master's thesis or master's report. Pr.: Graduate standing.

FAMILY AND CHILD DEVELOPMENT

MARJORIE STITH,* *Head of Department*

Professors McCord and Stith;* Associate Professors Edelman* and Kennedy;* Assistant Professors Bollman,* Larson, Raffington and Schmalzried; Instructors Bergen and Block; Emeritus: Professors Kell* and Williams;* Associate Professor Aldous**

This department offers unique opportunities for study of the child and his family, with enriching experiences in the child development laboratory. Courses are planned to create an awareness of the child as a developing personality and to promote an understanding of the dynamics of family relationships. For those interested in working with children or adults two options are provided: (1) Early Childhood Education and (2) Community Services. Within the Community Services option there are three areas of specialization: social welfare, extension and youth work.

Early Childhood Certification: Completion of the option in Early Childhood Education meets the requirements for the degree Three-Year Early Childhood Certificate as established by the State Board of Education. In addition to the option requirements, the following criteria must be met: (1) An over-all grade-point average of 2.2 on all work taken at Kansas State University; (2) recommendation for certification by the Director of the Child Development Laboratory and by the Head of the Department of Family and Child Development to the certifying officers of Kansas State University.

The department offers work toward the degree Master of Science for students interested in professional opportunities such as child development programs, child guidance clinics, family life programs in the public schools, college teaching, student personnel work, child welfare with community agencies, or research in child development and family life. Current emphasis on culturally disadvantaged families and children provides new professional opportunities to the home economist with a graduate degree in child development and family relationships.

The facilities for advanced study include a research room with one-way mirrors and an intercommunication system that provides opportunities for students to observe individuals or groups in an experimental setting. Through the cooperation of the community, opportunity is afforded for practicum experiences with families and with children of all ages.

Prerequisite to graduate work in this field is a B. S. or B. A. degree, with a major in home economics or a related field.

FOR UNDERGRADUATE CREDIT

620 250. Human Relations. (2) I, II, alt. S. Increases the student's knowledge of individual development through awareness and understanding of his relationships with his family, his peers, and others; concepts and generalizations describing development and relationships.

620 325. The Preschool Child. (3) I, II, alt. S. Principles of development and guidance of preschool children in homes and in groups; application of principles in nursery school. Pr.: Psych. 110 and sophomore standing.

620 330. Creative Experiences for the Preschool Child. (3) I. Tech-

niques of meeting the needs of preschool children through their experiences with stories, music, kinds of play activities, and creative media. Pr.: F. C. Dev. 325.

620 350. Family Relationships. (2) I, II, S. Effects of family interaction upon individual development; consideration of pre-marital, marital, and parent-child relationships, Pr.: Sophomore standing.

620 360. Middle Childhood. (3) I, II, alt. S. Development characteristics of middle childhood as a basis for guidance, with emphasis on understanding of family and peer group relationships; observation of children 6 to 12; field work arranged. Pr.: Psych. 110; and one of the following: F. C. Dev. 325, Educ. 202 or Psych. 415.

620 370. Field Study in Family and Child Development. Credit arranged. I, II, S. Directed study of processes of human development and participation in a field setting, with consideration of services available to individuals and families. Pr.: Sophomore standing; consent of department head.

620 375. Family Health. (2) I, II. Factors conducive to maintaining a high level of health for family members from the prenatal period through old age. Pr.: Eight hours biological science or consent of instructor.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

620 475. The Adolescent. (2-3) I, II, S. Focus on interpersonal processes; principles and characteristics of the helping relationship in light of developmental aspects of adolescence. Pr.: Five hours of Family and Child Development, or five hours of a combination of Psychology and Educational Psychology, and junior standing.

FOR UNDERGRADUATE AND GRADUATE CREDIT

620 625. Community Resources for Children. (3) I. Study of legislation, community agencies and programs pertaining to children. Field trips arranged. Pr.: F. C. Dev. 325 and Soc. 211.

620 650. Advanced Study of Children. (3) II, S. History and methods of child study; analysis of developmental theory; laboratory experience for graduate students. Pr.: Psych. 420 or equiv. and F. C. Dev. 320 or Psych. 415 or consent of instructor.

620 660. The Family. (2-3) I, II, S. Consideration of the family as a whole throughout the family life cycle; developmental tasks at each stage. Present-day resources available for strengthening American families. Pr.: F. C. Dev. 350 or consent of instructor.

620 670. Directed Experience in Early Childhood Education (with Children 2-5). (4-6) II, S. Full participation in the Nursery School Program; planning, administration, evaluation. Field experiences arranged. Prearrangement and consent of instructor required. Two hours rec. and two hours conference, eight weeks preschool participation. Pr.: F. C. Dev. 330 or equiv.

620 675. Parent Education. (2 or 3) II, S. Principles in child development and family relationships applied to professional group and individual work with parents. Pr.: F. C. Dev. 325, 660, six hours psychology, or consent of instructor.

620 680. Seminar in Family and Child Development. Credit arranged. I, II, S. Interpretation and evaluation of research relating to family members. May be taken more than one semester with consent of head of department. Pr.: F. C. Dev. 660 or consent of instructor.

620 690. Concepts of Activity Therapy. (3) On sufficient demand. Introduction to theory and methods of activity therapy in programs facilitating human development and rehabilitation. Pr.: 15 hours in F. C. Dev. or consent of instructor.

620 700. Child Development Center Programming. (2 or 3) S alt. years. Rationale for and techniques of administering programs for preschool

children, including health, education, social services, parent involvement. Pr.: Nine hours F. C. Dev. or consent of instructor.

620 720. Infant Behavior and Development. (3) II. Concern with the infant as a developing individual within the family; examination of the theories and research relevant to development from conception through the second year. Pr.: F. C. Dev. 325, 375, and Zool. 425.

620 780. Problems in Family and Child Development. Credit arranged. I, II, S. Students writing a master's report enroll in this course. Pr.: Consent of department head.

FOR GRADUATE CREDIT

620 820. Readings in Family and Child Development. (3) II, S. Implications of research findings for preparation for professional work in counseling, teaching, and research in family and child development. Pr.: F. C. Dev. 325 or equiv. and F. C. Dev. 660 or equiv. and six hours in social science or consent of department head.

620 830. Characteristics and Developmental Processes of College Students. (3) II. Study of characteristics of college students; relate patterns of maturation to academic experiences, to formulation of life styles and to development of a sense of vocation. Pr.: 12 hours in F. C. Dev., Psych., Soc., Physiol., Educ. and consent of instructor.

620 835. Marriage. (3) II. A study of generalizations and empirical research findings on marriage; foundation for teaching and research in family relations. Pr.: F. C. Dev. 350, 660 or equiv.; consent of instructor.

620 840. Family Processes. (3) Alt. years. Examination of theoretical approaches to the study of the family unit from the perspective of interpersonal relationships; participant observation of families and/or analysis of case materials. Pr.: F. C. Dev. 660 and consent of instructor.

620 851. Principles of Marriage and Family Counseling. (3) I, S. To develop an understanding of processes in marriage and family counseling; to initiate the study of interactions within the counseling setting; and to apply knowledge of the family and of marriage to the helping relationship. Pr.: F. C. Dev. 835; Educ. 832; F. C. Dev. 881, 882, or 883 or consent of instructor.

620 855. Group Counseling. (3) I in alt. years. Theories and procedures of group counseling; supervised experience in procedures and techniques. Pr.: F. C. Dev. 881, 882, or 883; Educ. 832; or consent of instructor.

620 860. Practicum in Counseling. Credit arranged. I, II, S. Supervised practical experience in counseling. Pr.: Psych. 844 or Educ. 832; and F. C. Dev. 881, 882, or 883 or equiv., and consent of department head. (Same as Psych. 860.)

620 861. Practicum in Family and Community Services. Credit arranged. I, II, S. Supervised experience in providing help or instruction to family members in community settings. Pr.: Nine hours social science; F. C. Dev. 881, 882, or 883; six other graduate hours in F. C. Dev.; consent of department head.

620 862. Practicum in Human Development Research. Credit arranged. I, II, S. Observation, codification, and reporting of behavior. Pr.: F. C. Dev. 881, 882, or 883; course in methods of research; six other graduate hours in F. C. Dev.; consent of department head.

620 863. Practicum in Early Childhood Education. Credit arranged. I, II, S. Supervised participation in child development laboratory and other group situations involving young children, 2 to 5. Pr.: F. C. Dev. 881, 882, or 883; F. C. Dev. 650; three other graduate hours in F. C. Dev.; consent of department head.

620 864. Practicum in Parent Education. Credit arranged. I, II, S. Supervised experience in providing help to parents; organization of par-

ent study groups. Pr.: F. C. Dev. 881, 882, or 883; F. C. Dev. 675; three other graduate hours in F. C. Dev.; consent of department head.

620 881. Social Processes in Human Development. (3) I, S. Integration of principles of social maturation and growth with physiological and self-processes of human development. Pr.: Eight hours natural science and eight hours social science or consent of instructor.

620 882. Physiological Processes in Human Development. (3) II. Integration of principles of physiological growth with social and self-processes of human development. Pr.: Eight hours natural science and eight hours social science or consent of instructor.

620 883. Self-Processes in Human Development. (3) S. Integration of precepts relating to self with principles of social and physiological processes in human development. Pr.: Eight hours natural science and eight hours social science or consent of instructor.

620 895. Practicum in Study of Student Development. (3) I, II. Supervised professional experience collecting and processing in-life data on college students. Pr.: F. C. Dev. 830, Psych. 856, Educ. 826, or equiv. or conc. enrollment.

620 980. Research in Family and Child Development. Credit arranged. I, II, S. Individual research problems which may form the basis for the master's thesis. Pr.: Consent of department head.

FAMILY ECONOMICS

RICHARD L. D. MORSE,* *Head of Department*

Professor Morse; Assistant Professors Annis* and Rasmussen; Instructor McKendrick; Emeritus: Associate Professor Agan**

This department prepares students for professional work in the areas of housing, household equipment, home management, consumer education, family finance, and family economics. Modern laboratory facilities and equipment are provided.

Emphasis in the department is twofold: to study the effect of social and economic forces on family living in society; and to study family management, its resources in relation to its goals. Undergraduate options are: (1) Consumer Interest, (2) Housing and Equipment.

Work leading to the degree Master of Science is offered by this department. Graduate students can prepare themselves for positions in home management laboratories, as family financial consultants, home management and consumer education specialists in extension, teachers and research workers in the fields of housing, equipment, home management, and family economics. Research in family economics, equipment and housing is conducted. Several research and teaching assistantships are available each year.

Prerequisite to graduate work in these fields is a B. S. or B. A. degree, with a major in home economics or a related field.

FOR UNDERGRADUATE CREDIT

630 300. Family Economics. (3) I, II, S. Economic forces affecting families, and management by families of their economic resources. Pr.: Econ. 110 or equiv.

630 305. Family Finance. (2) I, II, S. Financial problems involved in the effective management of the family's resources.

630 320. The House. (3) I, II, S. A consideration of dwellings, their environment, plans, and space requirements, which promote effective utilization of family resources. Six hours rec. and lab. a week. Pr.: Sophomore standing.

630 340. Household Equipment. (2) I, II, S. Principles of operation, care and design of equipment used in the home; methods of evaluating equipment performance and demonstrating application of principles. Four hours rec. and lab. a week.

630 360. Home Management. (2) I, II, S. Study of the use of family's resources toward maximum achievement of family's goals. Pr.: Junior standing.

630 365. Home Management Laboratory. (2) I, II, S. Residence in home management or equivalent experience with consent of department. Arrangements for enrollment must be made prior to registration. Pr.: F. Ec. 360 or conc. enrollment.

630 380. Field Study in Family Economics. Credit arranged. I, II, S. Supervised experiences with community action programs, homemakers' service, and consumer services in industry. May be taken more than one semester. Pr.: F. Ec. 300, 360, and consent of department head.

FOR UNDERGRADUATE AND GRADUATE CREDIT

630 600. Families in the American Economy. (3) I, S. Study of the interrelation of the national economy and the family, family incomes and expenditures, cost of living estimates, measures of family welfare, public policies affecting family welfare and standards of living. Pr. or conc.: Econ. 110 or consent of instructor.

630 605. Consumers and the Market. (2 or 3) I, S. Problems of the consumer in the present market, market practices, aids toward intelligent buying of commodities, and the types of protection, including legislation. Field trip out of town. Pr.: Econ. 110.

630 610. Consumer Marketing Programs and Policies. (3 or 2) II, S. Review of consumer marketing programs and policies of education, business and government as they bear upon consumer decision making in the market. Pr.: F. Ec. 605 or equiv.

630 620. Housing Requirements of Families. (2) I, S. Housing requirements of families as influenced by their interests, activities, and socioeconomic status; effective ways of meeting these requirements in homes in this area. Six hours rec. and lab. a week. Field trips. Pr.: F. Ec. 320, 340; senior or graduate standing.

630 640. Advanced Household Equipment. (2 or 3) II, S. Application of basic electrical, optical, refrigeration, heat transfer, psychometric, and detergent chemistry principles to the study of household equipment, with emphasis on techniques and instrumentation for consumer testing. Six hours rec. and lab. a week. Pr.: F. Ec. 340, Phys. 112 or 115 or 121; senior or graduate standing.

630 660. Work Simplification. (2) II, S. The application of the principles of motion economy in the performance of certain household tasks to promote effective use of time and energy. One hour rec. and two hours lab. a week. Pr.: Junior standing.

630 680. Seminar in Family Economics. (1 to 3) I, II, S. A review of research literature; trends in the field of family economics; the contribution of the area to the family and community. Pr.: Senior or graduate standing.

630 705. Financial Problems of Families. (2) II. Financial problems confronting families, primarily of the middle-income classes; study of insurance, credit, savings, and estate planning as they relate to family living. Pr.: F. Ec. 305 or consent of instructor.

630 710. Resources for Consumer Education. (3 or 2) S. Survey and evaluation of the subject matter content of consumer education books, pamphlets and audio-visuals. Pr.: Educ. 550 or 752 or degree in social science.

630 715. Advances in Consumer Economics. (3 or 2) S. Fundamental principles of consumer economics emphasizing money management, decision making in consumer purchases, institutional factors bearing on consumer decisions. Pr.: F. Ec. 600, 605 or equiv.

630 780. Problems in Family Economics. Credit arranged. I, II, S. Individual investigation in standards of living and family expenditures; housing and household equipment; time and motion study; and use of family resources. Pr.: Consent of instructor.

FOR GRADUATE CREDIT

630 820. Seminar on Aging. (2 or 3) S. Selected aspects of problems and current developments concerning the economic, housing, equipment and managerial needs of the aging. Pr.: F. Ec. 360, 600, Econ. 110, Soc. 211 or consent of instructor. May be taken more than once with consent of department head.

630 860. Advanced Home Management. Credit arranged. II, S. Review of current research in management, administration, decision making, goal evaluation, and problems of families handicapped by low income, physical disability, or age. Pr.: F. Ec. 365 or consent of department head.

630 980. Research in Family Economics. Credit arranged. I, II, S. Individual research problems which may form the basis for the master's thesis. Pr.: Consent of instructor.

FOODS AND NUTRITION

LUCILLE WAKEFIELD,* *Head of Department*

Distinguished Professor Caul; Professors Finkelstein,* Harrison,* Tinklin* and Wakefield;* Associate Professors Browning* and Fryer;* Assistant Professors Bowers* and Newell; Emeritus: Professor Aseham;* Associate Professor McMillan;* Assistant Professor Mullen**

The department of foods and nutrition provides through its two options specialized instruction for students who wish to become nutritionists, research workers in foods and nutrition, dietitians, extension specialists, food editors or work in food in business and test kitchens.

Two options in foods and nutrition lead to a bachelor's degree: (1) foods and nutrition in business and (2) foods and nutrition research. Basic courses in foods and nutrition are offered for all home economics students and for those whose major interest is outside the field of home economics. M. S. and Ph. D. programs are offered by the department. Requirement for graduate study in foods and nutrition is the completion of a four-year undergraduate curriculum equivalent to that required of undergraduate students majoring in foods and nutrition at this institution. Research and teaching laboratories provide students with excellent equipment. Research with other departments makes possible a variety of studies. Graduate research assistantships are available to qualified students.

FOR UNDERGRADUATE CREDIT

640 101. Food Preparation for Men. (1) I. Rudimentary aspects of food purchasing, preparation and service, including basic equipment required.

640 132. Basic Nutrition. (3) I, II. Nutritional requirements of man with emphasis on developing judgment in the selection of foods. Not open to students in Foods and Nutrition, Dietetics and Institutional Management, and Home Economics Education.

640 133. Food for Man. (2) I, II, S. Food production, distribution, significance and consumption. Nutritional status of world population and local, national and international programs for improvement.

640 300. Meal Management. (3) I, II. Factors involved in purchasing, production, marketing, and legal regulations of foods; preparation and service of food in varying cultures.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

640 410. Principles of Food Demonstration. (2) II. Fundamentals in food demonstrations used by the teacher, home economics agent, and commercial demonstrator. Six hours lab. a week. Pr.: F. & N. 132 or 602 and 300.

FOR UNDERGRADUATE AND GRADUATE CREDIT

640 601. Food Science. (3) I, II, S. Preparation of foods as related to their chemical, physical, and organoleptic properties. One hour rec. and six hours lab. a week. Pr.: Chem. 190, 191 or 350, 351, or Biochem. 120.

640 602. Principles of Nutrition. (3) I, II, S. Functions and interrelationships of various nutrients in the body. Two hours rec. and three hours lab. a week. Pr.: Chem. 190, 191 or 350, 351 and Zool. 205 or Biol. 198.

640 603. Child Nutrition. (3) II, S. A study of the principles of prenatal, infant, and child nutrition emphasizing the practical application to life situations. Pr.: F. & N. 132, Zool. 205 or Biol. 198 or consent of instructor.

640 604. Advances in Foods. (2 or 3) S. Recent developments in research related to foods. Pr.: F. & N. 601 or equiv. and consent of department head.

640 605. Food Research Techniques. (3) I, II, S. Fundamental principles of food quality evaluation and development of an independent research problem. Pr.: F. & N. 601.

640 606. Advances in Nutrition. (2 or 3) S. Recent developments in research related to nutrition. Pr.: F. & N. 602 or equiv. and consent of department head.

640 607. Nutrition in Developing Countries. (2-3) I or II, S. A study of nutritional problems in developing countries, including an analysis of factors which contribute to malnutrition, effects of undernutrition and malnutrition, methods for assessing nutritional status of a population, and application of measures for improvement of nutrition. Pr.: F. & N. 602 or consent of department head.

640 611. Nutrition for Social Service Agencies. (2-3) S. Socio-psychological, physical aspects of food intake including food function in society and needs of socio-economic and cultural groups during life cycle. Pr.: Three hours sociology, nutrition course, or consent of instructor.

640 680. Seminar in Foods and Nutrition. (2) I, II, S. Individual reports and discussion of current research in foods and nutrition. Pr. or conc.: F. & N. 602 and 605 or consent of department head.

640 710. Nutrition Needs Throughout the Life Cycle. (3) II alt. years. Food patterns, dietary intakes and nutritional requirements of infants, children, adolescents, and adults. Pr.: Biochem. 200 or 420, Zool. 425, F. & N. 602.

640 712. Diet Therapy. (3) II. Dietary modifications for pathological conditions. Pr.: F. & N. 710.

640 760. Fundamentals of Food Flavor Analysis. (3) I, II. Flavor perception considered from both the human senses of taste, feeling, and smell and the chemical and physical attributes of food; practical bases for reliable organoleptic measurement. One hour lec. and six hours lab. a week. Pr.: Chem. 190, 350, or 450; F. & N. 605; or consent of instructor.

640 780. Problems in Foods and Nutrition. Credit arranged. I, II, S. Laboratory and library experience in current problems in foods and nutrition. Three hours lab. a week for each hour of credit. Pr.: For home economics majors, F. & N. 602 or 605.

FOR GRADUATE CREDIT

640 800. Bionutrition. (3) I, S. Evaluation of nutrient needs of the whole man by integration of knowledge of biochemistry, physiology, and nutrition. Pr.: Biochem. 200 or 420, Zool. 425, and F. & N. 602 or equiv.

640 801. Advanced Nutrition. (3) II, S. Current knowledge of metabolic functions of food in the human organism. Pr.: Biochem. 200 or 421, Zool. 425, F. & N. 602.

640 806. Food Systems. (3) I, S. Application of principles of biochemistry to emulsions and egg, meat, and dairy products. Two hours rec. and three hours lab. a week. Pr.: Biochem. 200 or 421, F. & N. 601, or consent of department head.

640 807. Advanced Foods. (3) II, S. Properties and functions of fats, oils, and starches in food; the structure of batters and doughs; and principles and techniques in food preservation. Two hours rec. and three hours lab. a week. Pr.: Biochem. 200 or 421, and F. & N. 601, or consent of department head.

640 809. Research Methods in Foods and Nutrition. (3) I or II, on demand. Chemical, biological, and histological methods applied to research in foods and nutrition. One hour rec. and six hours lab. a week. Pr.: F. & N. 710 and 806.

640 880. Graduate Seminar in Foods and Nutrition. (1) I, II. Discussion of investigations in foods and nutrition. May be taken four semesters for credit. Pr.: F. & N. 605 and 710 or consent of instructor.

640 881. Food Science Colloquium. (1) I, II. Discussion of investigations in food science. Attendance required of all graduate students in food science. Maximum of two hours may be applied toward an M. S. degree or four hours toward a Ph. D. degree.

640 890. Readings in Foods and Nutrition. Credit arranged. I, II, S. Reports and discussions on current research and literature in foods and nutrition, and allied areas.

640 980. Research in Foods and Nutrition. Credit arranged. I, II, S. Three hours a week for each hour of credit. Pr.: Consent of instructor.

GENERAL HOME ECONOMICS

DORETTA SCHLAPHOFF HOFFMAN,* *Head of Department*

Professors Hoeflin and Hoffman;* Assistant Professor Reehling; Emeritus: Professor Kramer;* Assistant Professor Barnes**

FOR UNDERGRADUATE CREDIT

650 110. Introduction to Home Economics. (1) I. Scope, progress and trends in home economics.

650 300. Home Economics Seminar. (1) I, II. Challenges facing home economists, place of research in home economics, and professionalism in the field. Pr.: Senior standing or consent of instructor.

650 308. Home Economics Colloquium. Credit arranged. I, II, S. Special topics for home economics majors.

650 385. Problem in General Home Economics. Credit arranged. I, II, S. Independent study for undergraduate students. Pr.: Consent of instructor.

650 399. Honors Seminar in Home Economics. (1) I, II. Selected topics in home economics. May be taken more than once for credit. For students in the Honors Program only.

FOR UNDERGRADUATE AND GRADUATE CREDIT

650 780. Problem in General Home Economics. Credit arranged. I, II, S. Individual investigation into work in area of general home economics. Pr.: Consent of instructor.

FOR GRADUATE CREDIT

650 900. Methods of Research in Home Economics. (2) Study meanings of research, review of literature, organization of research from conception through publication, and research procedures. Offered when scheduled.

650 980. Research in General Home Economics. Credit arranged. I, II, S. Individual research problems that may form the basis for the master's thesis. Pr.: Consent of instructor.

THE MERRILL-PALMER PROGRAM

Selected graduate and undergraduate students may attend Merrill-Palmer Institute in Detroit for one semester, earning up to 16 hours of credit. All plans must be approved in advance by the Dean of the College of Home Economics.

MASTER'S DEGREE PROGRAMS IN GENERAL HOME ECONOMICS

Graduate study leading to the degree Master of Science is offered in General Home Economics in combination with one or two related areas. A master's thesis or report is required and is included in the total credit hour requirements for the master's degree. Prerequisites for graduate work include a background in home economics or related areas and admission to Graduate School. The Deans of the College of Home Economics serve as advisers to General Home Economics majors.

MASTER'S DEGREE PROGRAMS IN HOME ECONOMICS EDUCATION

The College of Home Economics and the College of Education have a cooperative arrangement so that a student who wishes a minor or major area in home economics education may plan a graduate program of study to include several areas in home economics to give strength to the student's background for teaching home economics. The Home Economics Education graduate student has to have had successful experience either in teaching or in extension service. Home Economics Education courses are listed on pages 257-258. The senior professor in Home Economics Education serves as adviser for those students who select this area as their major.

INSTITUTIONAL MANAGEMENT

GRACE M. SHUGART,* *Head of Department*

Professor Shugart; Associate Professors Riggs and Zeigler;* Assistant Professors Hemphill* and Middleton;* Instructor Roach; Emeritus: Professor West**

The Department of Institutional Management provides instruction for students preparing to become dietitians or managers in hospital, college, university, school, commercial, or industrial food services. Two degrees are offered: a Bachelor of Science in Restaurant Management and a Bachelor of Science in Home Economics for students majoring in Dietetics and Institutional Management.

Graduate study toward the M. S. degree is offered. Prerequisite to a graduate program is the completion of a four-year undergraduate curriculum substantially equivalent to that required of undergraduate students majoring in institutional management at this University.

A well-designed laboratory, furnished with hotel- and restaurant-sized equipment, provides experiences in quantity food preparation and management. A research laboratory with large-scale equipment is used for quantity food production research. Facilities for undergraduate and advanced study include units of the residence hall food services and Kansas State Union.

FOR UNDERGRADUATE CREDIT

660 300. School Lunch Management I. (2) S. Basic principles of nutrition, menu planning and quantity food production as related to school food services.

660 310. School Lunch Management II. (2) S. Problems of the school food service manager, including employee training and scheduling, supervision, and financial control. Pr.: Ins. M. 300.

660 320. School Lunch Management III. (2) S. School food service supervision in the unified district; problems of centralization; planning layout and equipment selection, purchasing, financial and personnel management. Pr.: Ins. M. 310.

FOR UNDERGRADUATE AND GRADUATE CREDIT

660 600. Quantity Foods. (3) II. Menu planning in food services; principles and methods of preparing food in quantity, emphasizing importance of standardized recipes and use of institutional equipment as related to physical layout. One hour rec. and six hours lab. a week. Pr.: F. & N. 601.

660 605. Food Production Management. (4) I. Production planning and controls in food service systems, with management experience in campus food services. Two hours rec. and six hours lab. a week. Pr.: Ins. M. 600.

660 625. Quantity Food Purchasing and Control. (2) I. Principles and methods of purchasing food in quantity; use of specifications; food cost control through estimating, buying, and storage. Pr.: Ins. M. 600.

660 635. Food Service Equipment and Layout. (2) I. Factors affecting the selection and arrangement of equipment in food service systems. Pr.: Ins. M. 600.

660 640. Organization and Management of Food Services. (3 or 2) II, S. Principles of management as applied to food services; study of food service policies, budgets, supervision and personnel. Three hours rec. a week. Field trip required. Pr.: Ins. M. 605 or consent of instructor.

660 655. Food Service in Community Institutions. Credit arranged. I, S. Management of the food service in small hospitals, nursing homes, and schools. Pr.: Ins. M. 600 or consent of instructor.

660 780. Problems in Institutional Management. Credit arranged. I, II, S. Individual investigation of problems in institutional management. Conferences and reports at appointed hours. Pr. or conc.: Ins. M. 640 or equiv., consent of instructor.

FOR GRADUATE CREDIT

660 885. Seminar in Institutional Management. Credit arranged. I, S. Developments in research related to food service management. May be taken more than one semester with consent of student's advisory committee. Pr.: Ins. M. 605 or equiv. and consent of department head.

660 890. Food Service Administration. (2 or 3) II, S. Advanced study of management as applied to food service systems; organizational structure, financial and personnel policies, responsibilities and problems of management. Pr.: Ins. M. 640 or equiv.

660 895. Food Service Facilities Planning. (2) II, S. Programming and planning of food service layout, with emphasis on the team approach.

660 980. Research in Institutional Management. Credit arranged. I, II, S. Pr.: Consent of instructor.

The College of Veterinary Medicine

CHARLES E. CORNELIUS,* *Dean*
DONALD M. TROTTER,* *Associate Dean*
LEE T. RAILSBACK, *Assistant to the Dean*

VETERINARY ENROLLMENT LIMITED

By authority of the State Board of Regents, enrollment in the Curriculum in Veterinary Medicine is limited. Advancement to each of the four professional years is based upon the applicant's scholarship record and completion of the previous year's, or semester's, requirements in the curriculum. Resident students wishing to enter this curriculum should apply for admission to the Dean of the College of Veterinary Medicine on or following December 1 upon completion of two or more semesters' requirements in the pre-veterinary curriculum. Transfer students should make application to the Director of Admissions before applying to the Dean of the College on or following December 1. Selection of applicants for the professional curriculum is based upon the applicant's scholarship record in the required pre-veterinary curriculum and other evidence of his fitness. When all other factors are equal, first preference is given to applicants who have qualified for resident fees at Kansas State University. Ordinarily application blanks for the professional curriculum are to be returned in complete form to the Dean's office within six days, after which time the Committee on Selection will proceed with interviews and with the process of selection. In general, no requests for admission to the professional curriculum will be approved after March 1.

Applicants must offer: (1) satisfactory evidence of completing the high school units required for admission to the University, (2) evidence of completing 64 hours of university work as indicated in the list to follow or evidence that such work will be completed satisfactorily by the end of the fourth semester of pre-veterinary medical training.

PRE-VETERINARY MEDICAL REQUIREMENTS

The pre-veterinary medical work may be pursued at Kansas State University in the College of Arts and Sciences (page 121) or the College of Agriculture (page 54) or in any approved junior college or university. It is strongly recommended that students who complete their first year of pre-veterinary work elsewhere enroll at Kansas State University in the pre-veterinary curriculum for their second year at Kansas State University.

Course	*Sem. Hrs.*	*Course*	*Sem. Hrs.*
English Composition I and II	6	General Zoology	4
Oral Communication	2-3	Genetics	2-3
Chemistry I	5	Social Science Electives	6
Chemistry II	5	Humanities Electives	6
General Organic Chemistry	5	Introductory courses in Animal Husbandry, Dairying and Poultry Producton or their equivalent	6-8
Physics I and II	8		
Trigonometry	3		
Electives*	1-6		
Total semester hours			64

* Number depending on selection of other courses.

A Kansas State University student who completes the pre-veterinary curriculum in the College of Arts and Sciences or the College of Agriculture is awarded a Bachelor of Science Degree at the end of his successful completion of the second year in the Professional Veterinary Medical Curriculum.

A Kansas resident is interpreted as a student who is entitled to pay resident fees; a non-resident is one who is required to pay non-resident fees. (See general section of this catalog for further details.)

VETERINARY MEDICAL LIBRARY

As a result of generous contributions from alumni and friends plus a federal grant, the College of Veterinary Medicine has a well-equipped library consisting of approximately 6,000 volumes which deal with all phases of veterinary medical literature and many allied fields. Numerous additional textbooks and journals are available at the main University Library on campus.

Fees for Veterinary Medical Students

Assessments

Per semester (16 weeks or more if enrolled in more than six hours)

	Kansas Residents or Staff Members	*Non-residents*
1. Incidental	$160.00	$410.00
2. Student Health	13.00	13.00
3. Student Union (building fund)	4.00	4.00
4. Student Union Annex I	3.50	3.50
5. Student Union Annex II	5.00	5.00
6. Student Activities (incl. Union operations)	14.25	14.25
7. Stadium Bonds	4.25	4.25
Total for Veterinary Medical students	$204.00	$454.00

CURRICULUM IN VETERINARY MEDICINE

Doctor of Veterinary Medicine

The Curriculum in Veterinary Medicine in Kansas State University was established to give the young men of this state an opportunity to pursue these studies in an environment where the facilities offered by other branches of the University would be at their command. To fit the veterinarian to deal with the livestock problems which he has to meet, he is required to take the work in livestock feeding, breeding, judging, poultry, in milk and dairy inspection, chemistry, bacteriology, parasitology, and zoology, in addition to his purely professional work.

Work must be taken as prescribed, except that certain courses may be selected from extracurricular electives if the student has the prerequisites.

While not required, fifth-year students are encouraged to accept summer internships with practicing veterinarians, federal and state regulatory forces.

See the Graduate School section for the program leading to the M. S. and Ph. D. degrees.

Curriculum in Veterinary Medicine

For admission to this curriculum, consult the previously listed "Pre-veterinary Medical Requirements."

The carefully planned two or two and one half year pre-veterinary program plus the four-year (total of at least six years) professional curriculum may lead to the two degrees, Bachelor of Science and Doctor of Veterinary Medicine.

FIRST PROFESSIONAL YEAR

First Semester					Second Semester				
	Course			*Sem. Hrs.*		*Course*			*Sem. Hrs.*
Physi.	740	630	Physio. Chem.	2	Bact.	213	410	Vet. Bacteriology	5
Chem.	221	421	Biochemistry	3	Physi.	740	605	Gross Anatomy II	5
Engl.	229	090	English Prof.	0	Physi.	740	615	Micro. Anatomy II	3
Physi.	740	600	Gross Anatomy I	7	Physi.	740	635	Physiology I	5
Physi.	740	610	Micro. Anatomy I	5					
Gn. V. M.	710	140	Vet. Orientation	1					
Total				18	Total				18

SECOND PROFESSIONAL YEAR

A. H.	005	240	Livestock Feeding	3	Physi.	740	670	Pharmacology	6
Bact.	213	370	Vet. Immunology	5	Path.	730	610	Systemic Pathology	5
Physi.	740	645	Physiology II	5	I. D.	720	675	Clinical Pathology	3
Path.	730	603	Gen. Pathology	5	I. D.	720	695	Parasitology I	3
					Surg.	750	610	Propaedeutic Med.	2
Total				18	Total				19

THIRD PROFESSIONAL YEAR

Gn. V. M.	710	690	Toxicology	4	Physi.	740	620	Anatomy III	2
I. D.	720	697	Parasitology II	3	Surg.	750	615	Surgery II	8
Surg.	750	605	Surgery I	3	Surg.	750	650	Medicine II	7
Surg.	750	630	Medicine I	5	Surg.	750	710	Clinic II	2
Surg.	750	640	Radiology I	2					
Surg.	750	700	Clinic I	2					
Total				19	Total				19

FOURTH PROFESSIONAL YEAR

B. A.	305	101	Fund. Bus. Professional People	2	Surg.	750	720	Therapeutic Nutri.	3
					I. D.	720	753	Public Health II	3
I. D.	720	751	Public Health I	4	Surg.	750	665	Lab. Animal Med.	3
Path.	730	757	Avian Medicine	3	Surg.	750	690	Medicine IV	6
Surg.	750	670	Medicine III	6	Surg.	750	735	Clinical Med. II	4
Surg.	750	725	Clinical Med. I	4					
Total				19	Total				19

Number of hours required for graduation: Pre-veterinary, 64; professional, 149; total, 213.

GENERAL VETERINARY MEDICINE

FOR UNDERGRADUATE CREDIT

710 140. Veterinary Orientation. (1) I. Lectures on introduction to veterinary medicine. One hour lec. a week. Pr.: Third-year standing in veterinary medicine.

FOR UNDERGRADUATE AND GRADUATE CREDIT

710 690. Toxicology. (3) I. A cooperative course in which the identification and habitat of plants poisonous to animals is taught during the first six weeks by the Division of Biology. The toxic principles, symptoms, and treatment of poisonous plants and the more common chemical poisoning occurring in domestic animals, their symptoms and treatment, to be taught by the Department of Surgery and Medicine during the remainder of the semester. Three hours rec. a week. Pr.: Physi. 670 and 675.

INFECTIOUS DISEASES

E. H. Coles,* *Head of Department*

Professors Coles and Leland;* Associate Professors Burroughs,* Kelley* and Osbaldiston;* Assistant Professors Hibbs* and Shipley; Instructor Wren*

Basic courses in parasitology, clinical pathology and public health are offered for students enrolled in the veterinary medicine curriculum. In addition, some courses are available for graduate students whose interests are in associated fields. Classroom instruction is by lecture, recitation, laboratory experience, seminar and demonstrations. Third- and fourth-year veterinary medical students receive practical instruction in clinical laboratory procedures and the interpretation of results of laboratory tests.

Major work leading to the degrees Master of Science and Doctor of Philosophy is offered. (See description in Graduate School section.) Work at the graduate level includes advanced courses in clinical pathology, parasitology and public health.

COURSES IN INFECTIOUS DISEASES

FOR UNDERGRADUATE AND GRADUATE CREDIT

720 645. Veterinary Mycology. (3) I, S in even years. Detailed study of etiology of cutaneous, subcutaneous and systemic fungus infections of animals, using histopathologic examinations and culture studies. Two hours rec. and three hours lab. a week. Pr.: Bact. 310, Path. 630.

720 650. Fundamentals of Veterinary Public Health. (3) II. Organization and function of food inspection services; zoonoses as related to foods of animal origin. Three hours rec. a week. Pr.: Bact. 220 and consent of staff.

720 675. Clinical Pathology. (3) II. Principles, application and interpretation of clinical laboratory procedures and experience with applicable techniques. Two hours lec. and three hours lab. a week. Pr.: Second-year standing in College of Veterinary Medicine.

720 690. Veterinary Hematology. (3) II. A detailed study of the blood of domestic animals. Emphasis is placed on the species variabilities. Two hours lec. and three hours lab. a week. Pr.: Path. 675 or consent of instructor.

720 695. Veterinary Parasitology I. (3) II. General introduction to parasitology and study of arthropod and protozoan parasites of domestic animals; emphasis on disease prevention, signs and lesions of parasitisms, biologic and medicinal controls, and the relationship of parasites to public health. Taxonomy, structure, physiology and life cycles pertinent to identification and diagnosis of diseases are included. Two hours lec. and three hours lab. a week. Pr.: Second-year standing in College of Veterinary Medicine or consent of instructor.

720 697. Veterinary Parasitology II. (3) I. Study of the helminth parasites—nematodes, cestodes, trematodes and acanthocephalans—of domestic animals. Emphasis, procedures and objectives are similar to those of Veterinary Parasitology I. Two hours lec. and three hours lab. a week. Pr.: Veterinary Parasitology I.

720 710. Techniques in Parasitology. (3) I, II. On sufficient demand. Techniques, including collecting, preservation, staining of parasites; experience with methods of exposing hosts, rearing intermediate and definitive hosts; organizing research information and preparing manuscripts. Pr.: Graduate student status and a course in parasitology or conc. enrollment.

720 751. Public Health I. (4) I. Theory and procedures of meat and dairy inspection, sanitation and public health. Consideration of domestic and international livestock regulations. Four hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

720 753. Public Health II. (3) II. Consideration of zoonotic diseases; sanitary aspects of food processing, handling and storage. Three hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

720 775. Advanced Food Hygiene. (3) I, II, S. Further studies of the more recent detailed procedures used in the preservation and sanitary control of manufactured products prepared from sea food, poultry, animal meat, and dairy products. Two hours lec. and three hours lab. a week. Pr.: Path. 753.

720 780. Principles and Techniques of Research in Medical Investigations. (4) I, S. A study of the procedures in planning and evaluating medical experiments and the use of special research instruments in medical research. Three hours rec. and three hours lab. a week. Pr.: Path. 603, Physi. 645.

FOR GRADUATE CREDIT

720 820. Advanced Clinical Pathology. (3) I, S. Further studies and application of the more detailed laboratory procedures and tests in hematologic, serologic, bacteriologic, chemic and pathologic diagnosis. Pr.: Path. 760 and consent of staff.

720 825. Pathology of Body Fluids. (3) II. A detailed study of the alterations of the components of body fluids occurring in disease processes, and interpretations of these changes. Pr.: Path. 820 or consent of staff.

720 835. Veterinary Epidemiology. (2) I, S in odd years. The scope and objectives of epidemiologic principles relative to infectious and noninfectious diseases transmissible from animals to man, and application of these principles by use of case investigations. Two hours lec. a week. Pr.: Path. 740, 753.

720 870. Parasitic Protozoa. (3) I in odd years. Structure, life cycle, physiology, host relations, methods, and diagnosis concerned with protozoan parasites affecting vertebrates, including man. Pr.: Graduate students and seniors (instructor's permission) in veterinary medicine, zoology, and entomology.

PATHOLOGY

S. M. Dennis.* *Head of Department*

Professors Dennis, Leasure* and West;* Associate Professors Anthony* and McGavin;* Assistant Professor Gray; Instructors Dillman, Leipold and Rapp*

Basic courses in pathology are offered for students enrolled in the veterinary medicine curriculum. Instruction is by lecture, recitation, laboratory work, seminars and demonstrations. Practical necropsy experience is provided for students as an adjunct to their pathology training and as an aid to disease diagnosis.

Major work leading to the degree Master of Science and Doctor of Philosophy is offered. Work at the graduate level includes advanced courses in general and systemic pathology.

COURSES IN PATHOLOGY

FOR UNDERGRADUATE AND GRADUATE CREDIT

730 603. General Pathology. (5) I. Study of etiology, pathogenesis, lesions and termination of processes of disease, including inflammation, necrosis, regeneration, oncology and disturbances of metabolism, circulation and growth. Three hours lec. and six hours lab. a week. Pr.: Second-year standing in College of Veterinary Medicine.

730 610. Systemic Pathology. (5) II. Pathology of the organ systems of domestic animals including gross and microscopic study of lesions. Three hours lec. and six hours lab. a week. Pr.: Path. 603.

730 745. Advanced Histopathology. (3) I, S. Advanced study of pathologic alterations of disease. Pr.: Path. 610 and consent of staff.

730 757. Avian Medicine. (3) I. The prevention, diagnosis and treatment of avian diseases. Three hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

730 760. Pathological Technique and Diagnosis. (3) I, II. Practical experience in mammalian necropsy, avian necropsy, clinical pathology, histologic techniques, and diagnostic laboratory procedures. Pr.: Path. 610 and consent of staff.

FOR GRADUATE CREDIT

730 800. Pathology of the Diseases of Laboratory Animals. (3) I, S. The pathology of the diseases affecting the more common laboratory animals. Pr.: Path. 745 and consent of staff.

730 802. Research in Pathology. (1-6) I, II, S. Individual research in the pathology of animal disease. Pr.: Path. 610, 760. This work may form the basis for the master's thesis and the Ph. D. dissertation.

730 810. Problems in Pathology. (1-6) I, II, S. Work is offered in poultry diseases, parasitology, clinical pathology, food hygiene, public health, and pathology. Pr.: Path. 610 and consent of staff.

730 830. Pathology Seminar. (1) I, II, S. Pr.: Consult department head.

730 840. Advanced Systemic Pathology I. (5) II. Study of etiology, pathogenesis, gross and microscopic characteristics and systemic effects of diseases of cardiovascular, respiratory, gastrointestinal, urinary, and endocrine systems. Pr.: Path. 745 and consent of staff.

730 845. Advanced Systemic Pathology II. (5) I. Study of etiology, pathogenesis, gross, and microscopic characteristics and systemic effects of diseases of the skin, musculoskeletal, genital, nervous systems, and special senses. Pr.: Path. 840 and consent of staff.

730 850. Pathology of Infectious Diseases. (5) II in odd years. Detailed study of gross and microscopic lesions of specific diseases; emphasis given to diagnostic characteristics and procedures. Pr.: Path. 745 and consent of staff.

730 855. Oncology. (4) II in even years. Etiology, behavior, gross, microscopic characteristics, identification and prognosis of tumors. Pr.: Path. 745 and consent of staff.

730 860. Necropsy Diagnosis. (1) I, II, S. Necropsy procedures and diagnosis. May be repeated each semester by all pathology majors with a maximum total of 10 credit hours. Pr.: Path. 745 and consent of staff.

PHYSIOLOGICAL SCIENCES

D. M. TROTTER,* *Acting Head of Department*

Professors Brown, Cornelius,* Trotter* and Underbjerg;* Associate Professors Besch,* Clarenburg* and Fedde;* Assistant Professors Cardinet,* Gronwall,* Klemm, Lingle and Westfall;* Instructors Barnhart, Frey,* Schoning and Upson*

The Department of Physiological Sciences presents courses in the areas of physiology, pharmacology, physiological chemistry, gross anatomy, and microscopic anatomy at both the undergraduate and graduate levels.

Biophysical electronic instrumentation, an electron microscope and other instruments are available for physiological and anatomical studies.

Graduate programs leading to the degree Doctor of Philosophy are offered in the field of physiology and to the degree Master of Science in both anatomy and physiology.

A combined Anatomy-Physiology course is offered for undergraduate and graduate students outside the field of veterinary medicine.

FOR UNDERGRADUATE AND GRADUATE CREDIT

740 331. Anatomy and Physiology. (4) I. General anatomy and physiology of the domestic animals. Three hours rec. and three hours lab. a week.

740 600. Gross Anatomy I. (7) I. Dissection of the body cavities, limbs, head, neck, and genital organs of the ruminant. Three hours rec. and 12 hours lab. a week. Pr.: First-year standing in veterinary medicine.

740 605. Gross Anatomy II. (5) II. Dissection of the body cavities, limbs, head, and neck of the horse and the dog. Parallel comparative studies on the laboratory animals, pig, chicken, and cat. Two hours rec. and 12 hours lab. a week. Pr.: Gross Anat. 600.

740 610. Microscopic Anatomy I. (5) I. Origin, development and microscopic structure and appearance of the cells and tissues of the animal body. Three hours lec. and six hours lab. a week. Pr.: First-year standing in veterinary medicine.

740 615. Microscopic Anatomy II. (3) II. Origin, development and microscopic structure and appearance of the cells and tissues of the animal body. Three hours lec. and six hours lab. a week. Pr.: Micro. Anat. 610.

740 620. Anatomy III. (2) II. Dissections and demonstrations of regions of diagnostic and surgical importance. One hour lec. and two hours lab. a week. Pr.: Third-year standing in veterinary medicine.

740 625. Special Anatomy. Credit arranged. I, II, S. The study of any part of the horse (as the digestive or reproductive system), ox, sheep, pig, dog, cat, or chicken. Pr.: Anat. 600, 605 or equiv.

740 630. Physiological Chemistry. (2) I. A laboratory course concerned with the physiological chemistry of animals, with special emphasis on basic processes important to veterinary medicine. Six hours lab. a week. Pr.: Biochem. 421 lecture or equivalent to be taken concurrently or previously. First-year standing in veterinary medicine or consent of instructor.

740 635. Physiology I. (5) II. General principles of physiology of the various organ systems of domestic animals. Functional aspects of the cell, principles of body fluids, excitable tissues, endocrine system, blood, cardiology, circulation, respiration, digestion and absorption are included. Four hours rec. and three hours lab. a week. Pr.: Anat. 600, 610; Physiol. Chem. 630.

740 645. Physiology II. (5) I. Cont. of Physi. 635 to include liver function, kidney function, electrolyte and acid-base balance, temperature regulation, integumentary system, nutritional physiology, growth and reproduction. Four hours rec. and three hours lab. a week. Pr.: Physi. 635.

740 665. Physiologic Constituents of Body Fluids. (2) I, II, S. Analysis of body fluids, with application to specific and fundamental problems

in veterinary medicine. One hour rec. and one to three hours lab. a week. Pr.: Physi. 645 and consent of staff.

740 670. Pharmacology. (6) II. The history, source, physical and chemical properties, compounding, biochemical and physiological effects, mechanism of action, absorption, distribution, biotransformation and excretion, therapeutic and other uses, and toxicity of drugs. Five hours rec. and three hours lab. a week. Pr.: Physi. 645, or Physi. 660 and Biochem. 420, or equiv.

740 700. Physiology and Pharmacology of the Hormones. (3) II. The internal secretions, their synthetic analogues and use in research and therapy in domesticated animals will be evaluated. Two hours rec. and one to three hours lab. a week. Pr.: Physi. 645 and consent of staff.

740 798. Problems in Physiology. Credit arranged. I, II, S. Special problem-involving techniques utilized in studying the function of various organ systems of the body. Pr.: Consent of instructor.

FOR GRADUATE CREDIT

740 801. Avian Anatomy. (2 to 4), I, S. The study of the gross anatomy of birds, using the chicken as a type. The histology of certain organs is considered. Pr.: Consent of staff.

740 803. Seminar. (1) I, II, S. Designed primarily for graduate and senior students enrolled for graduate credit in physiology. Each student is required to give a report on some subject related to physiology. The course is intended to stimulate interest in research and evaluate data. One hour a week. Pr.: Consent of staff.

740 810. Bovine Anatomy. (2 to 4) I, S. The study of gross anatomy of the digestive, respiratory, and circulatory systems of the ox. The urogenital system, integument, and certain muscles are included as time permits. Pr.: Consent of staff.

740 812. Canine Anatomy. (2 to 4) I, II, S. Pr.: Consent of staff.

740 815. Histophysiology of Nutritional Deficiencies. (3) I, II, S. The study of changes occurring in tissues from nutritional deficiencies. Two hours rec. and three hours lab. a week. Open to graduate students and veterinary students earning graduate credit. Pr.: Consent of staff.

740 820. Research in Physiology. (1 to 6) I, II, S. For graduate students working toward the M. S. and Ph. D. degrees. Pr.: Consent of staff.

740 824. Physiology of Reproduction. (3) I. Study of reproduction of farm animals as related to the gross and microscopic anatomical structures and physiologic processes in regard to ova and spermatozoa, nutrition, and hormones. Pr.: Anat. 625.

740 825. Advanced Physiology. (3 to 5) I, II, S. The principles and techniques in the investigation of bioelectrical phenomena in relation to: (a) The physiology of the digestive organs; (b) myophysiology; (c) endocrinology; and (d) neurophysiology. Advanced physiological experiments will be conducted to provide an understanding of the applications of electronic equipment. Rec. and two three-hour labs. a week. Pr.: Physi. 635, 645, 650 and consent of staff.

740 830. Anatomy of Laboratory Animals. (2 to 4) I of even-numbered years and each S. Pr.: Consent of staff.

740 840. Reproductive Organ Anatomy. (1) II of even-numbered years and each S. Pr.: Consent of staff.

740 850. Anatomical Techniques. (1 to 2) I of odd-numbered years and each S. Pr.: Consent of staff.

740 860. Special Microscopic Anatomy. (1 to 4) II of odd-numbered years and each S. Pr.: Consent of staff.

740 870. Research in Anatomy. (1 to 4) I, II, S. For graduate students in the field of anatomy.

SURGERY AND MEDICINE

J. E. Mosier,* *Head of Department*

Professors Mosier and Noordsy;* Associate Professor Oehme;* Assistant Professors Anderson, Fishburn, Gelatt,* Guffy, Jernigan, Milleret* and Wallace;* Instructors Blaueh, Bracken, Clifford, Coffman, Kruckenberg, Miller, Schoneweis, Taussig, Vestweber; Emeriti: Professors Frank* and Frick**

The Dykstra Veterinary Hospital is equipped for diagnosis and treatment of animal disease and for instruction of students in the science and art of veterinary medicine.

The hospital has a capacity of 35 horses or cattle and 100 small-animal patients such as the sheep, swine, dog, and cat. Members of the clinical staff, accompanied by students, conduct an ambulatory clinic for the purposes of diagnosing and treating animal patients for the various diseases affecting livestock and poultry. Consultation services result in frequent referral cases or investigational trips.

Third- and fourth-year students are active participants in the hospital and clinical services. Students are regularly assigned in rotation during the year to various specialists of the clinic and pathology staff. In addition to daily assignments, fourth-year students are required to serve a two-week internship in the veterinary hospital, during which time they are responsible for the various management phases of the hospital.

The department presents courses in medicine, surgery, propaedeutic medicine, obstetrics and gynecology to veterinary students.

Opportunities leading to the degree Master of Science are offered. Prerequisite to graduate work in the department is the completion of a four-year curriculum substantially equivalent to that required of students majoring in veterinary medicine at this University.

Good library facilities, adequate physical equipment, and an abundance of cases offer excellent resources for research in surgery or medicine.

COURSES IN SURGERY

FOR UNDERGRADUATE AND GRADUATE CREDIT

750 605. Surgery I. (3) I. Principles of surgery and consideration of instrumentation, the surgical suite, and preparation and monitoring of the patient. Three hours lec. a week. Pr.: Third-year standing in College of Veterinary Medicine.

750 615. Surgery II. (8) II. Discussions and demonstrations involving surgical and obstetrical patients; participation in surgical and obstetrical laboratories. Six hours lec. and six hours lab. a week. Pr.: Third-year standing in College of Veterinary Medicine.

FOR GRADUATE CREDIT

750 801. Research in Surgery. (1 to 6) I, II, S. The purpose of this course is to attempt to solve many of the problems confronting the veterinary surgeon. Pr.: Anat. 600, 605, 620; Surg. 605, 615. Offered especially for graduates in veterinary medicine.

750 830. Surgical Techniques. (1 to 6) I, S. The study and application of developments in surgical techniques. Pr.: D. V. M. degree or consent of staff.

COURSES IN CLINICAL MEDICINE

FOR UNDERGRADUATE AND GRADUATE CREDIT

750 610. Propaedeutic Medicine. (2) II. Introduction to the principles of animal hospitalization, diagnostic procedures and techniques, care of the hospitalized patient and an introduction to the psychology of veterinary medical practice. Two hours lec. a week. Pr.: Second-year standing in College of Veterinary Medicine.

750 640. Radiology. (2) I. The theory and principles of x-rays, production and interpretation of radiographs exposure factors, special radio-

graphic methods, film storage and handling, processing, safety measures and biologic effects of radiation. Two hours lec. a week. Pr.: Third-year standing in College of Veterinary Medicine.

750 685. Therapeutic Nutrition. (3) II. Veterinary medical aspects of nutrition, including a reinforcement of principles of nutrition, considerations relevant to therapeutic nutrition and discussions involving nutrient requirements of diseased and convalescent animals. Three hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

750 700, 750 710. Clinic I. (2) & II (2) I & II respectively. Instruction in operation of the outpatient clinic; participation in the receipt, restraint, examination and treatment of the patient and in ancillary services of the animal hospital. Six hours lab. a week. Pr.: Third-year standing in College of Veterinary Medicine.

750 725, 750 735. Clinical Medicine I. (4) & II (4) I & II respectively. Study of the hospitalized veterinary medical and surgical patient; participation in field studies of animal disease, veterinary public health, seminars, and clinico-pathologic conferences. Twenty-two hours lab. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

COURSES IN MEDICINE

FOR UNDERGRADUATE CREDIT

750 135. Principles of Animal Disease Control. (3) I. A study of the factors that influence animal health and disease control. For students majoring in agriculture and other fields. Three hours lec. a week. Pr.: A. H. 101 or equiv., Physi. 431, and sophomore standing.

FOR UNDERGRADUATE CREDIT AND FOR GRADUATE CREDIT IN MINOR FIELD ONLY

750 400. Diseases of Wildlife. (3) I. Infectious and noninfectious diseases of birds, fur-bearing animals, zoological animals, and fish, with reference to methods of prevention and control. Pr.: Zool. 205, Bact. 220.

FOR UNDERGRADUATE AND GRADUATE CREDIT

750 630. Medicine I. (5) I. Consideration of medical and pathological aspects of diseases affecting the musculoskeletal, respiratory, cardiovascular, hemic and lymphatic, endocrine and nervous systems. Five hours lec. a week. Pr.: Third-year standing in College of Veterinary Medicine.

750 650. Medicine II. (7) II. Consideration of the medical and pathological aspects of diseases affecting the skin, mucous membranes, urogenital, and digestive systems. Seven hours lec. a week. Pr.: Third-year standing in College of Veterinary Medicine.

750 665. Laboratory Animal Medicine. (3) II. Consideration of the management and health of common species of laboratory animals. Three hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

750 670. Medicine III. (6) I. Consideration of the medical and pathological aspects of diseases of special sense organs and of those affecting the body as a whole. Six hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

750 690. Medicine IV. (6) II. Consideration of programs of disease prevention for domesticated animals. Six hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

FOR GRADUATE CREDIT

750 810. Research in Medicine. (1 to 6) I, II, S. An attempted solution of some of the medical and parasitological problems confronting the practitioner of veterinary medicine. Pr.: Surg. 630, 650, 670; D. V. M. degree or consent of staff.

750 820. Breeding Diseases. (1 to 5) I, II, S. Advanced studies of the

breeding diseases of domestic animals. Pr.: D. V. M. degree or consent of staff.

750 825. Systemic Medicine I. (3) I, II, S. Study of the medical aspects of diseases of the urinary, nervous, integumentary systems and special senses. Pr.: D. V. M. degree or consent of staff.

750 827. Systemic Medicine II. (3) I, II, S. Study of the medical aspects of diseases of the urinary, nervous, integumentary systems and special senses. Pr.: D. V. M. degree or consent of staff.

The Division of Cooperative Extension

GLENN H. BECK,* *Vice President for Agriculture*
ROBERT A. BOHANNON, *Director*
PAUL W. GRIFFITH,* *Associate Director*
WILBER E. RINGLER,* *Assistant Director*
E. J. PETERSON, *Administrative Assistant*

The Division of Cooperative Extension conducts educational programs for Kansas people who are not enrolled as resident students of the University. The principal purpose of these programs is that of disseminating up-to-date, practical information developed through research and experimentation at this and other institutions and to encourage the adoption and use of such information.

COOPERATIVE EXTENSION SERVICE

The Cooperative Extension Service is so named because the federal, state, and county governments cooperate with the people of a county in planning, conducting, and financing a county-wide educational program for the people of the county. Kansas State University represents the state in this system through the Division of Cooperative Extension. The United States Department of Agriculture represents the federal government. The County Agricultural Extension Council and the Board of County Commissioners, all of whom are elected by the voters, represent the county.

The federal and state laws which provide this system, now organized and operating in every Kansas county, state that the purpose is to give instruction to the people in agriculture, home economics and related subjects (including 4-H Club work, marketing and agribusiness, and community resource development). Modern conditions continually enlarge the span of subjects related to agriculture and home economics so that many of the subject matter departments on the campus contribute information to the Extension program and are represented in the Division of Cooperative Extension by specialists in their subject matter fields.

The number of people participating in the Cooperative Extension program is also expanding and now includes urban and suburban people as well as farm families with whom the original program in agriculture, home economics, and 4-H Club work was developed.

EXTENSION TAKES THE UNIVERSITY TO THE PEOPLE

The basic idea of the Cooperative Extension Service is to take the University to the people, and this is done by stationing members of the faculty in every county. These members of the faculty are not commonly referred to as professors but are known as county Extension agents and include agricultural agents, home economics agents, and club agents. To literally thousands of people, these Extension agents are a constant channel for communicating to and from Kansas State University.

EXTENSION TEACHES IN MANY WAYS

The methods of instruction used by Extension workers are quite informal when compared to classroom methods. Instructions on specific problems may be given by personal conference or in public meetings. Extension workers may train individuals who in turn train others, either individually or in groups. There are thousands of these public-spirited lay leaders in Kansas who are continually receiving instructions from members of the faculty in the Division of Cooperative Extension. They become, in effect, assistant instructors without pay. Extension agents extend information through the newspapers, farm magazines, radio, and television.

EXTENSION STIMULATES COMMUNITY ACTION

Extension workers may assist people to work together as a group for a common goal that is not attainable to the individual, such as: organizing county-wide campaigns to control diseases, pests, and weeds; to conserve soil and moisture in an entire watershed; to study many different kinds of local, state, and national problems. They help conduct fairs and teach good standards of production in agriculture and home economics by serving as judges at county and state fairs.

EXTENSION TAKES PEOPLE TO THE UNIVERSITY

Extension agents acquaint many people with the work of the University by organizing and conducting groups to visit the University and its branch experiment stations and fields. Many of the state-wide organizations in agriculture, home economics, and 4-H Club work are given assistance with their annual conferences at the University. Included in this type of educational work are the various breed, seed, and feed associations; the Kansas Home Economics Advisory Council and the 4-H Round-up.

EXTENSION LINKS LOCAL PEOPLE TO STATE AND NATIONAL PROGRAMS

The county Extension agents, as official representatives of the United States Department of Agriculture, are responsible for the educational program of the Department and serve as the local source of information regarding the programs of all other governmental agencies affecting agriculture, such as: the Soil Conservation Service, Rural Electrification Administration, Farm Credit Administration, Agricultural Stabilization and Conservation Service, and the Farmers Home Administration.

COUNTY EXTENSION AS PART OF A STATE AND NATIONAL SYSTEM

While the county Extension offices constitute the principal means of contact between the people and the University, they are not isolated agencies. The county Extension offices are integrated with the state and national movements for the betterment of agriculture, home economics, and 4-H Club work by means of a highly trained staff of specialists and supervisors and administrative personnel, organized under several departments.

EXTENSION SPECIALISTS

Highly trained specialists are stationed at the University and in area offices in different parts of the state. These specialists assist the County Extension Agents in helping to solve problems for individuals that arise in the specialists' particular field. They also train the County Extension Agents in the new developments in research.

The basic role of the Extension Specialists is to interpret research developed by the State Agricultural Experiment Stations and the United States Department of Agriculture in a manner that the citizens of the state can use this complex technical information in solving their problems. The specialists assist the County Extension Agents in demonstrating the feasibility of applying new research by establishing practical demonstrations on farms, in homes and in agribusiness firms. The specialist has the responsibility of discovering problems confronting the people of the state on which further research is needed. Thus he serves as a liaison person between the technical research centers and the places where research is applied in a practical manner in the everyday operation of the farms, firms and homes.

EXTENSION INFORMATION

KENNETH E. THOMAS, *Head of Department*

State Leader and Director, Division of University Information, Professor Thomas

The state leader of the Department of Extension Information is also the director of the Division of University Information. This department head coordinates and directs informational activities of the Division of Cooperative Extension with all other informational activities of Kansas State University. The Department of Extension Information is divided into two sections consisting of the office of Extension Information and the office of Radio and Television Extension.

OFFICE OF EXTENSION INFORMATION

E. D. WARNER, *Extension Editor and Associate State Leader*

Professor Warner; Associate Professors Dexter, Graham, Parris and Unruh; Assistant Professors Esslinger, Peck and Tennant; Instructors Dierking, Koons and Peterson; Extension Assistant Medlin

It is the objective of this department to acquaint the people of Kansas with the research findings of this land-grant University, its branch experiment stations, and the United States Department of Agriculture, through the mediums of communication. It also has the responsibility of reporting the progress being made, especially by rural people, in the adoption of recommended scientific methods of farming and homemaking for an improved agricultural industry. All means of communication are utilized in the dissemination of information for the benefit of both rural and town people.

Scientific information, as written in popular version by the departmental staff, is channeled through all practical means of communication, including newspapers, printed publications, circulars and posters, printed annual reports, exhibits, motion pictures, 2 x 2 slides, radio, and TV.

Each week some 400 weekly newspapers of the state, the farm press, and daily newspaper outlets are provided with news stories on research work of the Kansas Agricultural Experiment Station.

County agents are provided a weekly press service and are given special training throughout the year in utilizing to the maximum a balanced information program. The department cooperates with all agents in the 105 organized County Extension Services, as well as central office staff workers, in planning and executing information programs that will acquaint people of Kansas with the projects being carried.

Each year over five million copies of timely, popular Extension Service, experiment station, USDA publications and other printed materials are printed and distributed.

A limited library of motion pictures and 2 x 2 slides for visual instruction is maintained for use by county agents, field workers, vocational education instructors, and personnel of cooperating agencies of government. Providing exhibits and other visual aids materials represents an important phase of work in the department.

OFFICE OF RADIO AND TELEVISION EXTENSION

JACK M. BURKE, *Manager, Radio Station KSAC, and Associate State Leader*

Associate Professors Burke and Titus; Assistant Professors DeWeese and Springer; Instructors Brewer, Ketch and Kuehn; Extension Assistants Nugent and Stockard

Radio is divided into two phases: *(a)* Broadcasting programs over KSAC, an institution-owned, non-commercial, educational station, and *(b)* broadcasting script and recorded services and live programs over more than 80 cooperating commercial radio stations in Kansas and on our borders.

Station KSAC, the University radio station, is used exclusively for the

dissemination of informative and cultural programs produced by this institution and other educational agencies. Four and three-fourths hours a day are devoted to the broadcast of programs originating from within all colleges of the University and the Division of Cooperative Extension. Approximately 50 percent of the broadcast time is devoted to all-University programs, while 50 percent is devoted to programs originating from within the Extension service. The University radio station is also used as a "proving ground" for students enrolled in radio courses.

Daily scripts are mailed to cooperating commercial radio stations, and county agents are given assistance in planning local radio programs. Numerous live programs are arranged for Extension Service and other University staff members to broadcast over these stations when the personnel are in the field.

Television programs showing results of research work and demonstrations are prepared, directed, and presented on the several cooperating TV stations in the state. Special television training is provided for Extension and other University staff members who participate from time to time on educational television shows.

AGRICULTURAL PRODUCTION, MANAGEMENT, AND NATURAL RESOURCE DEVELOPMENT

JOHN M. FERGUSON, *State Leader*

The departments listed below include those members of the Extension staff who conduct and supervise programs in agricultural production and management education throughout the state. The programs are developed in cooperation with the county Extension agents and the residents of the counties through their designated leaders.

AGRICULTURAL ECONOMICS

PAUL L. KELLEY, *Acting Head of Department*

NORMAN V. WHITEHAIR, *Assistant Head of Department*

Professors Coolidge, Kelley and Whitehair; Associate Professor Thomas; Assistant Professors Figurski, Langemeier, McReynolds, Overley, Schlender, Treat and Whipps; Instructors Appleby, Bartlett, Collins, DeLano, Dickson, Faidley, Frederick, Germann, Greene, Guy, Hackler, Hamilton, Herod, Kepley, Mullen, Olson, Parker, Smerchek, Trayer and Urban; Emeritus: Instructors Hageman, McClelland and Means

AGRONOMY

RAYMOND V. OLSON, *Head of Department*

FRANK G. BIEBERLY, *Section Leader*

Professors Bieberly, Jones and Olson; Assistant Professors Dicken, Edelblute, Harper, Hyde, McMaster, Nilson, Tobin, Whitney and Wilkins; Emeritus: Professors Clearinger and Lind

ANIMAL HUSBANDRY

DON L. GOOD, *Head of Department*

WENDELL A. MOYER, *Section Leader*

Professors Good and Moyer; Associate Professor Francis; Assistant Professors McAdams, Phar, Westmeyer and Zoellner; Instructor Ahlschwede; Emeritus: Professor Elling

DAIRY AND POULTRY SCIENCE

CHARLES L. NORTON, *Head of Department*

Professor Norton; Associate Professors Bonewitz and Jackson; Assistant Professors Adams and Call

ENTOMOLOGY

HERBERT C. KNUTSON, *Head of Department*

Professor Knutson; Associate Professors Gates and Halazon; Instructor Brooks

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HORTICULTURE AND FORESTRY

RONALD W. CAMPBELL, *Head of Department*

HAROLD G. GALLAHER, *Assistant Head of Department*

Professors Amstein, Campbell and Gallaher; Associate Professor Morrison; Assistant Professors Biswell, Deutsch, Gaylor, Grey, Kepler, Pinkerton and Strickler; Instructors Atchison, Biles, Bratton, Geisler, Gould, Jones, Louthold, Loucks, Naughton, Nighswonger, Shreve and Slusher

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PLANT PATHOLOGY

JOHN F. SCHAFER, *Head of Department*

Professors King and Schafer; Assistant Professor Willis

VETERINARY MEDICINE

CHARLES E. CORNELIUS, *Dean*

Professor Cornelius; Associate Professor Caley; Assistant Professor Lingle; Emeritus: Associate Professor Osburn

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ENGINEERING EXTENSION

JOHN M. FERGUSON, *Head of Department*

Professors Ferguson, Herpich and Wendling; Associate Professors Holmes and Schindler; Assistant Professors Jepsen and Selby; Instructor Bergsrud; Extension Assistant Shuyler

The function of the Department of Engineering Extension is to carry on an educational program throughout the state dealing with application of engineering principles to various phases of agriculture. The work of this department is carried to every county in the state by means of demonstrations, institutes, training schools, publications, news releases, radio and television programs, and personal contacts.

When the department was first started in 1910, it dealt chiefly with drainage and irrigation. Other subjects have been added, including the control of soil erosion, water conservation, farm structures, farm machinery, conveniences for the farm home, and farm electrification. Much of the work is conducted in cooperation with the county agricultural agent's office in each county. Some work is done in cooperation with various governmental agencies, some with commercial farm equipment companies, some with structural supply and appliance companies, some with REA cooperatives, and some with public utilities.

All counties in the state are cooperating with the department in demonstration work involving drainage, irrigation, water conservation, and the control of erosion. Standardized plans for hundreds of farm buildings are furnished to farm operators each year. Advice and suggestions for remodeling farm buildings are furnished upon request to several hundred farm families each year. Recommendations are made for the selection, installation, and operation of practical and efficient systems of water supply, sewage disposal, wiring, lighting, insulation, air conditioning, and heating for the rural home. A program on the selection, use, adjustment, and cost of operation of farm machinery is conducted each year for the rural people. A planned program of 4-H Club work is conducted on many of the engineering phases of agriculture.

Farm safety and the prevention of farm fires are a definite part of the over-all engineering Extension program.

MARKETING AND UTILIZATION OF AGRICULTURAL PRODUCTS

NORMAN V. WHITEHAIR, *Assistant Head of Department*

AGRICULTURAL ECONOMICS

PAUL L. KELLEY, *Acting Head of Department*
NORMAN V. WHITEHAIR, *Assistant Head*

Professors Coppersmith, Kelley and Whitehair; Associate Professors Jackson, Richards and Trieb; Assistant Professors McDonald and Walker; Instructor Pretzer

GRAIN SCIENCE AND INDUSTRY

WILLIAM J. HOOVER, *Head of Department*
ROBERT W. SCHOEFF, *Section Leader*

Professors Hoover, Schoeff and Wilcox; Extension Assistant Balding

These departments are responsible for carrying marketing programs in grain, livestock, poultry, dairy, retail products, marketing information, consumer information, and marketing and utilization of formula feeds.

During part of the year assistance is given in conducting county Extension schools. An increasing portion of the time is devoted to management work with marketing firms in the many areas of production. Special short courses for key personnel are held on the campus or over the state to assist in training in marketing and management principles.

An increasing amount of time is devoted to marketing orders. Adults as well as 4-H Club members are cooperators in these marketing programs.

HOME ECONOMICS EXTENSION

SHIRLEY A. WHITE, *Head of Department*

Professor White; Associate Professors Ellithorpe, Johnson, Self, Sughrue and Wiggins; Assistant Professors Anderson, Atkinson, Brill, Carlson, Dickinson, Guthrie, Hobble, Howe, Kemp, Miller, Neufeld, Pass, Redeker and Starkey; Emeritus: Professors Allen, Baird, Koenig, Myers and Smurthwaite; Assistant Professor Briggs

Extension educational work in home economics is carried on in counties through organized study groups, public meetings, press, radio, television, and self-teaching materials. Definite programs are pursued throughout the year by the extension homemaker units and other organized women's groups, 4-H Clubs, and special interest groups. Educational materials prepared by the specialists and by county extension home economists are used by local leaders in their respective communities.

The programs of work for the various groups in the counties are based on local situations in the communities. They evolve through community and committee meetings and include the development of activities pertaining not only to the home and to the community but also to international problems. On January 1, 1968, all 105 Kansas counties had appropriations for Home Economics Extension Work, with 117 home economist positions.

4-H AND OTHER YOUTH PROGRAMS

GLENN M. BUSSET, *Head of Department*

Professor Busset; Associate Professors Apel, Eyestone and Hanna; Assistant Professors Area, Bates, Borst, Honstead and Tomkinson

4-H Club work is an out-of-school youth educational program of the University, conducted in cooperation with County Agricultural Extension

Councils and the United States Department of Agriculture. There are 31,396 4-H members enrolled in 1,170 4-H Clubs; 4,527 special 4-H members who carry 4-H projects but are not enrolled in standard 4-H Clubs; 25,725 boys and girls who have had a 4-H experience as a member of 4-H TV Action through a 10-week television series in 1967. Two major educational offerings of 10 consecutive 30-minute programs featuring lessons in emergency preparedness were made in 1967. The Science Series that began in January 1968 is expected to enroll about 50,000.

In 4-H Club work young people take part in agricultural, homemaking, community service, and other activities. 4-H Club work is often explained by the slogan, "Learning by Doing." Through projects, scientific information recommended by the University is applied to problems of farm and home living.

Each local 4-H Club elects its own officers, who conduct club meetings with guidance of two or more volunteer adult leaders. Each club meets at least once monthly, in a club member's home or in a public building. The meetings have educational features, such as demonstrations, talks, discussions. Adult leaders counsel with the club members and give guidance to their club activities. Each club member carries to completion at least one project of his own. Any boy or girl 8 to 19 years of age may be a 4-H member. The leaders and club members work in cooperation with the county Extension agents.

4-H Club work began as the University sought to extend research developments to the farmers of Kansas. Children were organized into informal educational groups, shortly after 1903. Corn, canning, and poultry clubs were among the first educational groups that had affiliation with the University.

It became evident that the educational development of boys and girls was of greater importance than the spread of improved farm and home practices; hence, the 4-H Club program was broadened to include not only projects of a farm and home nature, but many activities such as health, music, conservation of wildlife and natural resources, recreation, parliamentary practices, and art. The present 4-H Club program is designed to develop citizenship and leadership among rural young people and to provide opportunity for them to participate with their parents and friends in the adoption of better farm and home practices.

A later development, extending 4-H Club work around the world, is the 4-H Club's International Farm Youth Exchange. Since the two-way exchange began in 1948, 152 Kansas 4-H Club members have lived for periods of up to six months with farm families in 47 foreign countries around the world. Three hundred five youths from 66 foreign countries have lived in 811 Kansas host family homes. Kansas has sent and received more "IFYE's" than any other state.

COMMUNITY AND RESOURCE DEVELOPMENT

NORMAN V. WHITEHAIR, *State Leader*
DONALD B. ERICKSON, *Section Leader*

AGRICULTURAL ECONOMICS

PAUL L. KELLY, *Acting Head of Department*
NORMAN V. WHITEHAIR, *Assistant Head of Department*

Professors Kelley, Regnier and Whitehair; Associate Professor Erickson; Assistant Professors Baker, Frazier, Olsen, Smythe and Vaein

This department has two purposes. The first aim is to provide stimulus and guidance in developing and implementing county or area-wide improvement programs that will strengthen the local economy, and otherwise enhance the level of well-being of people. Extension specialists en-

courage the optimum development and utilization of all local resources. They cooperate with county Extension agents, local leaders, civic and governmental agencies, and lay organizations to improve agriculture, promote non-farm employment and strengthen community services.

Secondly, Extension has an important obligation in public affairs and a responsibility to help people understand issues affecting them. In doing so, however, specialists do not determine public policy. Rather, their function is to equip people through educational processes to analyze the issues involved on the basis of all available facts. It is the prerogative and responsibility of people themselves, individually or collectively, to make their own decisions on policy issues and express them as they see fit.

COUNTY EXTENSION OPERATIONS

OSCAR W. NORBY, *Head of Department*

Professor Norby; Associate Professors Cox, Hoss, King and Ross; Assistant Professors Appleby, Blankenhagen and Wells; Instructors Crist and Schroeder; Emeritus: Professors Baird, Blecha, Hagans and Jaccard; Associate Professors Glover and Neff; Assistant Professor Meyer

County agricultural Extension work is an organized activity of Kansas State University to develop and carry out the Extension program as authorized in federal and state legislation. The Smith-Lever Act, passed by Congress in 1914 and amended in 1953, defines cooperative Extension work as follows:

"Cooperative agricultural extension work shall consist of the giving of instruction and practical demonstration in agriculture and home economics and subjects related thereto, through field demonstrations, publications and otherwise. (Persons not attending or resident in land-grant colleges in the several communities may participate in the program.) This work shall be carried out in such manner as may be mutually agreed upon by the Secretary of Agriculture and the state agricultural college or colleges receiving the benefits of the Smith-Lever Act."

The 1915 session of the Kansas Legislature accepted the provisions of the Smith-Lever Act. The Kansas law provides for county agricultural Extension councils with whom the Extension program of Kansas State University is conducted in the counties. The purpose of the councils is cooperative with the executive board of each County Agricultural Extension Council and the Director of Cooperative Extension.

Extension work is financed by federal, state and local tax funds. The Smith-Lever Act and subsequent congressional acts authorize federal appropriations for the support of Extension work. The Kansas Legislature makes appropriations for the Extension program through the budget of Kansas State University. The county boards of commissioners appropriate for Extension work in accordance with a budget developed annually and cooperative with the executive board of each County Agricultural Extension Council and the Director of Cooperative Extension.

Supervisory work of the district extension supervisors assisted by the district extension home economists includes selecting and training persons interested in becoming county extension agents, representing the Director of Cooperative Extension by carrying out his responsibilities as imposed by state law, cooperating with the County Agricultural Extension Councils in planning county Extension programs, and otherwise developing the cooperative program in the counties as conducted by the County Agricultural Extension Councils and Kansas State University.

Each of the 105 Kansas counties has a county extension home economist, 12 have assistant county extension home economists, six have county extension directors, 103 have county extension agricultural agents, five have horticultural agents, 35 have county extension 4-H agents, and one has an assistant county extension 4-H agent. There are 268 county extension agent positions. Approximately 40 young men and women with bachelor's or master's degrees in agriculture or home economics are employed annually to replace agents who are promoted within the college system or leave Extension.

DIVISION OF CONTINUING EDUCATION

JOHN E. KITCHENS, *Director*

Professor Kitchens; Assistant Professors Harold, Miller, Mordy and Williamson; Instructors Bowmaker, Locke, Reichow and Swegle; Assistant Instructor Deyoe; Emeritus: Professors Billings and Pattison

The Division of Continuing Education was established to help meet the increased demands of a changing society for greater educational opportunities beyond the campus, in response to rapidly developing patterns for a coordinated state-wide extension program in Kansas, and to recent federal legislation.

The purposes of the Division of Continuing Education are to provide:

1. University work for adults whose regular academic program has been interrupted.
2. Technical, professional and postgraduate continuing education.
3. Citizenship training for civic literacy and public responsibility.
4. Continuing opportunities for cultural, intellectual, physical and emotional development.
5. Family life and consumer education.
6. Urban and community development, including research on a wide range of urban problems.
7. Labor education.
8. International education.
9. Assistance to, and cooperation with, a wide range of adult education agencies—public and private; local, national and international; compulsory and voluntary.

To carry out these purposes, the work of the Division is divided into the following areas:

OFFICE OF COMMUNITY SERVICES
OFFICE OF CONFERENCES AND SHORT COURSES
OFFICE OF EXTENSION CLASSES
OFFICE OF CONTRACTS AND GRANTS

OFFICE OF COMMUNITY SERVICES

It is the function of this office to help Kansas communities improve the conditions of community life by offering programs of adult continuing education which help prepare citizens for civic responsibilities.

Instructional programs presented through the Office of Community Services are conducted by resident faculty members from the appropriate academic departments, or by instructors approved by those departments. The office has no instructional staff of its own.

The Office of Community Services is currently responsible for the following programs:

Education in Community Problem Solving—This involves administration of the University's projects under Title I of the Higher Education Act of 1965 which include:

1. Short course training in community planning and development.
2. Conferences on how to organize for community problem solving.
3. Providing for the application of research findings to the problems of Kansas communities.
4. Cooperation in the community service programs of local colleges.

World Affairs Education—The office sponsors the Foreign Policy Association's "Great Decisions" adult discussion program for the State of Kansas and cooperates in the adult educational programs of the Kansas Council on World Affairs.

University Speakers—Catalogs listing faculty members available for general engagements or commencement programs are published annually. The office also receives and processes requests for speakers.

The Office of Community Services cooperates with local governments

and organizations to plan for the University's participation in the adult educational programs they desire.

OFFICE OF CONFERENCES AND SHORT COURSES

The Office of Conferences and Short Courses is responsible for the conduct of the Division's conference activity. In addition, this Office coordinates all conferences held on the campus which involve off-campus personnel, performing the following functions: (1) advising of suitable dates and listing conferences on the Master Calendar in the Student Union; (2) committing physical plant facilities with the responsible university agents; (3) rendering all conference administrative services as are necessary; (4) coordinating the university conference with other campus and community activities; and (5) except in those cases where non-fee funds are available, collecting conference fees and making disbursements.

Any group interested in sponsoring or co-sponsoring such an activity with the Department is welcome to discuss its proposal with the Conference Coordinator. In general, conferences should conform to the following criteria: (1) be educational in nature so that the main purpose of those attending is to learn rather than to conduct organizational business; (2) be in the public interest; (3) and be financially self-supporting. Over-all conference planning is normally the joint responsibility of a committee composed of representatives from Continuing Education, academic department(s) and the off-campus group(s). Program content is the responsibility of the discipline department.

OFFICE OF EXTENSION CLASSES

The Office of Extension Classes is responsible for the following activities:

Extension Classes. Extension classes are off-campus credit courses offered for adults.

Non-Credit Classes. Non-credit classes are those on- or off-campus courses which, though on a college level, earn no credit toward a degree.

Kansas Rural-Urban Art Program. KRUAP, conducted in cooperation with the College of Architecture and Design, is a program of personal and cultural improvements centered around appreciation for and involvement in art. The program is centered around both credit and non-credit classes, regional art shows and critiques, the publication of an art newsletter and a state-wide amateur art exhibition.

Extension Course Offerings. In addition to many courses listed by the academic departments of the University, the Division of Continuing Education may offer the following courses on an extension class basis:

CAC 300. Accounting Principles I. (3) Principles and structure of accounts designed to give power to analyze commercial accounts and statements; problems used as an application of principles to practice. Lecture and demonstrations.

CAC 310. Accounting Principles II. (3) Partnership and corporation accounting and problems, with special emphasis on payroll records and accounting. Lecture and demonstrations. Pr.: Accounting I (CA 300, Acctg. 300, or equiv.).

CAR 3. Drawing Fundamentals I. (2) The fundamentals of drawing for non-professional students. Three hours of studio and three hours by arrangement with instructor a week. Not to be taken for credit by students enrolled in curriculums in Architecture and Humanities (Art and Painting Adaptation).

CAR 4. Drawing Fundamentals II. (2) Cont. of CAR 3.

CAR 5. Sketching Techniques. (2) Exploration and development of sketching skills and concepts intended for the non-professional student. Sketching techniques and approaches in charcoal, conté, pencil, pastel, pen and wash media. Three hours of studio and three hours by

arrangement with instructor a week. Not to be taken for credit by students enrolled in Art or Architecture. Pr.: CAR 3 or equiv.

CAR 7. Painting I. (2) The fundamentals of painting in oil or water color intended for non-professional students. Three hours of studio and three hours by arrangement with instructor a week. Not to be taken for credit by students enrolled in curriculums in Architecture and Humanities (Art and Painting Adaptation).

CAR 8. Painting II. (2) Cont. of CAR 7.

CAR 9. Exploration of Painting Media. (2) Development of basic techniques in the use of various painting media for the non-professional student. Experience in the use of several media, such as oil, watercolor, acrylics, casein, tempera, etc. Three hours of studio and three hours by arrangement with instructor a week. Not to be taken for credit by students enrolled in Art or Architecture. Pr.: CAR 7 or equiv.

CAR 10. Appreciation of Art. (2) Study of principles and ideas basic to an intelligent appreciation of drawings, paintings, and sculpture, and of the aims and techniques of the artists who created them. Two hours rec. a week. Not to be taken for credit by students enrolled in curriculums in Architecture and Humanities (Art and Painting Adaptation).

CAR 11. Clay Modeling I. (2) The fundamentals of clay modeling for non-professional students. Three hours of studio and three hours by arrangement with instructor a week. Not to be taken for credit by students enrolled in Architecture and Art and Painting.

CAR 12. Clay Modeling II. (2) Cont. of CAR 11.

CAR 13. Sculpture I. (2) The fundamentals of sculpture intended for non-professional students. Three hours of studio and three hours by arrangement with instructor a week. Not to be taken for credit by students enrolled in curriculums in Architecture and Art and Painting.

CAR 14. Sculpture II. (2) Cont. of CAR 13.

HOME STUDY

By action of the Board of Regents, correspondence instruction in Kansas at the state institutions of higher education was consolidated into the Extramural Independent Study Center, University of Kansas, Lawrence, Kansas 66044. Full and complete information about correspondence study opportunities in Kansas is available from the Division of Continuing Education, Room 313, Umberger Hall.

OFFICE OF CONTRACTS AND GRANTS

The Office of Contracts and Grants is responsible for the organization, development, and administration of programs of continuing education financed through federal programs, industry, and non-profit foundations. Specific programs under this department at the present time are listed below.

1. **Civil Defense Training Program.** This program is sponsored by the Department of Defense, Office of Civil Defense. The following courses and seminars are offered as part of the program:

   Radiological Monitoring for Instructors
   Radiological Defense Officer I
   Shelter Management for Instructors
   Civil Defense Management
   Plans and Operations I
   Emergency Operations Simulation Training
   Seminar in Emergency Preparedness for Public Officials
   Seminar in Emergency Preparedness for Business and Industry

   In general this program is responsible for the technical Civil Defense training throughout Kansas.

2. **Rural Electric Job Training and Safety Program.** This program is a joint training venture of the Kansas Electric Cooperatives, Inc., the

Kansas State Board for Vocational Education, and Kansas State University. The program provides training in the fields of power generation, transmission and distribution. A majority of this training is conducted in the field. However, each year several week-long training sessions are conducted on the KSU campus.

3. **Head Start Training Program.** This program, sponsored by the Office of Economic Opportunity, is designed to provide training for summer Project Head Start Child Development staff personnel. The training under this program is carried out on the Kansas State University campus under the joint direction of the Division of Continuing Education and the Department of Family and Child Development.
4. **Instrumentation for Medical Technologists—Short Course.** This program is sponsored by the Department of Health, Education and Welfare. The objectives of the courses are: (1) to cover the principles of operation of modern instrumentations; (2) to obtain laboratory experience with the instruments, performing experiments designed to point out the accuracy and limitations of each; (3) to do the basic calculations involving quantitative analysis with each instrument; and (4) to learn to do some of the simple trouble-shooting and make minor repairs and adjustments. Each course consists of approximately 35 hours of formal instruction. The training under this program is conducted on the Kansas State University campus under the direction of the Division of Continuing Education and the Department of Chemistry.

Officers of Administration, Instruction, and Research

Includes only those with rank of instructor or above.

Administrative Section

AKIN, JAMES N., Assistant Director of Placement (1966). B. S., 1960, M. S., 1964, Kansas State University.

AMEEL, HENRIETTA R., Assistant Professor, University Library (1960). A. B., 1930, Coe College; A. B. in L. S., 1935, University of Michigan.

*BAEHR, WILLIAM FREDERICK, Professor, University Library (1943, 1959). B. S. in L. S., 1927, M. A., 1930, University of Illinois.

BAXTER, MABEL GERTRUDE, Instructor Emeritus, University Library (1916-47, 1957).

BEATTY, DANIEL D., Business Manager, Professor of Business Administration (1956, 1959). A. B., 1947, Hope College; M. B. A., 1949, University of Michigan.

*BECK, GLENN H., Vice President for Agriculture (1936, 1965). B. S., 1936, University of Idaho; M. S., 1938, Kansas State University; Ph. D., 1950, Cornell University.

BERGEN, GERALD R., Assistant Director, Aids, Awards, and Veterans Service Office (1965). B. S., 1958, Kansas State University.

BILLIGMEIER, ARTHUR, Residence Hall Director (1967). B. S. Ed., 1961, East Central State College, Oklahoma.

BLACKBURN, RICHARD D., Director, Kansas State Union (1963). B. S., 1950, Kansas Wesleyan University; M. P. S., 1956, University of Colorado.

BONEBRAKE, CASE A., Administrator of Physical Plant (1947, 1967). B. S., 1947, B. S., 1955, Kansas State University.

BRETTELL, J. ALLAN, Assistant Dean, Foreign Student Adviser, Assistant Professor (1966). B. S., 1949, M. S., 1951, Westminster College.

BROWN, EDWIN V., Instructor, Computing Center (1967). B. S., 1965, M. S., 1967, Kansas State University.

*BROWN, JOHN LOTT, Vice President for Academic Affairs, Professor of Psychology and Physiology (1965, 1966). B. S. E. E., 1945, Worcester Polytechnic Institute; M. A., 1949, Temple University; Ph. D., 1952, Columbia University.

BUTLER, NORVILLE L., Associate Professor, Student Health Center (1964). B. A., 1931, Nebraska Wesleyan University; M. D., 1940, College of Medicine, University of Nebraska.

CADIZ, JOY M., Instructor (1967). B. S. C., 1958, University of Iowa; M. S., 1968, Kansas State University.

CAMP, MILDRED, Associate Professor Emeritus, University Library (1927, 1955). A. B., 1912, Eureka College; B. L. S., 1924, University of Illinois.

CHILDRESS, DOROTHY S., Instructor, University Library (1966). B. A., 1965, Kansas State University.

COOL, VINCENT J., Assistant Professor of Architecture; Assistant Vice President for Planning (1957, 1967). B. S., 1951, Kansas State University. Registered Architect 1952.

COON, CAROLYN A., Residence Hall Director, Instructor (1967). B. B. A., 1964, University of Iowa.

DALLAM, JERALD, Assistant Director of Records, Instructor (1968). B. S., 1959, Northwest Missouri State College; M. S., 1965, Oklahoma State University.

*DANSKIN, DAVID G., Director, Counseling Center, Professor of Psychology (1959, 1966). A. B., 1950, University of Redlands; M. A., 1951, Ph. D., 1954, Ohio State University.

DAVIS, ELIZABETH HAMILTON, Associate Professor Emeritus, University Library (1920, 1958). A. B., 1909, McMurry College for Women; B. L. S., 1911, University of Illinois.

DE ORDIO, JOSEPH P., Instructor, Counseling Center (1968). B. A., 1964, M. Ed., 1968, University of Rochester.

DODGE, THEODORE O., Director, Budget Office, Assistant Professor (1946, 1957). B. S., 1940, Kansas State University; C. P. A., 1954, Kansas.

DOMITZ, GARY, Instructor, University Library (1967). B. A., 1966, M. S. L. S., 1967, Kansas State Teachers College.

EDELMAN, SHELDON K., Associate Professor and Assistant Director, Student Counseling Center (1967). B. A., 1952, University of Illinois; M. A., 1956, Roosevelt University; Ph. D., 1960, Purdue University.

EDWARDS, A. THORNTON, Director of Housing and Food Service, Associate Professor of Psychology (1945, 1949). B. S., 1941, M. S., 1946, Kansas State University.

ELKINS, RICHARD NELSON, Associate Director of Admissions, Instructor (1966, 1968). B. S., 1956, M. S., 1963, Kansas State University.

FARLEY, RICHARD A., Director of Library, Professor (1966). B. S., 1941, University of Wisconsin; M. L. S., 1952, Ph. D., 1967, University of Illinois.

*FARRELL, FRANCIS DAVID, President Emeritus (1918, 1943). B. S., 1907, Utah State Agricultural College; Agr. D., 1925, University of Nebraska; LL. D., 1943, Washburn Municipal University.

FLOWERS, HENRY M., Instructor, Student Health (1966). B. A., 1948, Greenville College; M. A., 1957, Wichita University.

FOSTER, DONALD E., Director of Records (1965, 1968). B. S., 1960, M. S., 1961, Kansas State University.

FRITH, THOMAS J., Assistant Dean of Students, Residence Hall Program Director; Assistant Professor (1965). A. B., 1960, M. A., 1963, Ed. S., 1965, University of Iowa.

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* Graduate faculty.

GEISSLER, VERNON V., Assistant Director of Placement (1966). B. S., 1942, M. S., 1966, Kansas State University.

*GERRITZ, ELLSWORTH M., Dean of Admissions and Records; Professor (1954, 1962). B. E., 1938, St. Cloud State Teachers College; M. S., 1948, Ph. D., 1951, University of Minnesota.

GILDSETH, BRUCE L., Assistant Dean of Students, Assistant Professor (1968). B. A., 1962, Augsburg College; M. A., 1966, Ph. D., 1968, University of Minnesota.

GINGRICH, RANDOLPH F., Professor (1923, 1959). B. S., 1923, University of Nebraska; M. S., 1929, Kansas State University.

HAHN, DOYNE, Instructor, Library (1968). B. A., 1963, St. Joseph's Rensselaer; M. A., 1966, Arizona State University; M. S. in L. S., 1968, University of Wisconsin.

HAINES, RICHARD D., Assistant Professor, University Information (1967). B. S., 1953, Kansas State University.

*HAJDA, JOSEPH, Director of International Activities, Associate Professor of Political Science (1957, 1965). B. Pol. Sci., 1948, Charles University, Prague (Czechoslovakia); A. B., 1951, M. A., 1952, Miami University; Ph. D., 1954, Indiana University.

HATHAWAY, JAMES C., Assistant Professor, University Library (1967). B. S. Ed., 1962, Kansas State College at Pittsburg; M. S., 1964, Kansas State Teachers College.

HENSLEIGH, KAREN E., Residence Hall Director, Instructor (1967). B. S., 1966, Kansas State University.

HESS, H. DEAN, Executive Alumni Secretary (1961). B. S., 1950, Kansas State University.

HEYWOOD, KENNETH M., Director, Endowment and Development (1956). B. S., 1938, Kansas State University; M. A., 1949, University of Wyoming.

HILDEBRANDT, THEODORE W., Director of Computing Center, Professor of Statistics and Computer Science (1968). A. B., 1942, A. M., 1947, Ph. D., 1956, University of Michigan; S. M,. 1951, Massachusetts Institute of Technology.

HOYT, DONALD P., Director, Office of Educational Research, Professor (1968). B. S., 1948, University of Illinois; M. A., 1950, Ph. D., 1954, University of Minnesota.

HUBBLE, JAYNE N., Instructor, Counseling Center (1967). A. S., 1964, Vincennes University; B. S., 1966, Purdue University; M. S., 1967, Indiana State University.

HUSSONG, MARTHA, Assistant Director, Student Health (1967). B. E., 1964, University of Maryland.

HUTCHESON, ELIZABETH M., Instructor, Computing Center (1967). B. A., 1952, University of Cincinnati; M. A., 1953, Radcliffe College

*JONES, C. CLYDE, Vice President for University Development, Professor of Commerce (1960, 1966). B. A., 1944, Marshall College; M. A., 1950, Ph. D., 1954, Northwestern University.

JUBELT, HILBERT P., Director, Student Health Center; Physician (1961). B. S., 1941, University of Illinois; M. D., 1943, University of Illinois College of Medicine.

KASPER, EUGENE C., Dean of Students, Associate Professor of Education (1968). B. S., 1956, M. S., 1956, Ed. D., 1963, Kansas State Teachers College.

KAUP, BEVERLY JANE, Instructor, Counseling Center (1967). B. S., 1904, Fort Hays State College; M. S., 1967, Kansas State University.

KEELEY, TERRY, Assistant Professor, Counseling Center (1967). B. S., 1947, Fort Hays State College; M. S., 1959, Ed. D., 1965, Colorado State College.

KELLEY, HELEN L., Instructor, Library (1968). B. S., 1967, M. L. S., 1968, Kansas State College (Emporia).

*KENNEDY, CARROLL EARL, Assistant Director of Counseling Center, Associate Professor of Family and Child Development (1954, 1966). A. B., 1949, Wheaton College; M. S., 1953, Kansas State University; Ed. D., 1963, University of Maryland.

KENNEDY, HAROLD W., Director, Aids, Awards, and Veterans Service Office (1961). B. S., 1949, Colorado State University; M. S., 1962, Kansas State University.

KENNY, DEAN R., Editor, University Publications, Instructor, University Information (1964). B. A., 1953, University of Iowa.

KEPPLE, MELVIN T., Instructor, Director, Data Processing Center (1967). B. S., 1950, Washburn University of Topeka.

KERR, WENDELL ROBERT, Assistant to Director of Housing; Assistant Professor of Education (1947, 1957). B. S., 1947, M. S., 1957, Kansas State University.

KLEMM, EVELYN JOANN, Instructor, Counseling Center (1967). B. A., 1964, Southern Illinois University; M. A., 1966, Ohio State University.

*KRUH, ROBERT F., Dean of the Graduate School; Professor of Chemistry (1967). A. B., 1948, Ph. D., 1951, Washington University (St. Louis).

KUZNICKI, ELLEN MARIE, Instructor, Library (1968). B. S., 1950, M. S., 1961, Mount St. Joseph's.

LACY, JR., BURRITT S., Consulting Psychiatrist, Student Health Center (1964). B. A., 1941, Harvard University; M. D., 1944, Cornell University.

LAFENE, BENJAMIN WILLIAM, Professor; Physician, Student Health Center (1946, 1948, 1962). B. S., 1923, Michigan State University; M. D., 1931, Western Reserve University.

LAHEY, MARGARET N., Associate Dean of Students and Dean of Women; Associate Professor (1957). B. S., 1941, M. A., 1953, Ph. D., 1962, University of Minnesota.

LAMBERT, JOHN P., Instructor, Radiation Safety Officer (1964). B. S., 1959, Lebanon Valley College; M. P. H., 1963, University of Michigan.

LAUGHLIN, J. BRUCE, Director of Placement (1962, 1966). B. S., 1950, University of Kansas; M. S., 1961, Kansas State University; J. D., 1967, Washburn University.

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* Graduate faculty.

LEONARD, DONALD G., Instructor, Counseling Center (1968). B. S., 1957, Oregon State University; M. Ed., 1958, Springfield College.

LEWIS, JAMES J., Director of Admissions (1963). B. S., 1953, M. S., 1954, Kansas State University; Ed. D., 1961, University of Kansas.

LILLY, JERRY A., Instructor, Administrative Assistant, Office of Student Affairs (1967). B. S. Ed., 1964, Concord College.

LITCHFIELD, MEREDITH, Instructor, University Library (1967). B. S., 1950, M. S., 1967, Kansas State Teachers College.

LUKE, LAI'TING, Instructor, University Library (1967). B. A., 1958, University of Hong Kong; M. A. L. S., 1967, University of Wisconsin.

LUNN, EDWARD A., Residence Hall Director; Instructor (1968). B. A., 1966, Kansas State University.

MacMILLAN, WILLIAM, Instructor, Counseling Center (1964). A. B., 1951, University of Michigan.

*McCAIN, JAMES ALLEN, President (1950). A. B., 1926, LL. D., 1951, Wofford College; M. A., 1929, Duke University; Ed. D., 1948, Stanford University; LL. D., 1965, Montana State University.

MILBOURN, MAX W., Assistant to the President, Associate Professor of Journalism (1949, 1957). A. B., 1938, University of Wichita.

NELSON, DeVERE V., Director of Sports Information, Assistant Professor (1966). B. S., 1949, Kansas State University.

*NOONAN, JOHN P., Associate Dean of Graduate School (1947, 1966). B. S., 1947, Rockhurst College; M. S., 1950, Kansas State University; Ph. D., 1955, Denver University.

OGG, WILLIAM D., Instructor, Counseling Center (1964). B. S., 1956, M. S., 1964, Kansas State University.

OWSLEY, CAROL LEE, Instructor, University Library (1942, 1947). B. S., 1932, M. S., 1947, Kansas State University.

PEINE, CAROLINE F., Assistant Dean of Women, Instructor (1961). A. B., 1947, Carleton College; M. S., 1951, Kansas State University.

PERRY, RALPH H., Comptroller, Assistant Professor (1946, 1953, 1962). B. S., 1946, Kansas State University.

PETERS, CHESTER E., Vice President for Student Affairs, Professor (1958). B. S., 1947, M. S., 1950, Kansas State University; Ph. D., 1953, University of Wisconsin.

PETERSON, JACK TELLIN, Consulting Pathologist, Student Health Center (1965). A. B., M. D., 1950, Kansas University.

PYLE, CALVIN A., Assistant Professor, Student Health Center (1963). B. A., 1929, Pacific Union College; M. D., 1943, Loma Linda University.

RAZAK, C. KENNETH, Director of Kansas Industrial Extension Service, Professor (1966). B. S., 1939, M. S., 1942, University of Kansas. Professional Engineer, 1951.

RICHARDS, ARNE H., Assistant Professor, University Library (1965). B. A., 1954, Yankton College; M. S. in L. S., 1960, University of Illinois.

RIDGEWAY, EDITH MARY, Assistant Professor, University Library (1943, 1956). A. B., 1927, Kansas State Teachers College of Emporia; B. S. in L. S., 1940, University of Illinois; M. S., 1956, Kansas State University.

ROBERTS, MARY EILLEEN, Assistant Professor, University Library (1938, 1943). B. S., 1930, Kansas State University; B. S. in L. S., 1938, University of Illinois; A. M., 1949, University of Michigan.

ROCHAT, CARL ROBERT, Director, Office of University News, Associate Professor of Journalism (1953, 1954). B. S., 1940, Kansas State University; M. S., 1948, University of Illinois.

ROOF, DONALD B., Residence Hall Director, Instructor (1964). B. S., 1964, Kansas State University.

RUDOLPH, GERALD A., Associate Professor, University Library (1963). A. B., 1952, Washington University; M. S. in L. S., 1960, Western Reserve University; Ph. D., 1959, University of Washington.

SACHSON, ANGELA, Instructor, Student Health Center (1967). B. A., 1964, Wichita State University; M. A., 1966, Miami University of Ohio.

SEGO, WILBURN, Residence Hall Director (1967). A. B., 1951, West Kentucky University.

SIBIA, TEJINDER, Assistant Professor, University Library (1967). B. Sc., 1959, Punjab Agricultural University; M. S., 1964, Kansas State University; M. L. S., 1965, Kansas State Teachers College.

*SINNETT, E. ROBERT, Student Health Center, Professor of Psychology (1962). A. B., 1948, University of Iowa; M. A., 1950, Ph. D., 1953, University of Michigan.

SMITH, ROBERT W., Residence Hall Director, Instructor (1968). B. S., 1964, Kansas State University.

SMITH, WALTER D., Associate Director, Kansas State Union (1957, 1966). B. A., 1960, Kansas Wesleyan University.

SODERHOLM, DOROTHY J., Instructor, University Library (1966). B. A., 1946, Kearney State Teachers College; M. A., 1956, Wheaton College; M. S., 1959, University of Illinois.

SPEER, JACK, Instructor, University Library (1967). B. S., 1966, Kansas State Teachers College; B. S. L. S., 1967, Kansas State Teachers College.

STEFFEN, JOHN D., Instructor, Counseling Center (1967). B. A., 1956, Hamline University; Ph. D., 1968, University of Minnesota.

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* Graduate faculty.

STEHLEY, DONALD R., Associate Alumni Secretary (1961, 1966). B. S., 1950, Kansas State University.

STRONG, MABEL B., Residence Hall Director; Instructor (1964). B. S., 1961, Kansas State University.

TAYLOR, ELLYN MARIE, Instructor, University Library (1957, 1958). B. S., 1938, Kansas State Teachers College of Emporia.

*THOMAS, KENNETH EUGENE, Head, Division of University Information, Professor (1951, 1963). A. B., 1951, Southwestern College; M. S., 1952, Kansas State University; Ph. D., 1961, University of Wisconsin.

THOMAS, ROBIN, Instructor, Computing Center (1967). B. S., 1967, Fort Hays State College.

THOMPSON, WILMA M., Residence Hall Director, Instructor (1960). B. S., 1960, Colorado State College; M. S., 1964, Kansas State University.

*TREMMEL, WILLIAM C., Director, Student Religious Activities; Professor of Philosophy (1956, 1965). A. B., 1940, Denver University; Th. M., 1945, Th. D., 1950, Iliff School of Theology.

TROTTER, MARILYN B., Instructor, Counseling Center (1967). B. S., 1965, M. S., 1967, Kansas State University.

UNGER, ELIZABETH A., Associate Director; Instructor, Computing Center (1966). B. S., 1961, M. S., 1963, Michigan State University.

UPHAM, JAMES A., Assistant Director, Aids, Awards and Veterans' Service Office (1967). B. S., 1943, Kansas State University.

VAN DER VELDE, JOHN, Instructor, Library (1968). B. A., 1967, M. L. S., 1968, Kansas State Teachers College, Emporia.

WALLACE, ROGER KEITH, Consulting Radiologist, Student Health Center (1954). B. S., M. S., 1944, University of South Dakota; M. D., 1946, University of Nebraska.

WANCURA, ELDON N., Assistant Professor, University Library (1962). B. S., 1957, Kansas State University; M. A., 1961, Denver University.

*WEBER, ARTHUR D., Vice President Emeritus (1924, 1963). B. S., 1922, M. S., 1926, Kansas State University; Ph. D., 1940, D. Sc., 1950, Purdue University.

WHITE, NEVA L., Assistant Professor, University Library (1966). A. B., 1944, Goshen College; A. B. in L. S., 1946, University of Michigan.

WILDE, LUCY, Instructor, University Library (1967). B. A., 1965, Avila College; M. L. S., 1967, Rosary College.

WILDER, RUSSELL, Professor, Counseling Center (1967). B. S., 1933, Princeton University; M. D., 1938, Harvard University Medical School; Ph. D., 1949, University of Minnesota.

WILLIAMS, EVAN W., Instructor, University Library (1964). A. B., 1955, Washington University; M. S. in L. S., 1956, University of Illinois.

College of Agriculture**

ARMEYER, ERWIN, Assistant Professor of Horticulture and Forestry; Assistant Pomologist, Northeast Kansas Experiment Fields (1934, 1935). B. S., 1933, Kansas State University.

*ADAMS, ALBERT W., Associate Professor of Dairy and Poultry Science; Assistant Poultry Scientist, Agr. Exp. Sta. (1962, 1965). B. S., 1951, M. S., 1955, Kansas State University.

AGAN, RAYMOND JOHN, Professor of Agriculture (1963). B. S., 1940, M. S., 1950, Iowa State University; Ed. D., 1955, University of Missouri.

AICHER, LOUIS CORNELIUS, Professor of Animal Science and Industry Emeritus (1921, 1957). B. S., 1910, Kansas State University.

ALBRACHT, JAMES J., Assistant Professor of Agriculture (1966). B. S., 1948, M. S., 1954, University of Nebraska; Ph. D., 1966, Michigan State University.

ALLEN, DELORAN M., Assistant Professor of Animal Science and Industry; Assistant Animal Husbandman, Agr. Exp. Sta. (1966). B. S., 1961, Kansas State University; M. S., 1963, University of Idaho; Ph. D., 1966, Michigan State University.

ANDERSON, KLING L., Professor of Agronomy Emeritus (1936, 1946). B. S., 1936, University of California; M. S., 1938, Kansas State University; Ph. D., 1951, University of Nebraska.

ARMBRUST, DEAN VINCENT, Research Soil Scientist, U. S. D. A., Agricultural Research Service (1967). B. S., 1961, M. S., 1962, Kansas State University.

ARMSTRONG, C. ANCEL, Assistant Professor of Dairy Science; Assistant in Dairy Improvement, Agr. Exp. Sta. (1958). B. S., 1958, Kansas State University.

ATKINSON, C. HARRY, Associate Professor of Agronomy; Soil Scientist, Soil Conservation Service, U. S. D. A., Agr. Exp. Sta. (1949). B. S., 1931, M. S., 1933, Pennsylvania State University.

*AUBEL, CLIFF E., Professor of Animal Science and Industry Emeritus (1915, 1961). B. S., 1915, Pennsylvania State University; M. S., 1917, Kansas State University; Ph. D., 1931, University of Minnesota.

AXELTON, MILBURNE C., Instructor in Agronomy; Assistant Agronomist, Southwest Kansas Experiment Fields (1929, 1951). B. S., 1928, Kansas State University.

BALL, JAMES D., Instructor in Agronomy, Agr. Exp. Sta. (1967). B. S., 1966, Kansas State University.

BANBURY, EVANS E., Associate Professor; Superintendent in charge, Colby Branch Agr. Exp. Sta. (1946, 1955). B. S., 1940, Kansas State University.

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* Graduate faculty.

** Only faculty on teaching and research appointment are listed herein. Faculty on Extension appointment are listed under the Division of Cooperative Extension beginning on page 346.

*BARNETT, FRANCIS L., Associate Professor of Agronomy; Associate Agronomist, Agr. Exp. Sta. (1956, 1959). B. S., 1952, McGill University (Canada); M. S., 1954, Ph. D., 1956, Pennsylvania State University.

*BARTLEY, ERLE E., Professor of Dairy and Poultry Science; Dairy Nutritionist, Agr. Exp. Sta. (1949, 1958). B. S., 1944, Allahabad University (India); M. S., 1946, Ph. D., 1949, Iowa State University.

*BASSETTE, RICHARD, Associate Professor of Dairy and Poultry Science; Associate Dairy Scientist, Agr. Exp. Sta. (1958, 1964). B. S., 1952, M. S., 1955, Ph. D., 1958, University of Maryland.

BAXTER, WILLIAM M., Instructor and Assistant to the Superintendent, Fort Hays Agr. Exp. Sta. (1949, 1952). B. S., 1949, Kansas State University.

BEECHER, GARY R., Assistant Professor of Biochemistry; Assistant Biochemist, Agr. Exp. Sta. (1968). B. S., 1961, Ph. D., 1966, University of Wisconsin.

*BIDWELL, ORVILLE W., Professor of Agronomy; Agronomist, Agr. Exp. Sta. (1950, 1960). A. B., 1940, Oberlin College; B. S., 1942, Ph. D., 1949, Ohio State University.

BIERE, ARLO WILLIAM, Assistant Professor of Agricultural Economics; Assistant Economist, Agr. Exp. Sta. (1968). B. S., 1963, University of Nebraska; M. A., 1964, Ph. D., 1967, University of California.

*BLOCKER, H. DERRICK, Assistant Professor of Entomology; Assistant Entomologist, Agr. Exp. Sta. (1965). B. S., 1954, M. S., 1958, Clemson University; Ph. D., 1965, North Carolina State.

BOREN, FRED W., Associate Professor and Superintendent in charge, Southeast Kansas Branch Agr. Exp. Sta. (1957, 1965). B. S., 1946, A and M College of Texas; M. S., 1950, Kansas State University; Ph. D., 1965, Utah State University.

BRADLEY, HOWARD RALEY, Associate Professor of Agriculture (1951). B. S., 1930, M. S., 1937, Kansas State University.

*BRANDNER, LOWELL, Professor; Agricultural Editor (1947, 1961). A. B., 1937, B. S., 1937, Emporia State Teachers College; M. S., 1951, Kansas State University; Ph. D., 1960, University of Wisconsin.

BRENT, BENNY E., Assistant Professor of Animal Science and Industry; Assistant Animal Husbandman, Agr. Exp. Sta. (1966). B. S., 1959, M. S., 1960, Kansas State University; Ph. D., 1966, Michigan State University.

BRETHOUR, JOHN R., Assistant Professor of Animal Science and Industry; Assistant Animal Husbandman, Fort Hays Branch Agr. Exp. Sta. (1957, 1962). B. S., 1955, Kansas State University; M. S., 1956, Oklahoma State University.

*BROWDER, LEWIS E., Assistant Professor of Plant Pathology; Research Plant Pathologist, U. S. D. A., Agr. Exp. Sta. (1958). A. S., 1952, Cameron State Agricultural College; B. S., 1954, M. S., 1956, Oklahoma State University; Ph. D., 1965, Kansas State University.

*BULLER, ORLAN H., Assistant Professor of Agricultural Economics; Assistant Economist, Agr. Exp. Sta. (1963). B. S., 1958, Kansas State University; M. S., 1959, Ph. D., 1965, Michigan State University.

BURCHETT, LOWELL A., Instructor in Agronomy; Assistant Agronomist, North Central Kansas Experiment Fields (1965). B. S., 1956, Oklahoma State University.

*BURKHARD, RAYMOND KENNETH, Professor of Biochemistry; Biochemist, Agr. Exp. Sta. (1950, 1957). A. B., 1947, Arizona State College; Ph. D., 1950, Northwestern University.

*BURLEIGH, JAMES R., Assistant Professor of Plant Pathology; Research Plant Pathologist, U. S. D. A., Agr. Exp. Sta. (1964). B. S., 1958, Fresno State College; M. S., 1962, Ph. D., 1964, Washington State University.

*CALL, LELAND E., Dean and Director Emeritus (1907, 1946). B. S., 1906, M. S., 1912, Ohio State University.

*CAMPBELL, RONALD W., Professor; Head, Department of Horticulture and Forestry; Horticulturist in charge, Agr. Exp. Sta. (1946, 1966). B. S., 1943, M. S., 1946, Kansas State University; Ph. D., 1955, Michigan State University.

CARPENTER, FRANK R., Assistant Dean, College of Agriculture; Assistant Professor (1961). B. S., 1948, M. S., 1951, Kansas State University; Ph. D., 1967, University of Missouri.

*CARPENTER, WILLIAM J., Professor of Horticulture and Forestry; Floriculturist, Agr. Exp. Sta. (1953, 1966). B. S., 1949, University of Maryland; M. S., 1950, Ph. D., 1953, Michigan State University.

CASADY, ALFRED J., Assistant Professor of Agronomy; Research Agronomist, U. S. D. A., Agricultural Research Service (1949, 1955). B. S., 1948, M. S., 1950, Ph. D., 1962, Kansas State University.

CLAPP, ALFRED L., Professor of Agronomy Emeritus (1915, 1961). B. S., 1914, M. S., 1934, Kansas State University.

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LAUNCHBAUGH, JR., JOHN L., Associate Professor; Associate Agronomist, Fort Hays Branch Agr. Exp. Sta. (1955). A. B., 1947, M. S., 1948, Fort Hays Kansas State College; Ph. D., 1952, Texas A and M College.

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LIANG, GEORGE H. L., Assistant Professor of Agronomy; Assistant Agronomist, Agr. Exp. Sta. (1964). B. S., 1956, Taiwan Provincial College; M. S., 1961, University of Wyoming; Ph. D., 1964, University of Wisconsin.

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*RICHARDSON, DRAYTFORD, Professor of Animal Science and Industry; Animal Nutritionist, Agr. Exp. Sta. (1951). B. S., 1938, Clemson Agricultural College; M. S., 1950, Ph. D., 1951, Iowa State University.

ROBERTS, HAROLD A., Instructor in Dairy and Poultry Science; Assistant Dairy Scientist, Agr. Exp. Sta. (1963). B. S., 1959, M. S., 1967, Kansas State University.

ROBINSON, DONALD L., Instructor, Garden City Branch Agr. Exp. Sta. (1966). B. S., 1964, Southern Illinois University; M. S., 1966, Oklahoma State University.

ROBINSON, ROBERT J., Temporary Assistant Professor of Agronomy (1968). B. S., 1939, Shaw University; H. A., 1949, Cornell University; M. A., 1950, New York University; Ph. D., 1957, Kansas State University.

ROSS, WILLIAM MAX, Associate Agronomist, Cereal Crops, Field Crops Research Branch, A. R. S., U. S. D. A., Fort Hays Agr. Exp. Sta. (1951, 1954). B. S., M. S., Ph. D., University of Illinois.

*RULIFFSON, WILLARD S., Professor of Biochemistry: Associate Biochemist, Agr. Exp. Sta. (1953, 1968). B. S., 1940, Buena Vista College; M. S., 1948, Ph. D., 1953, State University of Iowa.

RUSS, OLIVER G., Associate Professor of Agronomy; Associate Agronomist, Agr. Exp. Sta. (1949, 1965). B. S., 1950, M. S., 1953, Kansas State University.

*SANFORD, PAUL EVERETT, Professor of Dairy and Poultry Science; Poultry Nutritionist, Agr. Exp. Sta. (1949, 1960). B. S., 1941, Kansas State University; M. S., 1942, Ph. D., 1949, Iowa State University.

*SAUER, DAVID B., Assistant Professor of Plant Pathology; Research Plant Pathologist, U. S. D. A., Agr. Exp. Sta. (1967). B. A., 1961, Kent State University; M. S., 1964, Ph. D., 1967, University of Minnesota.

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*SCHAFER, JOHN F., Professor; Head, Department of Plant Pathology; Plant Pathologist in Charge, Agr. Exp. Sta. (1968). B. S., 1942, Washington State University; Ph. D., 1950, University of Wisconsin.

SCHALLES, ROBERT R., Assistant Professor of Animal Science and Industry; Assistant Animal Husbandman, Agr. Exp. Sta. (1966). B. S., 1963, Colorado State University; M. S., 1966, Ph. D., 1966, Virginia Polytechnic Institute.

*SCHRUBEN, LEONARD WILLIAM, Professor of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1949, 1951). B. S., 1939, Kansas State University; M. S., 1940, University of Illinois; M. P. A., 1948, M. A., 1949, Ph. D., 1949, Harvard University.

SCOVILLE, ORLIN J., Professor of Agricultural Economics (1966). B. S., 1931, M. S., 1933, Colorado State University; Ph. D., 1949, Harvard University.

*SHELLENBERGER, JOHN A., Distinguished University Professor of Grain Science and Industry; Head of Department Emeritus (1944, 1966). B. S., 1928, University of Washington; M. S., 1930, Kansas State University; Ph. D., 1934, University of Minnesota.

*SILL, JR., WEBSTER HARRISON, Professor of Plant Pathology; Plant Pathologist, Agr. Exp. Sta. (1952, 1963). B. S., 1939, West Virginia Wesleyan College; M. A., 1947, Boston University; Ph. D., 1951, University of Wisconsin.

*SJO, JOHN B., Professor of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1948, 1967). B. S., 1949, M. S., 1952, Kansas State University; Ph. D., 1960, Michigan State University.

*SKIDMORE, EDWARD L., Soil Scientist, Agricultural Research Service, U. S. D. A. (1963). B. S., 1958, Utah State University; Ph. D., 1963, Oklahoma State University.

SLOAN, ROBERT F., Assistant Professor of Agronomy; Assistant Agronomist, Cornbelt Agricultural Experiment Field (1936, 1951). B. S., 1938, M. S., 1941, Kansas State University.

*SMITH, EDGAR FITZHUGH, Professor of Animal Science and Industry; Animal Husbandman, Agr. Exp. Sta. (1946, 1961). B. S., 1941, Texas A and M College; M. S., 1947, Kansas State University; Ph. D., 1956, Texas A and M College.

*SMITH, FLOYD W., Director, Agr. Exp. Sta. (1946, 1965). B. S., 1942, Kansas State University; M. S., 1946, Ph. D., 1949, Michigan State University.

*SMITH, ROGER CLETUS, Professor of Entomology Emeritus (1920, 1958). A. B., 1911, Miami University; A. M., 1915, Ohio State University; Ph. D., 1917, Cornell University.

*SMITH, WALTER H., Associate Professor of Animal Science and Industry; Associate Animal Husbandman, Agr. Exp. Sta. (1948, 1965). B. S., 1943, M. S., 1949, Kansas State University.

SOMSEN, HAROLD W., Entomologist, U. S. D. A. (1948). B. S., 1948, M. S., 1950, North Dakota Agricultural College.

*SORENSEN, EDGAR LAVELL, Assistant Professor; Research Agronomist, U. S. D. A. (1955). B. S., 1941, M. S., 1952, Utah Agricultural College; Ph. D., 1955, University of Wisconsin.

*SORENSON, LEONARD ORLO, Associate Professor of Agricultural Economics; Associate Agricultural Economist, Agr. Exp. Sta. (1955, 1964). B. A., 1951, M. S., 1953, Ph. D., 1963, University of Minnesota.

STEGMEIER, WILLIAM D., Instructor; Assistant in Soils, Garden City Branch Agr. Exp. Sta. (1958). B. S., 1956, M. S., 1959, Colorado State University.

STILES, DARRELL L., Instructor in Dairy and Poultry Science; Assistant in Dairy Improvement, Agr. Exp. Sta. (1965). B. S., 1963, Oklahoma State University.

STILES, DAVID A., Assistant Professor, Southeast Kansas Branch Agr. Exp. Sta. (1966). B. S., 1964, University of Maryland; M. S., 1966, Kansas State University.

STINSON, T. BRUCE, Assistant Professor; Tribune Branch Agr. Exp. Sta. (1924, 1952). B. S., 1924, Kansas State University.

*STUTEVILLE, DONALD L., Assistant Professor of Plant Pathology; Assistant Plant Pathologist, Agr. Exp. Sta. (1964). B. S., 1959, M. S., 1961, Kansas State University; Ph. D., 1964, University of Wisconsin.

SWALLOW, CLARENCE W., Assistant Professor of Agronomy; Assistant Agronomist, Agr. Exp. Sta. (1954, 1964). B. S., 1951, M. S., 1955, Kansas State University.

THOMPSON, CARLYLE A., Assistant Professor; Assistant in Soils, Fort Hays Branch Agr. Exp. Sta. (1964). B. S., 1958, M. S., 1959, Kansas State University.

*THOMPSON, HUGH E., Associate Professor of Entomology; Associate Entomologist, Agr. Exp. Sta. (1956, 1963). B. S., 1941, University of Rhode Island; Ph. D., 1953, Cornell University.

*THROCKMORTON, RAY IAMS, Dean and Director Emeritus, Agriculture (1911, 1952). B. S., 1911, Pennsylvania State University; M. S., 1922, Kansas State University.

*TUMA, HAROLD J., Associate Professor of Animal Science and Industry; Associate Animal Husbandman, Agr. Exp. Sta. (1965). B. S., 1955, M. S., 1958, Kansas State University; Ph. D., 1961, Oklahoma State University.

VACIN, GARY L., Assistant Professor of Agricultural Economics; Extension Economist, Resource Development Information (1966). B. S., 1960, M. S., 1964, Kansas State University.

*VANDERLIP, RICHARD L., Assistant Professor of Agronomy; Assistant Agronomist, Agr. Exp. Sta. (1964). B. S., 1960, Kansas State University; M. S., 1962, Ph. D., 1965, Iowa State University.

WALTER, TED L., Assistant Professor of Agronomy, Assistant Agronomist, Agr. Exp. Sta. (1951). B. S., 1949, University of Nebraska; M. S., 1951, Colorado State University.

*WARD, ARLIN B., Professor of Grain Science and Industry; Agr. Exp. Sta. (1961). B. S., 1942, M. S., 1951, Kansas State University.

*WARD, GEORGE M., Professor of Dairy and Poultry Science; Dairy Scientist, Agr. Exp. Sta. (1955, 1966). B. S., 1941, University of Vermont; M. S., 1947, Rutgers University; Ph. D., 1950, Michigan State University.

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*WASSOM, CLYDE E., Associate Professor of Agronomy; Assistant Agronomist, Agr. Exp. Sta. (1954). B. S., 1949, M. S., 1951, Ph. D., 1953, Iowa State University.

*WHEAT, JOHN D., Associate Professor of Animal Science and Industry; Associate Animal Husbandman; Agr. Exp. Sta. (1954, 1957) (on leave). B. S., 1942, M. S., 1951, Texas A and M College; Ph. D., 1954, Iowa State University.

*WHITNAH, CARRELL HENRY, Professor of Biochemistry Emeritus; B. A., 1913, University of Nebraska; M. S., 1917, University of Chicago; Ph. D., 1925, University of Nebraska.

*WILBUR, DONALD A., Professor of Entomology; Entomologist, Agr. Exp. Sta. (1928, 1949). B. S., 1925, Oregon State College; A. M., 1928, Ohio State University.

WILDE, GERALD E., Assistant Professor of Entomology; Assistant Entomologist, Agr. Exp. Sta. (1966). B. S., 1962, Texas Technological College; Ph. D., 1966, Cornell University.

WILKINS, HOWARD D., Assistant Professor of Agronomy; Secretary, Kansas Crop Improvement Association (1954, 1965). B. S., 1953, M. S., 1954, Kansas State University.

WILKINSON, GUY E., Associate Professor of Agronomy; Associate Agronomist, Agr. Exp. Sta. (1967). B. S., 1952, M. S., 1953, Oklahoma State University; Ph. D., 1960, University of Illinois.

WILLIS, WILLIAM WAYNE, Assistant Professor of Horticulture and Forestry Emeritus (1944, 1961); A. B., 1912, College of Emporia.

WINZER, JACK W., Assistant Professor of Horticulture and Forestry; Southeast Kansas Experiment Field (1963, 1966). B. S., 1957, M. S., 1959, Texas A and M College.

*WITHEE, LAURESTON VAN, Associate Professor of Agronomy; Associate Agronomist, Agr. Exp. Sta. (1953, 1965). B. S., 1947, Kansas State University; M. S., 1952, University of Nebraska; Ph. D., 1963, Kansas State University.

WOODRUFF, NEIL PARKER, Research Investigations Leader, Agricultural Research Service, U. S. D. A. (1949, 1963). B. S., 1949, M. S., 1953, Kansas State University.

*ZAHNLEY, JAMES WALTER, Professor of Agronomy Emeritus (1915, 1954). B. S., 1909, B. S. in Agric., 1918, M. S., 1926, Kansas State University.

College of Architecture and Design

BARNES, ALTON A., Instructor in Landscape Architecture (1967). B. L. A., 1965, University of Georgia.

BARTLETT, LARRY E., Instructor in Landscape Architecture (1966). B. S. L. A., 1964, Kansas State University.

BLACKMAN, MERRILL EMMETT, Assistant Professor of Architecture (1965). B. S., 1949, Kansas State University. Registered Architect, 1955. Professional Engineer, 1949.

BUTKE, WALTER J., Instructor in Architecture (1966). B. Arch., 1963, Columbia University.

*CHADWICK, THEODORE AVERY, Professor of Architecture (1927, 1947). B. S., 1927, North Dakota Agricultural College; M. Arch., 1954, Massachusetts Institute of Technology. Registered Architect in New York, 1936; in Kansas, 1953.

*CHIANG, AMOS I. T., Associate Professor of Architecture (1966). B. S., Civil Engg., 1939, National Chung King University; M. F. A. in Arch., 1949, Ph. D. in Arch., 1951, Princeton University. Registered Architect.

*CHRISTENSEN, KEITH H., Associate Professor of Architecture (1966). B. Arch., 1950, University of Nebraska; M. Arch., 1957, University of Michigan. Registered Architect, 1960.

*DAY, DENNIS J., Assistant Professor of Landscape Architecture (1966). B. S., 1964, Michigan State University; M. L. A., 1966, University of Michigan.

DEINES, VERNON PHILIP, Associate Professor of Planning; Director of the Curriculum in Regional and Community Planning (1957, 1966); Director of the Center for Community Planning Services. B. S., 1952, M. R. P., 1961, Kansas State University. Registered Professional Engineer, 1952.

*DURGAN, JACK CLYDE, Professor of Architecture (1954, 1962). B. Arch., 1951, Oklahoma State University; M. S., 1958, Kansas State University. Registered Architect in Texas, 1951; in Kansas, 1954.

*EALY, ROBERT P., Professor of Landscape Architecture; Associate Dean of the College of Architecture and Design (1967); Director of the Curriculum in Landscape Architecture (1961). B. S., 1940, Oklahoma State University; M. S., 1946, Kansas State University; Ph. D., 1955 Louisiana State University.

ERNST, F. GENE, Assistant Professor of Architecture; Assistant Dean of the College of Architecture and Design (1967). B. A., 1953, Kansas State University. Registered Architect in Kansas, 1953; in Louisiana, 1957.

*FISCHER, EMIL C., Professor; Dean, College of Architecture and Design; Architect (1955, 1963). A. B., 1930, Columbia College; B. S., 1932, M. S., 1933, Columbia University. Registered Architect in New Jersey, 1935; in Ohio, 1946; in Kansas, 1955.

HALL, CHARLES L., Associate Professor of Architecture (1964). B. Arch., 1953, Pennsylvania State University. Registered Architect in Kansas, 1953; in Minnesota, 1961; in North Dakota, 1962; in South Dakota, 1962. NCARB, 1961.

*HEINTZELMAN, JOHN CRANSTON, Professor of Architecture (1947, 1954). B. Arch., 1938, Massachusetts Institute of Technology; M. Arch., 1941, Columbia University. Registered Architect, 1953.

*HELM, JR., JOHN FREDERICK, Professor of Architecture (1924, 1938). B. D., 1924, Syracuse University; D. F. A., 1951, Bethany College.

JAHNKE, WILLIAM R., Associate Professor of Architecture (1968). B. S., 1948, Duke University. Registered Professional Engineer in Missouri, 1951; in Pennsylvania, 1952.

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*KRIDER, ALDEN, Professor of Architecture (1949, 1962). B. S., 1933, M. S., 1955, Kansas State University. Registered Architect in Missouri, 1945; in Kansas, 1949.

LIPPENBERGER, RAY E., Assistant Professor of Architecture (1964). B. S., 1936, Kansas State University. Registered Architect in Kansas, 1949; in Nebraska, 1955.

*McGRAW, EUGENE THOMAS, Associate Professor of Planning (1958, 1964). B. Arch., 1957, Oklahoma State University; M. R. P., 1963, Kansas State University.

*MELARAGNO, MICHELE G., Assistant Professor of Architectural Structures (1966). Dr. of Engg., 1959, University of Bari, Italy. Registered Professional Engineer, Rhode Island and Massachusetts; member Society of Professional Engineers.

MILES, FREDERICK D., Professor of Architecture (1967). B. S., 1936, University of Illinois. Registered Architect in Illinois, 1952; in Arizona, 1965.

*MILLER, HAROLD JAMES, Associate Professor of Architecture (1959, 1965). B. S., 1952, B. Arch., 1952, Kansas State University; March, 1960, University of Illinois. Registered Architect, 1952. Professional Engineer, 1952.

*PARKS, CHARLES ELWOOD, Associate Professor of Landscape Architecture (1949, 1965). Extension Specialist in Landscape Architecture (1949, 1950). B. S., 1949, University of Illinois; M. S., 1957, Kansas State University.

*QUINLAN, LEON REED, Professor of Landscape Architecture Emeritus; Ornamental Horticulturist and Landscape Architect, Agr. Exp. Sta. (1927, 1931, 1964). B. S., 1921, Colorado State University; M. L. A., 1925, Harvard University.

*SANNER, ALBERT E., Associate Professor of Architecture (1963). B. S., Arch., 1947, B. S., Arch. Engg., 1948, University of Illinois. Registered Architect in Illinois, 1950; in Indiana, 1959.

SHEPPARD, JIM B., Assistant Professor (1967). B. A., 1959, Kansas State University. Registered Architect in Kansas, Missouri and Nebraska.

SLACK, EARL REX, Assistant Professor of Architecture (1965). B. Arch., 1952, University of Oklahoma. Registered Architect in Oklahoma, 1957.

*THORSON, INGOLF EUGENE, Professor of Architectural Structures (1948, 1966). B. S., 1940, University of Washington. Professional Engineer in Washington, 1947; in Kansas.

*WEIGEL, PAUL, Professor of Architecture Emeritus (1921, 1924, 1959). B. Arch., 1912, Cornell University. Registered Architect in New York, 1917; in Kansas, 1950.

WEISENBURGER, RAY B., Assistant Professor of Planning (1964). B. Arch., 1959, University of Illinois. Registered Architect, 1962.

WENDT, EUGENE G., Instructor in Architecture (1962). B. Arch., 1959, Kansas State University.

*WRIGHT, HENRY, Regents' Distinguished Professor of Environmental Technology (1965).

College of Arts and Sciences

*ABERLE, NELLIE, Professor of English Emerita (1921, 1959). B. S., 1912, M. S., 1914, Kansas State University.

*ACKERT, JAMES EDWARD, Professor of Biology Emeritus; Dean of Graduate School Emeritus (1913, 1950). A. B., 1909, A. M., 1911, Ph. D., 1913, University of Illinois.

*ADAMS, MARJORIE, Assistant Dean; Associate Professor of English (1954, 1961). B. A., 1941, Louisiana Polytechnic; M. A., 1948, Ph. D., 1951, University of Texas.

AESCHBACHER, WILLIAM DRIVER, Temporary Professor of History; Director Dwight D. Eisenhower Library; Secretary Mississippi Valley Historical Association. B. S., 1940, M. A., 1946, Ph. D., 1948, University of Nebraska.

AHUJA, YOGA DHYAN, Associate Professor of Modern Languages (1968). M. A., 1948, Ph. D., 1951, Panjab University; Diploma, 1957, Tehran University; Diploma, 1964, Delhi University.

ALEXANDER, LOREN R., Instructor in Modern Languages (1965). B. M., 1951, Southwestern College; M. A., 1954, Colorado State College of Education; M. A., 1965, Michigan State University.

*ALM, OSCAR WILLIAM, Professor of Psychology Emeritus (1929, 1957). A. B., 1917, University of Nebraska; M. A., 1918, Columbia University; Ph. D., 1920, University of Minnesota.

*ALSOP, INEZ, Associate Professor of History Emerita (1923, 1960). B. S., 1916, Kansas State Teachers College (Emporia); M. S., 1920, University of Kansas.

*AMEEL, DONALD JULES, Professor of Zoology; Zoologist, Agr. Exp. Sta. (1937, 1945). A. B., 1928, Wayne University; M. A., 1930, D. Sc., 1933, University of Michigan.

AMOS, EDGAR McCALL, Associate Professor of Technical Journalism Emeritus (1921, 1950). B. S., 1902, Kansas State University.

ANDERSON, ANTHONY, Visiting Professor of Physics (1965). M. A., 1956, Ph. D., 1960, Oxford University (U. K.)

ANDERSON, JR., CHARLES C., Professor and Head of Department of Aerospace Studies (1968). A. B., 1951, M. A., 1953, Sacramento State College; 1954, Air Command and Staff School.

*ANDERSON, LORAN C., Assistant Professor of Biology; Plant Anatomist, Agr. Exp. Sta. (1963). B. S., 1958, M. S., 1959, Utah State University; Ph. D., 1962, Claremont.

*ANDREWS, ARTHUR CLINTON, Professor of Chemistry (1926, 1952). B. S., 1924, University of Wisconsin; M. S., 1929, Kansas State University; Ph. D., 1938, University of Wisconsin.

*ANSDELL, ORA JOYE, Associate Professor of English (1946, 1957). B. S., 1932, Kansas State University; M. A., 1939, University of Michigan; B. L. S., 1946, University of Chicago; Ph. D., 1956, University of Colorado.

APPLEGATE, ROBERTA G., Assistant Professor of Technical Journalism (1964). A. B., 1940, Michigan State University; M. S., 1942, Northwestern University.

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* Graduate faculty.

ASENETA, LYDIA, Instructor in Speech (1967). B. S., 1949, M. A., 1958, The National Teachers' College of the Philippines; M. A., 1968, Kansas State University.

AVERY, MADALYN, Associate Professor of Physics (1924, 1946). B. S., 1924, M. S., 1932, Kansas State University.

*BABCOCK, RODNEY WHITTEMORE, Professor of Mathematics Emeritus; Dean Emeritus (1930, 1960). A. B., 1912, University of Missouri; M. A., 1915, Ph. D., 1924, University of Wisconsin.

*BAGLEY, EDGAR SIDNEY, Professor of Economics; Economist, Agr. Exp. Sta. (1940, 1950). B. A., 1935, M. A., 1937, University of California at Los Angeles; Ph. D., 1950, State University of Iowa.

BAILEY, BILLY H., Research Associate of Physics (1962). B. S., 1961, M. S., 1964, Kansas State University.

BAKER, ARVEL HERLEY, Instructor in Military Science (1967).

*BANERJEE, KALI S., Professor of Statistics (1965, 1968). B. A., 1935, M. A., 1937, Ph. D., 1950, Calcutta.

*BARFOOT, DOROTHY, Professor of Art Emerita (1930, 1962). B. A., State University of Iowa; M. A., 1928, Columbia University.

*BARK, LAURENCE DEAN, Associate Professor of Physics; Associate Meteorologist, Agr. Exp. Sta. (1956). B. S., 1948, M. S., 1950, University of Chicago; Ph. D., 1954, Rutgers University.

*BARKLEY, THEODORE M., Associate Professor and Associate Director, Division of Biology; Curator of the Herbarium; Taxonomist, Agr. Exp. Sta. (1961, 1967). B. S., 1955, Kansas State University; M. S., 1957, Oregon State University; Ph. D., 1960, Columbia University.

BARRETT, ERNIE D., Assistant Athletic Director (1958). B. S., 1951, M. S., 1956, Kansas State University.

BASTIDA, JULIO R., Assistant Professor of Mathematics (1967). B. S., 1960, M. S., 1960, Georgia Tech; Ph. D., 1963, University of Florida.

*BATES, JAMES C., Professor of Biology Emeritus (1935, 1953). A. B., 1920, M. A., 1933, Ph. D., 1935, University of Kansas.

*BECK, HENRY VOORHEES, Professor of Geology (1946, 1961). B. S., 1946, M. S., 1949, Kansas State University; Ph. D., 1955, University of Kansas.

*BEESON, MARGARET E., Associate Professor of Modern Languages (1960). A. B., 1948, Wesleyan College; M. A., 1949, Emory University; Ph. D., 1954, University of Texas.

BELL, ALAN, Instructor in Art (1968). A. A. S., 1962, New York State University of Agriculture and Technology; B. S., 1966, New York State University.

BELL, CLARENCE ALTON, Instructor in Mathematics (1964). B. S., 1953, M. S., 1954, Kansas State University.

BENNETT, JAMES ALDEN, Assistant Professor of Modern Languages (1967). A. S., 1950, St. Joseph Junior College and Kansas University; B. S., 1952, Northwest Missouri State College; M. A., 1960, Kansas University.

BERGER, EDWARD P., Instructor in Statistics (1965). B. S., 1958, A. M., 1959, Duke University.

BHALLA, CHANDER P., Associate Professor of Physics (1966). B. S., 1952, B. Sc., 1954, M. S., 1955, Punjab University; Ph. D., 1960, University of Tennessee.

*BODE, WERNER, Assistant Professor of Biology (1964). B. S., 1955, University of Hamburg, Germany; M. S., 1958, University of Gottingen, Germany; Ph. D., 1962, University of Cologne, Germany.

BOLAN, JOHN ELDON, Instructor in Physical Education (1967). B. A., 1952, Ottawa University.

BOURSAW, JON E., Assistant Professor of Aerospace Studies (1968). B. S., 1961, Washburn University.

*BOYER, WILLIAM WALTER, Professor and Head of Political Science (1965). B. A., 1947, College of Wooster; M. A., 1949, Ph. D., 1953, University of Wisconsin.

BRADFORD, JOHN N., Assistant Professor of Physics (1967). B. S., 1954, Kansas State University; Ph. D., 1965, Iowa State University.

BRADLEY, DOROTHY GOUGH, Instructor in Economics (1947). B. S., 1932, Northwestern University; M. S., 1950, Kansas State University.

BRANCH, JESSE O., Assistant Football Coach (1967). B. S. E., 1963, University of Arkansas.

BRANN, SYLVIA J., Assistant Professor of Modern Languages (1968). B. S., 1959, Kansas State Teachers College at Pittsburg; M. A., 1963, University of Illinois.

BRASHER, BOB R., Instructor in Physical Education (1964). B. S., 1954, Bradley University; M. S., 1955, University of Colorado.

*BRIGGS, JR., J. MORTON, Assistant Professor of History (1965). A. B., 1951, Dartmouth College; A. M., 1957, Ph. D., 1962, Columbia University.

BRIGHT, CHARLES D., Associate Professor of Aerospace Studies (1963). S. B., 1948, Massachusetts Institute of Technology; M. B. A., 1950, Harvard Graduate School of Business.

BRINKMAN, P. DELBERT, Assistant Professor of Technical Journalism (1965). B. S., 1958, Emporia State Teachers College; M. A., 1963, Indiana University.

*BRONDELL, WILLIAM JOHN, Assistant Professor of English (1964). A. B., 1959, M. A., 1964, Ph. D., 1964, University of Missouri.

*BROOKINS, DOUGLAS G., Associate Professor of Geology (1962). A. B., 1958, University of California; Ph. D., 1963, Massachusetts Institute of Technology.

*BROOKS, PHILIP C., Adjoint Professor of History (1964); Director Harry S. Truman Library. A. B., 1928, University of Michigan; M. A., 1930, Ph. D., 1933, University of California.

* Graduate faculty.

BROOKS, ROBERT S., Assistant Professor of Speech (1964). B. A., 1952, Ottawa University; M. S., 1954, Ph. D., 1964, University of Kansas.

*BROWDER, ROBERT PAUL, Professor; Head, Department of History (1965). B. A., 1942, M. A., 1947, Stanford University; M. A., 1949, Ph. D., 1951, Harvard University.

BROWN, MERLE, Assistant Professor of Physics (1964) (State Climatologist). B. S., 1942, Kansas State College at Pittsburg.

*BROWN, SAM C., Assistant Professor of Psychology (1963). B. B. A., 1957, City College of New York; M. A., 1961, Ph. D., 1963, University of Virginia.

*BUNTON, NORMA D., Professor; Head, Department of Speech (1954, 1960). B. S., 1939, Southwest Texas State College; M. Ed., 1947, University of Texas; Ph. D., 1954, State University of Iowa.

*BURKE, WILLIAM L., Assistant Professor of Speech (1964). B. S., 1959, M. A., 1960, Ph. D., 1965, Northwestern University.

BUSSING, CHARLES EARL, Assistant Professor of Geography (1961). A. B., 1959, Colorado State College; M. A., 1961, University of Colorado.

BYRNES, DAVID FRANCIS, Associate Professor of Military Science (1967). B. S., 1960, U. S. M. A.; 1965, Engineer Career Course.

CAINE, HOMER D., Assistant Professor of Music (1966). B. M., 1940, Drake University, Arkansas City Junior College, University of Kansas; M. S., 1957, Kansas State University, University of Hawaii, American Conservatory, Drake University.

CAMMACK, LARRY ALAN, Instructor in Mathematics (1963, 1965). A. B., 1963, Phillips University; M. S., 1965, Kansas State University.

*CARDWELL, ALVIN BOYD, Director, Bureau of General Research; Professor of Physics (1936, 1955). Physicist in charge, Agr. Exp. Sta.; Physicist in charge, Engg. Exp. Sta.; B. S., 1925, D. Sc., 1961, University of Chattanooga; M. S., 1927, Ph. D., 1930, University of Wisconsin.

*CAREY, JAMES CHARLES, Professor of History (1948, 1954). B. A., 1937, Nebraska State Teachers College (Wayne); M. A., 1940, Ph. D., 1948, University of Colorado.

CARLSON, NANCY B., Assistant Professor of Speech (1968). B. A., 1953, M. S., 1959, West Michigan University.

CATRELL, FREDERICK ALBERT, Associate Professor of Military Science (1964). B. S., 1950, Michigan State University; 1957, Artillery Career Officers' Course.

*CHALMERS, JOHN, Dean; Professor of Economics (1963). A. B., 1938, Middlebury College; Ph. D., 1943, Cornell University.

*CHAPIN, ERNEST KNIGHT, Associate Professor of Physics Emeritus (1923, 1968). A. B., 1918, M. S., 1923, University of Michigan.

CHATELAIN, VIRGINIA L., Instructor in Mathematics (1947). B. S., 1943, M. S., 1947, Kansas State Teachers College of Emporia.

*CHAUDHURI, SAM, Assistant Professor of Geology (1966). Ph. D., 1966, Ohio State University.

*CHELIKOWSKY, JOSEPH RUDOLPH, Professor of Geology (1937, 1955). B. A., 1931, M. A., 1932, Ph. D., 1935, Cornell University.

*CHRIST, RICHARD E., Assistant Professor of Psychology (1965). B. S., 1955, M. S., 1961, University of Toledo; Ph. D., 1962, University of Massachusetts.

CLARK, WILLIAM KLINE, Instructor in Geology (1949, 1956). B. S., 1947, University of Notre Dame; M. S., 1950, Kansas State University.

CLEARY, ELIZABETH, Assistant Professor of Speech (1961, 1968). B. S., 1934, Boston University; M. S., 1961, Kansas State University.

CLEMONS, LEROY S., Associate Professor of Aerospace Studies (1967). B. S., 1955, University of Idaho; M. B. A., 1965, Eastern New Mexico University.

CLIMENHAGA, JOEL, Associate Professor of Speech (1968). B. A., 1953, M. A., 1958, University of California at Los Angeles.

COATES, WILLIAM A., Associate Professor of Modern Languages (1966). B. A., 1937, Harvard College; M. A., 1939, Ph. D., 1950, Harvard University.

COHEN, ECKFORD, Professor of Mathematics (1967). B. S., 1943, Mississippi State College; M. A., 1945, Ph. D., 1947, Duke University.

COHEN, PETER Z., Instructor in English (1961). B. S., 1953, M. A., 1961, University of Wyoming.

CONOVER, DARLINE, Instructor in English (1963). B. S., 1927, Kansas State University.

CONOVER, WILLIAM JAY, Associate Professor of Statistics; Statistical Consultant, Agr. Exp. Sta. (1964, 1967). B. S., 1958, Iowa State University; M. A., 1962, Ph. D., the Catholic University of America.

*CONROW, KENNETH, Associate Professor of Chemistry (1961, 1964). B. A., 1954, Swarthmore College; Ph. D., 1957, University of Illinois.

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*CONSIGLI, RICHARD ALBERT, Associate Professor of Biology (1962, 1966). B. S., 1954, Brooklyn College; M. A., 1956, Ph. D., 1960, University of Kansas.

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*CRAWFORD, FRANCIS W., Associate Professor of Physics (1960). A. B., 1924, Phillips University; M. S., 1929, Ph. D., 1934, University of Oklahoma.

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GREEN, RALPH EMERSON, Instructor in Physics (1961). B. S., 1939, Tri-State College; M. S., 1954, University of Alabama.

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GREENWOOD, MICHAEL JAMES, Assistant Professor of Economics (1965). B. S., 1962, DePaul University; M. A., 1965, Northwestern University; Ph. D., 1967, Northwestern University.

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GRILLET, PIERRE ANTOINE, Assistant Professor of Mathematics (1967). Licence, 1960, Ph. D., 1965, University de Paris.

GROSH, DORIS L., Part-time Instructor in Statistics (1967). B. S., 1943, University of Chicago; M. S., 1946, Kansas State University.

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GUTANA, ALBERTO M., Assistant Professor of Music (1967). Artist Diploma, 1951, University of Philippines; A. B., 1957, Central Philippines University; M. M., 1960, University of Rochester; D. MA. in progress.

GUTHRIDGE, WILLIAM W., Assistant Basketball Coach (1964). B. S., 1960, M. S., 1963, Kansas State University.

HAILEY, ROBERT L., Assistant Football Coach (1960). B. S., 1951, M. A., 1959, University of Missouri.

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*HANSEN, MERLE FREDERICK, Professor of Biology; Parasitologist, Agr. Exp. Sta. (1950, 1963). A. B., 1939, M. A., 1941, University of Minnesota; Ph. D., 1948, University of Nebraska.

HARDIN, OCANOUS T., Instructor in Aerospace Studies (1967).

*HARRIS, JOHN ORVILLE, Professor of Biology; Bacterial Physiologist, Agr. Exp. Sta. (1941, 1952). B. S., 1939, Kansas State University; M. S., 1941, University of Hawaii; Ph. D., 1943, Kansas State University.

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HERZMANN, LaVERNE CARL, Instructor in Mathematics (1963, 1965). B. S., 1963, Upper Iowa University; M. S., 1965, Kansas State University.

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KLAASSEN, HAROLD E., Assistant Professor of Biology (1967). A. B., 1957, Tabor College; M. S., 1959, Kansas Staate University; Ph. D., 1967, University of Washington.

KNORR, FRITZ GUSTAVE, Head Wresling Coach; Assistant Professor of Athletics (1942, 1952). B. S., 1932, M. S., 1945, Kansas State University.

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MACY, ELBERT BONEBRAKE, Associate Professor of Technical Journalism (1946, 1951). B. S., 1930, M. S., 1939, Kansas State University.

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SCHEER, RICHARD K., Associate Professor of Philosophy (1968). A. B., 1950, University of Nebraska; M. A., 1951, University of Florida; Ph. D., 1958, University of Nebraska.

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STEWARD, DONALD C., Assistant Professor of English (1968). B. A., 1952, M. A., 1955, Kansas University; Ph. D., 1962, University of Wisconsin.

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WILKINS, GEORGE MELVIN, Instructor in Military Science (1965).

*WILLIAMS, DUDLEY, Distinguished Regents Professor of Physics (1964). A. B., 1933, M. A., 1934, Ph. D., 1936, University of North Carolina.

*WILLIAMS, ROBERT E., Assistant Professor of Mathematics (1965). B. S., 1959, M. A., 1961, Ph. D., 1965, University of Missouri.

WILLIAMS, T. ALDEN, Associate Professor of Political Science (1967). A. B., 1954, Davidson College; Ph. D., 1964, University of North Carolina.

WILLMING, EDWARD A., Assistant Professor of Aerospace Studies (1968). B. A., 1954, Coe College; M. A., 1967, Inter-American University.

*WILSON, FRED E., Assistant Professor of Biology; Physiologist, Agr. Exp. Sta. (1965). A. B., 1958, M. A., 1960, University of Kansas; Ph. D., 1965, Washington State University.

*WIMMER, EDWARD JOSEPH, Professor of Biology (1928, 1941). A. B., 1925, M. A., 1927, Ph. D., 1928, University of Wisconsin.

WINEGARDNER, CARROLL, Instructor in Art (1966). B. F. A., 1960, Kansas City Art Institute; M. F. A., 1963, University of Oklahoma.

*WINGARD, PAUL SIDNEY, Assistant Professor of Geology (1957, 1961). A. B., 1952, M. S., 1955, Miami University; Ph. D., 1960, University of Illinois.

WOLDT, GRACE S., Instructor in Mathematics (1946). A. B., 1927, Ohio Wesleyan University.

WOLSTENHOLME, DAVID ROBERT, Associate Professor of Biology (1968). B. Sc., 1958, Ph. D., 1961, University of Sheffield.

WOOLF, MAURICE D., Professor of English (1945, 1946). B. S., 1929, Northeast Missouri State Teachers College (Kirksville); Ed. D., 1941, University of Missouri.

WRIGHT, RALPH, Head and Professor of Military Science (1965, 1967). B. S., 1962, University of Maryland; M. A., 1963, George Washington University; 1952, Army Command and General Staff College; 1960, Army War College.

YEE, KANE, Associate Professor of Mathematics (1968). B. S., 1957, M. S., 1958, Ph. D., 1963, University of California, Berkeley.

*ZIMMERMAN, JOHN L., Associate Professor of Biology (1963, 1968). B. S., 1953, M. S., 1959, Michigan State University; Ph. D., 1963, University of Illinois.

ZINNECKER, BENNETT B., Assistant Professor of Aerospace Studies (1966). B. S., 1955, University of Nebraska; M. B. A., 1964, Arizona State University; 1961, Squadron Officers' School.

College of Commerce

*ALLEN, JR., A. DALE, Associate Professor of Business Administration (1967). B. S., 1959, M. B. A., 1960, Indiana University; D. B. A., 1966, University of Colorado.

*BARTON-DOBENIN, JOSEPH, Associate Professor of Business Administration (1958, 1967). B. S., 1956, M. A., 1958, Ph. D., 1966, University of Nebraska.

BUZENBERG, MILDRED E., Assistant Dean; Assistant Professor of Business Administration (1964). B. A., 1938, Michigan State University; M. S., 1951, Kansas State University.

*CLARK, WILLIAM J., Professor of Business Administration (1946, 1961). B. S., 1929, Kansas State Teachers College (Pittsburg); M. A., 1940, State University of Iowa; C. P. A., 1954, Kansas.

* Graduate faculty.

COLEMAN, RAYMOND J., Assistant Professor of Business Administration (1965). B. S., 1948, University of Kansas; M. A., 1963, Central Missouri State College; Ph. D., 1967, University of Arkansas.

*ERIKSEN, CONRAD J. K., Associate Professor of Business Administration (1946, 1947). B. A., 1929, University of Kansas; M. B. A., 1931, Harvard University.

*GILKISON, PAUL D., Associate Professor of Business Administration (1962, 1967). B. S., 1959, M. B. A., 1960, University of Kansas; D. B. A., 1964, University of Colorado.

GOHEEN, JAMES R., Assistant Professor of Business Administration (1967). B. A., 1964, Kansas State University; J. D., 1967, Washburn University.

GUDGELL, DOROTHY B., Assistant Professor of Business Administration (1943, 1954). B. S., 1938, M. S., 1946, Kansas State University.

*GUGLER, MERLE E., Associate Professor of Business Administration (1947, 1959). B. S., 1940, Kansas State Teachers College (Emporia); M. S., 1948, Kansas State University; C. P. A., 1956, Kansas.

HOLLINGER, ROBERT D., Instructor in Business Administration (1966). B. S., 1964, M. S., 1968, Kansas State University.

*LAUGHLIN, EUGENE J., Acting Assistant Dean; Associate Professor of Business Administration (1955, 1961, 1964). B. S., 1951, Rockhurst College; M. S., 1959, Kansas State University; C. P. A., 1960, Kansas; Ph. D., 1965, University of Illinois.

LYNN, ROBERT A., Dean; Professor of Business Administration (1968). B. S., 1951, Maryville College; M. S., 1955, University of Tennessee; Ph. D., 1958, University of Illinois.

*MULANAX, ALVIN EDGAR, Associate Professor of Business Administration (1947, 1951). B. S., 1946, M. S., 1951, Kansas State University.

RAPP, CHARLES WILLIAM, Assistant Professor of Business Administration (1955). B. S., 1931, M. S., 1946, Kansas State Teachers College (Emporia).

REED, IRA MAX, Assistant Professor of Business Administration (1961, 1967). B. S., 1959, M. B. A., 1960, University of Arkansas.

RICHARDS, VERLYN D., Assistant Professor of Business Administration (1965). B. S., 1956, M. S., 1960, Kansas State University; C. P. A., 1961, Kansas; Ph. D., 1967, University of Illinois.

RILEY, MERRILL J., Assistant Professor of Business Administration (1966). B. S., 1951, John Brown University; M. B. A., 1955, University of Arkansas.

*SWISHER, JR., RHAE M., Director of Management Services; Associate Professor of Business Administration (1965). B. S., 1943, J. D., 1950, Indiana University.

TUXBURY, WILLIAM D., Assistant Professor of Business Administration (1961). B. B. A., 1946, Southern Methodist University; M. B. A., 1954, Northwestern University; C. P. A., 1954, Texas.

College of Education

*AGAN, RAYMOND JOHN, Professor of Education (1958, 1963). B. S., 1940, M. S., 1950, Iowa State University; Ed. D., 1955, University of Missouri.

ALBRACHT, JAMES J., Assistant Professor of Education (1966). B. S., 1948, M. S., 1954, University of Nebraska; Ph. D., 1966, Michigan State University.

*BAKER, HARRY LEIGH, Professor of Education Emeritus (1946, 1963). A. B., 1920, LL. D., 1951, Baker University; B. S., 1922, Kansas State University; A. M., 1928, University of Chicago; Ph. D., 1934, Yale University.

*BARTEL, ROY A., Assistant Professor of Education (1963). A. B., 1942, Bethel College; M. S. E., 1949, Ed. D., 1959, University of Kansas.

*BAXTER, LAURA FALKENRICH, Associate Professor of Education Emerita (1927, 1962). B. S., 1915, M. S., 1930, Kansas State University.

BLOOMQUIST, MARGARET CHRISTINE, Instructor in Education (1967). A. B., 1941, Bethany College; M. B. A., 1949, University of Denver.

*BRADLEY, HOWARD RALEY, Associate Professor of Education (1951, 1963). B. S., 1930, M. S., 1937, Kansas State University.

CHOLLAR, WILLIAM F., Assistant Professor of Education (1968). A. B., 1935, Friends University; M. A., 1941, Wichita State University; Ed. D., 1968, University of Nebraska.

*COPPEDGE, FLOYD L., Assistant Professor of Education (1966). B. S., 1960, M. of Teaching, 1936, Northeastern State College (Tahlequah, Oklahoma); Ed. D., 1965, University of Oklahoma.

CRAIG, M. DOROTHY, Assistant Professor of Education (1959). B. M., 1931, Bethany College; B. S., 1941, Kansas State Teachers College (Emporia); M. A., 1944, Columbia University.

*DeMAND, JOHN WESLEY, Professor of Education (1940, 1959). A. B., 1937, University of Kansas; M. S., 1940, Kansas State University; Ed. D., 1953, University of Colorado.

DRISS, ANN NASH, Instructor in Education (1967). A. B., 1952, Washburn University; M. S., 1966, Kansas State Teachers College (Emporia).

*GREEN, FINIS McGRADY, Professor of Education Emeritus (1948, 1967). B. S., 1922, Kansas State Teachers College (Pittsburg); M. S., 1929, University of Kansas; Ed. D., 1949, University of Colorado.

*HALL, LAWRENCE FENOR, Associate Professor of Education Emeritus (1926, 1966). B. S., 1923, M. S., 1927, Kansas State University.

*HANNA, GERALD S., Associate Professor of Education (1967). A. A., 1954, B. S., 1956, M. A., 1959, Long Beach State College; Ed. D., 1965, University of Southern California.

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* Graduate faculty.

HAUSE, RICHARD G., Assistant Professor of Education (1966). A. B., 1954, M. A. 1955, Colorado State College; Ed. D., 1966, University of Colorado.

HUDSON, WANDA L., Instructor in Education (1966). B. S., 1949, M. Ed., 1957, University of Texas.

*KAISER, HERBERT EMIL, Assistant Professor of Education (1961). B. S., 1941, Concordia Teachers College; M. S., 1943, Oklahoma State University; Ph. D., 1959, University of Nebraska.

*LAUGHERY, WAYNE W., Associate Professor of Education (1967). B. S., 1948, M. A., 1955, San Diego State College; Ed. D., 1958, Teachers College, Columbia University.

*LITTRELL, J. HARVEY, Professor of Education (1954, 1966). B. A., 1935, Iowa State Teachers College; M. A., 1939, State University of Iowa; Ed. D., 1950, University of Missouri.

*LOEB, JOE HENRY, Assistant Professor of Education (1956). B. A., 1948, Northeastern State College; M. S., 1951, Kansas State Teachers College (Pittsburg); Ed. D., 1957, University of Arkansas.

*McANARNEY, HARRY EDWARD, Associate Professor of Education (1957, 1966). B. S., 1943, Kansas State Teachers College (Emporia); M. S., 1947, Ed. D., 1958, University of Kansas.

*McCOMAS, JAMES D., Dean and Professor of Education (1967). B. S., 1951, West Virginia University; M. S., 1960, Ph. D., 1962, Ohio State University.

*MOGGIE, MAURICE CHARLES, Professor of Education (1930, 1945). B. S., 1929, M. S., 1931, Kansas State University; Ph. D., 1941, Ohio State University.

*MOORE, ARNOLD J., Professor of Education (1967). B. A., 1949, State College of Iowa; M. A., 1955, Ph. D., 1961, State University of Iowa.

NOWATZKI, MARGARET M., Instructor in Education (1966). B. S., 1959, College of St. Benedict (St. Joseph, Minn.); M. S., 1967, Kansas State University.

O'FALLON, OWEN KENNETH, Professor of Education (1950, 1958). A. B., 1937, M. A., 1941, Western State College of Colorado; Ed. D., 1952, University of Colorado.

*OLSON, GEORGE ARTHUR, Professor of Education (1949, 1957). A. B., 1928, A. M., 1931, University of Kansas; Ph. D., 1953, Northwestern University.

*OWENS, RICHARD E., Assistant Professor of Education (1964). A. B., & B. S., 1949, Northwest Missouri State College; M. A., 1953, Ed. D., 1964, Colorado State College.

*PECCOLO, CHARLES M., Professor of Education (1962, 1968). A. B., 1949, M. A., 1949, Adams State College; Ph. D., 1962, University of Iowa.

PRAWL, WARREN L., Associate Professor of Education and Extension (1952, 1966). B. S., 1954, Kansas State University; M. S., 1958, Ed. D., 1962, Cornell University.

*PRICE, FLOYD HAMILTON, Assistant Professor of Education and Assistant to Dean (1963, 1965). A. B., 1951, Friends University; M. Ed., 1957, Wichita State University; Ed. S., 1960, George Peabody College; Ed. D., 1965, University of Oklahoma.

REPLOGLE, RENATA J., Instructor in Education and Art (1966). A. B., 1963, A. M., 1964, Colorado State College.

ROSCOE, JOHN T., Associate Professor of Education (1968). B. E., 1961, Colorado State University; A. M., 1963, Ph. D., 1965, Colorado State College.

*RUST, LUCILE OSBORN, Professor of Education Emerita (1924, 1960). B. S., 1921, Kansas State Teachers College (Pittsburg); M. S., 1922, Kansas State University.

SCHELL, LEO M., Assistant Professor of Education (1966). A. B., 1955, Bethany College; M. S., 1962, University of Kansas; Ph. D., 1964, University of Iowa.

SMETHERS, HOWARD DEWIGHT, Assistant Professor of Education and Industrial Arts (1947, 1951). B. S., 1927, Kansas State Teachers College (Emporia); M. S., 1935, Kansas State University.

*STRICKLAND, VIVAN LEWIS, Professor of Education Emeritus (1917, 1950). A. B., 1906, M. S., 1915, Ph. D., 1925, University of Nebraska.

SULLIVAN, RITA J., Instructor in Education (1966). B. S., 1956, Kansas State Teachers College (Pittsburg); M. S., 1964, University of Kansas.

TEAGUE, FRED A., Assistant Professor of Education (1966). B. S., 1959, Central State College (Edmond, Oklahoma); Ed. M., 1963, Ed. D., 1966, University of Oklahoma.

*TRENNEPOHL, HARLAN JEAN, Associate Professor of Education (1956, 1963). B. S., 1947, M. S., 1951, Kansas State Teachers College (Emporia); Ed. D., 1956, University of Colorado.

*TRENT, CURTIS, Professor of Education and Extension (1961, 1964). B. S., 1948, Oklahoma State University; M. S., 1960, Ph. D., 1961, University of Wisconsin.

WANKLYN, JANICE R., Instructor in Education (1968). B. S., 1963, M. S., 1968, Kansas State University.

College of Engineering

ABDEL-RASSOUL, SAYED MOHAMMED, Visiting Associate Professor of Industrial Engineering (1967). B. S., 1958, Alexandria University, Egypt; Ph. D., 1963, Moscow Steel Institute, Moscow, Russia.

*AGUILAR, ANTONIO MANUEL, Assistant Professor of Civil Engineering (1965). B. S., 1951, University of Havana; M. S., 1965, Purdue.

*AKINS, RICHARD GLENN, Associate Professor of Chemical Engineering (1963, 1967). B. S., 1957, M. S., 1958, University of Louisville; Ph. D., 1962, Northwestern University.

ANDERSON, CARL ELMER, Instructor in Agricultural Engineering, Agr. Exp. Sta. (1967). B. S., 1962, Pennsylvania State University; M. E., 1965, University of Arizona. Professional Engineer, 1968.

* Graduate faculty.

*ANNIS, JASON CARL, Instructor in Mechanical Engineering (1959). B. S., 1953, University of Minnesota; M. S., 1956, Michigan College of Mining and Technology.

*APPL, FREDERIC CARL, Professor of Mechanical Engineering and Jennings Distinguished Professor (1960, 1964, 1967). B. S., 1954, M. S., 1955, Ph. D., 1958, Carnegie Institute of Technology.

ARNOLD, RICHARD C., Instructor in Applied Mechanics (1966). B. S., 1961, Kansas State University.

*ASHOUR, ELSAID, Assistant Professor of Industrial Engineering (1967). Diploma, 1955, Technische Hochschule Munchen, Germany; M. S., 1964, University of Minnesota; Ph. D., 1967, University of Iowa.

*AZER, NAIM ZAKI, Associate Professor of Mechanical Engineering (1958, 1964). B. S., 1950, M. S., 1954, University of Alexandria, Egypt; Ph. D., 1959, University of Illinois.

BALL, HERBERT DEAN, Instructor in Mechanical Engineering (1958). B. S., 1956, M. S., 1958, University of Nebraska.

*BATES, HERBERT TEMPLETON, Professor of Chemical Engineering (1958, 1960). B. S., 1935, Iowa State University; M. S., 1938, Virginia Polytechnic Institute; Ph. D., 1941, Iowa State University.

BAUGHER, EARL EUGENE, Assistant Professor of Agricultural Engineering (1967). B. S., 1958, M. S., 1964, Kansas State University.

*BESCH, EMERSON LOUIS, Associate Professor of Mechanical Engineering (1967). B. S., 1952, M. A., 1955, Southwest Texas State College; Ph. D., 1964, University of California.

*BEST, CECIL HAMILTON, Associate Dean, Professor of Applied Mechanics (1961, 1964, 1968). B. S., 1955, M. S., 1956, Ph. D., 1960, University of California. Professional Engineer, 1962.

*BLACKBURN, JACK BAILEY, Professor; Head, Department of Civil Engineering; Civil Engineer, Engg. Exp. Sta. (1963). B. S., 1947, Oklahoma University; M. S., 1949, Ph. D., 1955, Purdue University. Professional Engineer, 1950.

*BOWYER, JR., JAMES MARSTON, Professor of Mechanical Engineering (1963, 1965). B. S., 1942, M. S., 1949, Kansas State University; Ph. D., 1956, University of California.

BRAINARD, BOYD BERTRAND, Professor of Mechanical Engineering Emeritus (1923, 1938, 1967). B. S., 1922, University of Colorado; S. M., 1931, Massachusetts Institute of Technology. Professional Engineer, 1945.

BYERS, EARL CONRAD, Assistant Professor of Industrial Arts (1946, 1956). A. B., 1941, Greenville College; M. S., 1954, Kansas State University.

CHEN, MICHAEL S. K., Instructor in Chemical Engineering (1964, 1967). B. S., 1963, National Taiwan University, Taipei, Formosa.

*CHUNG, DO SUP, Assistant Professor of Agricultural Engineering (1965, 1966). B. S., 1958, Purdue University; M. S. 1960, Ph. D., 1966, Kansas State University.

CLACK, ROBERT WYNANDUS, Assistant Professor of Nuclear Engineering (1955, 1959). B. S., 1943, U. S. Naval Academy. Professional Engineer, 1956.

*CLARK, STANLEY JOE, Associate Professor of Agricultural Engineering, Agr. Exp. Sta. (1966). B. S., 1954, M. S., 1959, Kansas State University; Ph. D., 1964, Purdue University.

*CLIFTON, JOHN PAUL, Associate Professor of Industrial Engineering; Industrial Engineer, Engg. Exp. Sta. (1947, 1956). B. S., 1929, University of Kansas; M. S., 1956, Kansas State University. Professional Engineer, 1956.

CONVERSE, HARRY HUNT, Associate Professor of Agricultural Engineering (1966). B. S., 1946, M. S., 1947, Kansas State University.

*COOPER, PETER B., Assistant Professor of Civil Engineering (1966). B. S., 1957, M. S., 1960, Ph. D., 1965, Lehigh University.

*COTTOM, MELVIN CLYDE, Assistant Professor of Electrical Engineering (1955). B. S., 1945, M. S., 1948, University of Kansas. Professional Engineer in Kansas, 1947; in Missouri, 1952.

*CRANK, ROBERT EUGENE, Associate Professor of Mechanical Engineering (1947, 1951). B. S., 1947, M. S., 1950, Kansas State University. Professional Engineer, 1949.

CRARY, JAMES FRED, Assistant Professor of Applied Mechanics (1947, 1952). B. S., 1947, Kansas State University. Professional Engineer, 1948.

CRAWFORD, WILLIAM WESLEY, Associate Professor of Civil Engineering Emeritus (1923, 1942, 1949). B. Di., 1903, M. Di., 1905, Iowa State Teachers College; A. B., 1912, B. S., 1917, Iowa State University.

DARBY, EARL G., Professor of Industrial Arts Emeritus (1941, 1952, 1963). B. S., 1923, M. S., 1943, Kansas State University.

DIETRICH, HARVEY F., Assistant Professor of Industrial Arts Emeritus (1948, 1957, 1967). B. S., 1957, Kansas State University.

DOLLAR, JOHN PAUL, Instructor in Electrical Engineering (1960). B. S., 1956, M. S., 1966, Kansas State University.

*DONNERT, HERMANN JAKOL ANTON, Associate Professor of Nuclear Engineering (1966). Ph. D., 1951, Franzens University, Austria.

*DUNCAN, ALLEY HUGH, Professor of Mechanical Engineering (1942, 1954). B. S., 1937, M. S., 1949, Kansas State University. Professional Engineer, 1948.

DURLAND, MERRILL AUGUSTUS, Dean and Director Emeritus; Professor of Mechanical Engineering Emeritus (1919, 1961, 1967). B. S., 1918, M. S., 1923, Kansas State University. Professional Engineer, 1935.

ECKHOFF, NORMAN DEAN, Instructor in Nuclear Engineering (1961, 1964). Assoc. in Arts, 1958, Pratt Junior College; B. S., 1961, M. S., 1963, Ph. D., 1968, Kansas State University.

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* Graduate faculty.

*ERICKSON, LARRY EUGENE, Assistant Professor of Chemical Engineering (1964, 1965). B. S., 1960, Ph. D., 1964, Kansas State University.

*FAIRBANKS, GUSTAVE EDMUND, Professor of Agricultural Engineering; Agricultural Engineer, Agr. Exp. Sta. (1941, 1957). B. S., 1941, M. S., 1950, Kansas State University. Professional Engineer, 1948.

*FAN, LIANG-TSENG, Professor and Head of Chemical Engineering; Director, Systems Institute; Kansas Power and Light Distinguished Professor (1957, 1963, 1967). B. S., 1951, National Taiwan University; M. S., 1954, Kansas State University; Ph. D., 1957, West Virginia University. Professional Engineer in China, 1951.

*FAW, RICHARD EARL, Acting Director of Nuclear Engineering (1962, 1966, 1968). B. S., 1959, University of Cincinnati; Ph. D., 1962, University of Minnesota.

FENTON, FREDERICK CHARLES, Professor of Agricultural Engineering Emeritus; Agricultural Engineer, Agr. Exp. Sta. (1928, 1961). B. S., 1914, M. S., 1930, Iowa State University. Professional Engineer, 1947.

*FLINNER, ARTHUR ORAN, Professor of Mechanical Engineering (1929, 1947). B. S., 1929, M. S., 1934, Kansas State University; S. M., 1937, Massachusetts Institute of Technology.

FRAZIER, FORREST FAYE, Professor of Civil Engineering Emeritus (1911, 1922, 1954). B. S., 1910, Ohio State University. Professional Engineer, 1931.

FUNK, MONROE LYLE, Assistant Professor of Civil Engineering (1956, 1961). B. S., 1956, M. S., 1960, Kansas State University. Professional Engineer, 1960.

*GORTON, ROBERT LESTER, Assistant Professor of Mechanical Engineering (1960, 1966). B. S., 1953, Louisiana Polytechnic Institute; M. S., 1960, Louisiana State University; Ph. D., 1966, Kansas State University.

*GOWDY, KENNETH KING, Assistant Professor of Mechanical Engineering and Assistant Dean of Engineering (1957, 1962, 1965). B. S., 1955, M. S., 1961, Kansas State University; Ph. D., 1965, Oklahoma State University.

GRAY, PAUL EUGENE, Instructor in Electrical Engineering (1965). B. S., 1962, M. S., 1964, Virginia Polytechnic Institute.

*GROSH, LOUIS E., Associate Professor of Industrial Engineering (1965, 1966). B. S., 1944, Louisiana State University; B. S., 1947, M. S., 1949, Ph. D., 1954, Purdue University.

*HAFT, EVERETT EUGENE, Professor of Applied Mechanics (1961). B. S., 1947, M. S., 1951, Ph. D., 1955, University of Wisconsin. Professional Engineer in Wisconsin, 1952.

*HALL, RAYMOND CLARENCE, Assistant Professor of Chemical Engineering (1950, 1952). B. S., 1941, Iowa State University; M. S., 1951, Kansas State University.

HANSEN, CARL ULLMAN, Assistant Professor of Industrial Engineering (1957, 1962). B. S., 1936, Kansas State University; M. S., 1961, University of Nebraska. Professional Engineer, 1961.

*HARRIS, FLOYD WAYNE, Assistant Professor of Electrical Engineering (1965). B. S., 1956, University of Oklahoma; M. S., 1960, Ph. D., 1965, Oklahoma State University.

*HAYNIE, RICHARD MARION, Assistant Professor of Civil Engineering (1964). B. S., 1959, Iowa State University; M. S., 1960, University of Arizona; Ph. D., 1964, Colorado State University.

HEARN, JR., NORVAL KELLY, Instructor in Industrial Engineering (1964, 1966). B. A., 1957, M. S., 1966, Kansas State University.

*HECHTL, ERICH, Assistant Professor of Electrical Engineering (1967). Diplomingenieur, 1962, Ph. D., Technische Hochschule.

HELANDER, LINN, Professor of Mechanical Engineering Emeritus (1935, 1961). B. S., 1915, University of Illinois. Professional Engineer, 1941.

HIGHTOWER, CHARLES HOWARD, Instructor in Electrical Engineering (1967). B. S., 1966, Kansas State University.

HIGHTOWER, RAY E., Instructor in Nuclear Engineering (1961, 1966). B. S., 1964, Kansas State University.

HOBSON, LELAND STANFORD, Professor of Mechanical Engineering (1946, 1961). B. S., 1927, Kansas State University. Professional Engineer, 1946.

*HODGES, TEDDY OMAR, Professor of Agricultural Engineering; Agricultural Engineer, Agr. Exp. Sta. (1959). B. S., 1950, Texas A and M; M. S., 1951, Iowa State University; Ph. D., 1959, Michigan State University. Professional Engineer in Iowa, 1952.

HOLM, FRANCIS WILFORD, Instructor in Mechanical Engineering (1964). B. S., 1959, M. S., 1961, University of Missouri.

*HONSTEAD, WILLIAM HENRY, Professor of Chemical Engineering, Engg. and Agr. Exp. Sta.; Kansas Industrial Extension Service (1943, 1960, 1968). B. S., 1939, M. S., 1946, Kansas State University; Ph. D., 1946, Iowa State University. Professional Engineer, 1948.

*HOSTETTER, ABRAM ELDRED, Professor of Industrial Engineering; Metallurgist, Engg. Exp. Sta. (1931, 1952). B. S., 1925, McPherson College; M. S., 1932, Ph. D., 1938, Kansas State University.

*HUANG, CHI-LUNG, Assistant Professor of Applied Mechanics (1964). B. S., 1954, National Taiwan University; M. S., 1960, University of Illinois; Dr. of Engg., 1964, Yale University.

*HUNT, ORVILLE DON, Professor of Electrical Engineering (1923, 1947). B. S., 1923, Washington State University; M. S., 1930, Kansas State University. Professional Engineer, 1947.

*HWANG, CHING-LAI, Assistant Professor of Industrial Engineering (1959, 1962). B. S., 1953, National Taiwan University; M. S., 1960, Ph. D., 1962, Kansas State University.

*JOHNSON, GARY L., Assistant Professor of Electrical Engineering (1966). B. S., 1961, M. S., 1963, Kansas State University; Ph. D., 1966, Oklahoma State University.

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* Graduate faculty.

JORGENSON, LOUIS, Professor of Electrical Engineering Emeritus (1925, 1951, 1954). B. S., 1907, M. S., 1931, Kansas State University.

*KAUFMAN, DALE EDWARD, Assistant Professor of Electrical Engineering (1967). B. S., 1959, M. S., 1963, Ph. D., 1967, Kansas State University.

KERCHNER, RUSSELL MARION, Professor of Electrical Engineering Emeritus (1922, 1964). B. S., 1922, University of Illinois; M. S., 1927, Kansas State University. Professional Engineer, 1945.

*KIPP, JOHN EDWARD, Assistant Professor of Applied Mechanics (1956). B. S., 1951, M. S., 1955, University of Kansas; Ph. D., 1968, Oklahoma State University. Professional Engineer, 1960.

*KIRMSER, PHILIP GEORGE, Professor; Head, Department of Applied Mechanics (1942, 1958). B. S., 1939, M. S., 1944, Ph. D., 1958, University of Minnesota. Professional Engineer, 1961.

*KLADNIK, RUDOLF, Visiting Associate Professor of Nuclear Engineering (1967). B. S., 1956, Ph. D., 1963, University of Ljubljana.

KLOEFFLER, ROYCE GERALD, Professor of Electrical Engineering Emeritus (1916, 1960). B. S., 1913, University of Michigan; M. S., 1930, Massachusetts Institute of Technology. Registered Engineer, 1945.

*KNOSTMAN, HARRY DANIEL, Assistant Professor of Applied Mechanics (1957, 1965). B. S., 1955, M. S., 1961, Kansas State University; Ph. D., 1966, University of Colorado. Professional Engineer, 1959.

*KOEPSEL, WELLINGTON WESLEY, Professor; Head, Department of Electrical Engineering; Electrical Engineer, Engg. Exp. Sta. (1964). B. S., 1944, M. S., 1951, University of Texas; Ph. D., 1960, Oklahoma State University. Professional Engineer in Texas, 1952.

*KONZ, STEPHAN A., Associate Professor of Industrial Engineering (1964). B. S., 1956, M. B. A., 1956, University of Michigan; M. S., 1960, State University of Iowa; Ph. D., 1964, University of Illinois.

KRISHEN, KUMAR, Instructor in Electrical Engineering (1965, 1966). B. A., 1959, Kashmir University; B. Tech., 1962, M. Tech., 1963, Calcutta University; M. S., 1966, Kansas State University.

*KYLE, BENJAMIN GAYLE, Professor of Chemical Engineering (1958, 1964). B. S., 1950, Georgia Institute of Technology; M. S., 1955, Ph. D., 1958, University of Florida.

*LARSON, GEORGE HERBERT, Professor; Head, Department of Agricultural Engineering; Agricultural Engineer, Agr. Exp. Sta. (1939, 1956). B. S., 1939, M. S., 1940, Kansas State University; Ph. D., 1955, Michigan State University. Professional Engineer, 1947.

*LEE, E. STANLEY, Assistant Professor of Industrial Engineering (1967). B. S., 1953, Ordnance Engineering College; M. S., 1957, North Carolina State College; Ph. D., 1962, Princeton University.

*LENHERT, DONALD H., Assistant Professor of Electrical Engineering (1966). B. S., 1956, Kansas State University; M. S., 1958, Syracuse University; Ph. D., 1966, University of New Mexico.

*LINDHOLM, JOHN C., Associate Professor of Mechanical Engineering (1960). B. S. B. A., B. S. M. E., 1949, Kansas State University; M. S., 1957, University of Kansas; Ph. D., 1961, Purdue University. Professional Engineer, 1954.

*LINDLY, EDWIN CURGUS, Associate Professor of Applied Mechanics (1949, 1954, 1965). B. S., 1942, Oklahoma State University; M. S., 1949, Purdue University; M. S., 1957, Kansas State University; Ph. D., 1964, Iowa State University. Professional Engineer, 1950.

*LIPPER, RALPH IDEN, Associate Professor of Agricultural Engineering; Associate Agricultural Engineer, Agr. Exp. Sta. (1946, 1957). B. S., 1941, M. S., 1950, Kansas State University. Professional Engineer, 1953.

MANGES, HARRY LEO, Assistant Professor of Agricultural Engineering; Assistant Agricultural Engineer, Agr. Exp. Sta. (1946, 1963). B. S., 1949, M. S., 1959, Kansas State University. Professional Engineer, 1960.

*MATTHEWS, JOHN C., Assistant Professor of Chemical Engineering (1962). B. S., 1959, D. Sc., 1965, Washington University.

*McCORMICK, FRANK JAMES, Professor of Applied Mechanics (1939, 1947). B. S., 1927, M. S., 1931, Iowa State University. Professional Engineer, 1944.

McDERMOTT, COLIN, Assistant Professor of Industrial Engineering (1967). M. S., 1959, Ph. D., 1964, University of Sheffield, Birmingham, England.

McMILLAN, ALAN DREW, Instructor in Agricultural Engineering, Agr. Exp. Sta. (1967). B. S., 1967, Kansas State University.

*McNALL, PRESTON ESSEX, Professor, Head, Department of Mechanical Engineering; Associate Director, Environmental Research Laboratory (1965, 1968). B. S., 1947, University of Wisconsin; M. S., 1949, Ph. D., 1951, Purdue University.

MENSCH, ROBERT LEON, Instructor in Agricultural Engineering; Assistant Agricultural Engineer, Agr. Exp. Sta. (1962). B. S., 1959, Iowa State University; M. S., 1962, Oklahoma State University.

*MERKLIN, JOSEPH FREDERICK, Assistant Professor of Nuclear Engineering (1967). B. S., 1957, Manhattan College, New York; Ph. D., 1963, University of Minnesota.

MESSENHEIMER, ALVA ERNEST, Associate Professor of Mechanical Engineering (1942, 1963). B. S., 1924, Kansas State University. Professional Engineer, 1948.

*MEYER, WALTER, Associate Professor of Nuclear Engineering (1964, 1966). B. S., 1956, M. S., 1957, Syracuse University; Ph. D., 1964, Oregon State University.

*MILLER, JR., PAUL LEROY, Associate Professor of Mechanical Engineering (1958, 1968). B. S., 1957, M. S., 1961, Kansas State University; Ph. D., 1966, Oklahoma State University. Professional Engineer, 1962.

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* Graduate faculty.

*MINGLE, JOHN ORVILLE, Professor of Nuclear Engineering (1956, 1965). B. S., 1953, M. S., 1958, Kansas State University; Ph. D., 1960, Northwestern University. Professional Engineer, 1961.

MORSE, REED FRANKLIN, Professor of Civil Engineering Emeritus (1923, 1947, 1968). B. A., 1921, Cornell College; B. S., 1928, Iowa State University; M. S., 1933, Kansas State University; Ph. D., 1941, Cornell University. Professional Engineer, 1939.

*MUNGER, HAROLD HAWLEY, Associate Professor of Applied Mechanics Emeritus (1939, 1954, 1961). B. S., 1939, M. S., 1941, Kansas State University. Professional Engineer, 1941.

*MURPHY, JAMES PATRICK, Instructor in Agricultural Engineering (1968). B. S. Ag. E., 1968, B. S. B. A., 1968, Kansas State University.

NELSON, CLARENCE LESLIE, Instructor in Industrial Arts (1943).

NESMITH, DWIGHT ALVIN, Associate Professor of Engineering; Acting Director, Engg. Exp. Sta. (1948, 1965, 1968). B. S., 1948, Northwestern University; M. S., 1952, Kansas State University. Professional Engineer, 1962.

*NEVINS, RALPH GRIFFITH, Professor and Dean; Mechanical Engineer, Engg. Exp. Sta.; Director, Environmental Research Lab. (1948, 1963, 1967). B. M. E., 1947, M. S., 1948, University of Minnesota; Ph. D., 1953, University of Illinois. Professional Engineer, 1948.

PAULI, ROSS IRWIN, Assistant Professor of Mechanical Engineering (1947, 1954). B. A., 1941, Westmar College; M. S., 1947, Kansas State College of Pittsburg.

POTTS, GERALD RICK, Instructor in Mechanical Engineering (1966). B. S., 1966, Wichita State University.

*ROBINSON, M. JOHN, Assistant Professor of Nuclear Engineering (1966). B. S., 1960, M. S., 1962, Ph. D., 1965, University of Michigan.

*ROHLES, JR., FREDERICK HENRY, Professor of Mechanical Engineering; Associate Director, Environmental Research Lab. (1963, 1965). B. S., 1942, Roosevelt University, Chicago; M. A., 1949, Ph. D., 1956, University of Texas.

*ROSEBRAUGH, VERNON HART, Associate Professor of Civil Engineering (1953, 1954). B. S., 1933, Oregon Institute of Technology; B. S., 1938, Oregon State University; M. A., 1952, University of Portland; C. E., 1956, Oregon State University. Professional Engineer, 1954.

*ROTH, THOMAS A., Assistant Professor of Industrial Engineering (1965). B. S., 1960, M. S., 1961, Ph. D., 1966, University of Wisconsin.

SCHMID, LAWRENCE A., Assistant Professor of Civil Engineering (1968). B. S., 1962, M. S., 1963, Iowa State University; Ph. D., 1968, University of Kansas.

*SEATON, ROY ANDREW, Dean and Director Emeritus; Professor of Applied Mechanics Emeritus (1904, 1920, 1954). B. S., 1904, M. S., 1910, Kansas State University; S. B., 1911, Massachusetts Institute of Technology; Sc. D., 1942, Northeastern University. Professional Engineer, 1931.

SIEH, WAYNE DELBERT, Assistant Professor of Mechanical Engineering Emeritus (1946, 1952, 1965). B. S., 1952, Kansas State University.

*SITZ, EARL LeROY, Professor of Electrical Engineering (1927, 1948). B. S., 1927, Iowa State University; M. S., 1932, Kansas State University. Professional Engineer, 1947.

*SMALTZ, JACOB JAY, Professor of Industrial Engineering (1939, 1952). B. S., 1939, Bradley Polytechnic Institute; M. S., 1946, Kansas State University. Professional Engineer, 1960.

*SMITH, BOB LEE, Professor of Civil Engineering (1948, 1965). B. S., 1944, M. S., 1953, Kansas State University; Ph. D., 1963, Purdue University. Professional Engineer, 1953.

SMUTZ, FLOYD ALONZO, Professor of Machine Design Emeritus (1918, 1934, 1960). B. S., 1914, Kansas State University.

*SNELL, ROBERT ROSS, Associate Professor of Civil Engineering (1957, 1965). B. S., 1954, M. S., 1961, Kansas State University; Ph. D., 1963, Purdue University. Professional Engineer, 1959.

*SPRAGUE, CLYDE HOWARD, Assistant Professor of Mechanical Engineering (1963, 1964). B. S., 1958, M. S., 1963, Ph. D., 1968, Kansas State University; Ph. D., 1968, Purdue.

*STEVENSON, PAUL NELSON, Associate Professor of Farm Mechanics (1957). B. S., 1948, University of Missouri; M. S., 1957, Iowa State University.

SWARTZ, STUART E., Assistant Professor of Civil Engineering (1968). B. S., 1959, M. S., 1962, Ph. D., 1968, Illinois Institute of Technology.

SWEARINGEN, THOMAS BURKE, Assistant Professor of Mechanical Engineering (1965). B. S., 1954, Kansas State University; M. S., 1961, Washington State University; Ph. D., 1966, University of Arizona.

*TAYLOR, DELOS CLIFTON, Professor of Applied Mechanics (1931, 1956). B. S., 1925, M. S., 1937, Kansas State University. Professional Engineer, 1948.

TEN EYCK, GEORGE ROBERT, Instructor in Agricultural Engineering; Assistant Agricultural Engineer, Agr. Exp. Sta. (1965). B. S., 1951, Kansas State University.

*TILLMAN, FRANK AUBREY, Associate Professor; Head, Department of Industrial Engineering; Associate Director of Systems Institute (1965, 1966). B. S., 1960, M. S., 1961, University of Missouri; Ph. D., 1965, State University of Iowa.

TIMMONS, DARROL HOLT, Instructor in Nuclear Engineering (1967). B. S., 1963, M. S., 1966, Kansas State University.

*TRIPP, WILSON, Professor of Mechanical Engineering (1936, 1947). B. S., 1930, M. S., 1933, University of California; Ph. D., 1955, University of Illinois. Professional Engineer, 1946.

TURNER, EDWARD L., Instructor in Civil Engineering (1966). B. S., 1966, Kansas State University.

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*TURNQUIST, RALPH OTTO, Assistant Professor of Mechanical Engineering (1959, 1965). B. S., 1952, M. S., 1961, Kansas State University; Ph. D., 1965, Case Institute of Technology.

WAKABAYASHII, ISAAC, Instructor in Electrical Engineering (1955). B. S., 1953, University of California.

*WALKER, HUGH SANDERS, Associate Professor of Mechanical Engineering (1964, 1965). B. S., 1957, M. S., 1960, Louisiana State University; Ph. D., 1965, Kansas State University.

*WARD, JR., JOSEPH EVANS, Professor of Electrical Engineering (1940, 1961). B. S., 1937, University of Texas; M. S., 1940, University of Illinois. Professional Engineer, 1948.

WARD III, JOSEPH EVANS, Instructor in Electrical Engineering (1967). B. S., 1966, Kansas State University; M. S., 1967, University of Miami.

WILLIAMS, WAYNE WATSON, Associate Professor of Civil Engineering (1965). B. S., 1951, M. S., 1953, Iowa State University.

WILSON, CHARLES EDWARD, Instructor in Mechanical Engineering (1963). B. S., 1962, M. S., 1964, Kansas State University.

*WIRTZ, LEO ANDREW, Associate Professor of Electrical Engineering (1947, 1962). B. S., 1947, B. S., 1951, M. S., 1957, Kansas State University. Professional Engineer, 1954.

WOOD, JOE NATE, Professor of Mechanical Engineering (1936, 1947). B. S., 1936, University of Iowa. Professional Engineer, 1948.

WOODARD, CLAUDE LOWELL, Assistant Professor of Industrial Engineering (1949, 1954). B. S., 1948, Kansas State University; M. S., 1961, Ph. D., 1968, University of Missouri School of Mines.

YEN, CHANG-CHIH, Instructor in Applied Mechanics (1964, 1967). B. S., 1961, National Taiwan University, Taipei, Formosa, M. S., 1965, Kansas State University.

College of Home Economics

*AGAN, ANNA TESSIE, Associate Professor of Family Economics Emerita; Agr. Exp. Sta. (1929, 1944, 1968). B. S., 1927, University of Nebraska; M. S., 1930, Kansas State University.

*ALDOUS, CORAL KERR, Associate Professor of Family and Child Development Emerita (1940, 1958). B. S., 1911, Utah State Agricultural College; M. A., 1940, Columbia University.

*ANNIS, PATTY SMITH, Assistant Professor of Family Economics, Agr. Exp. Sta. (1958, 1961). B. S., 1955, Mississippi State College for Women; M. S., 1957, University of Tennessee.

*ASCHAM, LEAH, Professor of Foods and Nutrition Emerita (1927, 1951). A. B., 1903, Ohio Northern University; B. S., 1918, Ohio State University; Ph. D., 1929, Yale University.

*BARFOOT, DOROTHY, Professor of Art Emerita (1930, 1962, 1966). B. A., State University of Iowa; M. A., 1928, Columbia University.

*BARNES, JANE WILSON, Assistant Professor Emerita (1939, 1963). B. S., 1912, M. S., 1932, Kansas State University.

BERGEN, BETSY, Instructor in Family and Child Development (1966). A. B., 1949, Ottawa University; M. S., 1964, Kansas State University.

BLOCK, SUSAN HYLAND, Instructor in Family and Child Development (1966). B. S., 1964, University of Nebraska.

*BOLLMAN, STEVE RAY, Assistant Professor of Family and Child Development; Agr. Exp. Sta. (1966). B. S., 1957, M. S., 1963, Ph. D., 1966, Iowa State University.

*BOWERS, JANE RAYMOND, Assistant Professor of Foods and Nutrition; Agr. Exp. Sta. (1966). B. S., 1962, M. S., 1963, Ph. D., 1967, Kansas State University.

*BROWNING, NINA MYRTLE, Associate Professor of Foods and Nutrition (1930, 1943). B. S., 1923, M. S., 1927, Kansas State University.

*CAUL, JEAN FRANCES, Distinguished Professor of Foods and Nutrition; Agr. Exp. Sta. (1967). A. B., 1937, Lake Erie College; M. A., 1938, Ph. D., 1942, Ohio State University.

*CORMANY, ESTHER MARGARET, Associate Professor of Clothing, Textiles and Interior Design; Agr. Exp. Sta. (1936, 1941). B. S., 1926, M. S., 1932, Kansas State University.

*CRAIGIE, BARBARA, Assistant Professor of Clothing, Textiles and Interior Design (1954, 1963). B. A., 1932, University of Minnesota; M. A., 1942, University of Missouri.

*FINKELSTEIN, BEATRICE, Professor of Foods and Nutrition; Agr. Exp. Sta. (1967). B. A., 1933, Hunter College; M. S., 1939, Columbia University.

*FRYER, BETH ALSUP, Associate Professor of Foods and Nutrition; Agr. Exp. Sta. (1959). B. S., 1945, University of New Mexico; M. S., 1949, Ohio State University; Ph. D., 1959, Michigan State University.

*HARRIS, VIDA AGNES, Associate Professor of Art Emerita (1924, 1963). B. S., 1914, Kansas State University; A. M., 1927, University of Chicago.

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*HEMPHILL, MARJORIE McCALL, Assistant Professor of Institutional Management; Agr. Exp. Sta. (1939, 1954). B. S., 1937, M. S., 1941, Kansas State University.

*HESS, KATHARINE PADDOCK, Associate Professor of Clothing and Textiles Emerita (1925, 1950). B. S., 1900, M. S., 1925, Kansas State University.

*HILL, OPAL BROWN, Associate Professor of Clothing, Textiles and Interior Design (1944, 1954, 1965). B. S., 1944, M. S., 1950, Kansas State University.

*HOEFLIN, RUTH, Professor; Associate Dean of Home Economics (1957, 1960). B. S., 1940, Iowa State University; M. A., 1945, University of Michigan; Ph. D., 1950, Ohio State University.

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*HOFFMAN, DORETTA SCHLAPHOFF, Dean; Professor of Home Economics; Assistant Director, Agr. Exp. Sta. (1954). B. S., 1941, University of Nebraska; M. S., 1943, Michigan State University; Ph. D., 1949, Cornell University.

*HOWE, HAZEL DELL, Associate Professor of Clothing and Textiles Emerita (1936, 1947, 1967). B. S., 1921, M. S., 1935, Kansas State University.

*KELL, LEONE BOWER, Professor of Family and Child Development Emerita; Agr. Exp. Sta. (1927, 1947, 1965). B. S., 1923, M. S., 1928, Kansas State University.

*KRAMER, MARTHA MORRISON, Professor of Home Economics Emerita (1922, 1960). B. S., 1916, University of Chicago; M. S., 1919, Ph. D., 1922, Columbia University.

LARSON, SUSAN SPEARIE, Assistant Professor of Family and Child Development (1950, 1962). B. A., 1940, University of Iowa; M. S., 1942, University of Wisconsin.

*LATZKE, ALPHA CORINNE, Professor of Clothing and Textiles Emerita (1927, 1960, 1965). B. S., 1919, M. S., 1928, Kansas State University.

*LIENKAEMPER, GERTRUDE ELISE, Associate Professor of Clothing and Textiles Emerita (1941, 1948, 1966). B. S., 1921, Oregon State College; M. A., 1938, University of Washington.

*McCORD, IVALEE HEDGE, Professor of Family and Child Development (1957, 1963). B. S., 1933, M. S., 1951, Kansas State University; Ph. D., 1964, Purdue University.

McCRACKEN, DEANNA M., Instructor in Clothing, Textiles and Interior Design (1967). B. S., 1966, M. S., 1967, Kansas State University.

McKENDRICK, JUDY LOU, Instructor in Family Economics (1967). B. S., 1964, M. S., 1967, University of Idaho.

*McMILLAN, EVA M., Associate Professor of Foods and Nutrition Emerita (1930, 1937, 1939, 1958). M. S., 1918, Ph. D., 1929, University of Chicago.

*MIDDLETON, RAYMONA, Assistant Professor of Institutional Management; Agr. Exp. Sta. (1962, 1966). B. S., 1937, University of Nebraska; M. S., 1941, Kansas State University.

*MORRIS, MARIA, Associate Professor of Art Emerita (1925, 1963). B. S., 1911, M. S., 1927, Kansas State University.

*MORSE, RICHARD L. D., Professor; Head, Department of Family Economics; Agr. Exp. Sta. (1955). B. A., 1938, University of Wisconsin; Ph. D., 1942, Iowa State University.

*MULLEN, IVA MANILLA, Assistant Professor of Foods and Nutrition Emerita (1936, 1964). B. S., 1925, Kansas State University; M. S., 1928, Iowa State University.

NEWBY, FRANCES ANN, Instructor in Clothing, Textiles and Interior Design (1963). B. F. A., 1961, Kansas City Art Institute.

NEWELL, KATHLEEN, Assistant Professor of Foods and Nutrition (1962). B. S., 1944, Kansas State University; M. S., 1951, University of Wisconsin.

OTT, PEGGY SUE, Assistant Professor of Clothing, Textiles and Interior Design (1966). B. S., 1954, Southeastern Louisiana College; M. S., 1959, University of North Carolina (Greensboro).

RAFFINGTON, MARGARET ELIZABETH, Assistant Professor of Family and Child Development (1938, 1939, 1966). B. S., 1924, M. S., 1928, Kansas State University; Professional Diploma, 1954, Columbia University.

*RASMUSSEN, ALBIE C., Assistant Professor of Family Economics (1966, 1967). B. S., 1942, University of Alaska; M. S., 1964, Kansas State University.

REEHLING, JEAN ELIZABETH, Assistant Dean; Assistant Professor of Home Economics (1964, 1967). B. S., 1962, Kansas State University; M. A., 1963, Colorado State College.

RIGGS, JEAN M., Associate Professor of Institutional Management (1960). B. S., 1939, M. S., 1956, Iowa State University.

ROACH, FAITH RUSSELL, Instructor in Institutional Management (1965). B. S., 1947, M. S., 1966, Kansas State University.

SCHMALZRIED, BEVERLY, Assistant Professor of Family and Child Development; Agr. Exp. Sta. (1967). B. S., 1962, Fort Hays Kansas State College; M. S., 1965, Kansas State University; Ph. D., 1967, Florida State University.

SEGO, R. JEAN WHEELER, Assistant to Dean; Instructor in Home Economics (1967). B. A., 1960, Friends University; M. S., 1967, Kansas State University.

*SHUGART, GRACE SEVERANCE, Professor; Head, Department of Institutional Management; Agr. Exp. Sta. (1951, 1961). B. S., 1931, State College of Washington; M. S., 1938, Iowa State University.

STEWART, KAREN KAY, Assistant Professor of Clothing, Textiles and Interior Design (1967). A. B., 1963, Oklahoma Baptist University; M. S., 1965, Oklahoma State University.

*STITH, MARJORIE MAY, Professor; Head, Department of Family and Child Development; Agr. Exp. Sta. (1961). B. S., 1943, Alabama State College for Women; M. S., 1958, Ph. D., 1961, Florida State University.

*TINKLIN, GWENDOLYN LaVERNE, Professor of Foods and Nutrition; Agr. Exp. Sta. (1943, 1956). B. S., 1940, M. S., 1944, Kansas State University.

*WAKEFIELD, LUCILLE MARIAN, Professor; Head, Department of Foods and Nutrition (1966). Agr. Exp. Sta. (1966). B. S., 1949, M. S., 1956, University of Connecticut; Ph. D., 1965, Ohio State University.

*WARDEN, JESSIE A., Professor; Head, Department of Clothing, Textiles and Interior Design; Agr. Exp. Sta. (1960). B. S., 1940, Northeast Missouri State Teachers College; M. A., 1946, Columbia University; Ph. D., 1955, Pennsylvania State University.

*WEST, BESSIE BROOKS, Professor of Institutional Management Emerita (1928, 1960). A. B., 1924, M. A., 1928, University of California; M. S., 1951, Michigan State Normal College.

*WILLIAMS, JENNIE, Professor of Family and Child Development Emerita (1932, 1959). B. S., 1910, M. S., 1933, Kansas State University; Graduate, 1925, University of Michigan School of Nursing.

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* Graduate faculty.

*ZEIGLER, MERNA MILLER, Associate Professor of Institutional Management; Director of Food Service of the Student Union (1940, 1957). B. S., 1932, M. S., 1941, Kansas State University.

College of Veterinary Medicine

ANDERSON, NEIL V., Assistant Professor of Medicine (1967). B. S., 1959, D. V. M., 1961, University of Minnesota.

*ANTHONY, HARRY D., Associate Professor of Medicine (1955, 1964). D. V. M., 1952, M. S., 1957, Kansas State University.

BAUGH, ROBERT C., Instructor in Anatomy (1965). B. S., 1962, D. V. M., 1965, Kansas State University.

BESCH, EMERSON L., Associate Professor and Head, Department of Physiological Sciences (1967, 1968). B. S., 1952, M. A., 1955, Southwest Texas State College; Ph. D., 1964, University of California.

BLAUCH, BRUCE, Instructor in Medicine (1965). B. S., 1946, Pennsylvania State University; D. V. M., 1956, University of Pennsylvania.

BLOGG, ROWAN, Instructor in Surgery (1966). B. V. S., 1955, University of Melbourne.

BRACKEN, WILLIAM J., Instructor in Medicine (1967). B. S., 1948, D. V. M., 1955, Kansas State University.

*BURROUGHS, ALBERT L., Associate Professor of Pathology, Parasitology and Public Health (1960). B. S., 1938, University of Wyoming; D. V. M., 1958, Texas A and M College; M. S., 1941, Montana State College; Ph. D., 1946, University of California.

BUTLER, HUGH C., Professor of Surgery (1968). D. V. M., 1954, M. S., 1968, Washington State University.

*CARDINET III, GEORGE H., Assistant Professor of Anatomy (1966). A. A., 1957, Diablo Valley College; B. S., 1960, D. V. M., 1963, Ph. D., 1966, University of California.

CARNAHAN, DAVID L., Assistant Professor of Surgery and Medicine (1961, 1964). B. S., 1959, D. V. M., 1959, M. S., 1964, Kansas State University.

*CLARENBURG, RUDOLF, Associate Professor of Physiology (1966). B. S., 1954, Ph. D., 1959, State University of Utrecht.

CLIFFORD, JR., JOHN R., Instructor in Medicine (1966). B. S., 1962, D. V. M., 1964, Kansas State University.

COFFMAN, JAMES, Instructor in Medicine (1965). B. S., 1960, D. V. M., 1962, Kansas State University.

*COLES, JR., EMBERT H., Professor and Head, Department of Infectious Diseases (1968). D. V. M., 1945, Ph. D., 1958, Kansas State University; M. S., 1946, Iowa State University.

*CORNELIUS, CHARLES E., Dean; Professor of Physiology and Associate Director, Agr. Exp. Sta. (1966). B. S., 1949, D. V. M., 1953, Ph. D., 1958, University of California.

*DENNIS, STANLEY M., Professor and Head, Department of Pathology (1966, 1968). F. R. C. V. S., 1962, B. V. Sc., 1949, Ph. D., 1961, University of Sidney.

DILLMAN, RICHARD C., Instructor in Pathology, Parasitology and Public Health (1965). B. S., 1961, D. V. M., 1961, Iowa State University; M. S., 1964, Kansas State University.

*FEDDE, MARION ROGER, Associate Professor of Physiology (1964). B. S., 1957, Kansas State University; M. S., 1959, Ph. D., 1963, University of Minnesota.

*FRANK, EDWARD RAYMOND, Professor of Surgery Emeritus (1926, 1935, 1962). B. S., 1918, D. V. M., 1924, M. S., 1929, Kansas State University.

*FREY, RUSSELL A., Instructor in Physiology (1963). D. V. M., 1952, Kansas State University.

*FRICK, EDWIN JACOB, Professor, Department of Surgery and Medicine Emeritus (1919, 1935, 1966). D. V. M., 1918, Cornell University.

*GELATT, KIRK N., Assistant Professor of Surgery (1967). B. S., 1961, V. M. D., 1965, University of Pennsylvania.

GRAY, ANDREW P., Assistant Professor of Pathology, Parasitology and Public Health (1966). D. V. M., 1953, M. S., 1963, Ph. D., 1966, Kansas State University.

*GRONWALL, RONALD R., Assistant Professor of Physiology (1966). B. S., 1960, D. V. M., 1962, Ph. D., 1966, University of California.

GUFFY, MARK MITCHELL, Assistant Professor of Radiology (1963). D. V. M., 1949, M. S., 1966, Colorado State University.

HARTKE, GLEN THEODORE, Instructor in Anatomy (1962). B. S., 1958, D. V. M., 1960, M. S., 1965, Kansas State University (AID Nigeria, 1966-1970).

HENRY, JR., JACK D., Instructor in Surgery and Medicine (1968). B. A., 1960, D. V. M., 1968, Kansas State University.

*HIBBS, CLAIR M., Associate Professor of Pathology, Parasitology and Public Health (1962, 1965). B. S., 1949, D. V. M., 1953, University of Missouri; M. S., 1962, Ph. D., 1965, Kansas State University.

HUMBURG, JAY M., Assistant Professor of Physiology (1966). D. V. M., 1957, M. S., 1964, Kansas State University (AID Nigeria).

JERNIGAN, LOYCE D., Temporary Assistant Professor of Medicine (1965). D. V. M., 1945, Kansas State University.

*KELLEY, DONALD CLIFFORD, Associate Professor of Pathology, Parasitology and Public Health (1958). Diplomate American Board of Veterinary Public Health. D. V. M., 1935, M. S., 1952, Kansas State University.

KIMBALL, ALICE DAY, Instructor in Pathology, Parasitology and Public Health Emeritus (1934, 1955). B. S., 1935, Kansas State University.

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* Graduate faculty.

*KITSELMAN, CHARLES HOWARD, Professor of Pathology Emeritus (1919, 1933, 1965). V. M. D., 1918, University of Pennsylvania; M. S., 1927, Kansas State University.

KLEMM, ROBERT D., Assistant Professor of Anatomy (1967). B. S., 1957, Capital University; M. S., 1959, Ohio University; Ph. D., 1964, Southern Illinois University.

KRUCKENBERG, SAMUEL M., Instructor in Surgery; Director of Animal Resources (1966, 1967). D. V. M., 1963, M. S., 1965, Kansas State University.

*LEASURE, ELDEN E., Dean Emeritus; Professor of Pathology, Parasitology and Public Health (1926, 1948, 1964). D. V. M., 1923, M. S., 1930, Kansas State University.

LEIPOLD, HORST W., Instructor in Pathology (1967). Der. Med. Vet., 1963, Justus Liebig University.

*LELAND, JR., STANLEY E., Professor of Parasitology (1967). B. S., 1949, M. S., 1950, University of Illinois; Ph. D., 1953, Michigan State University.

*LUMB, JOHN WALLACE, Professor of Anatomy Emeritus (1924, 1957). D. V. M., 1910, M. S., 1930, Kansas State University.

*McGAVIN, MATTHEW D., Associate Professor of Pathology (1968). B. V. Sc., 1952, M. V. Sc., 1962, Queensland University; Ph. D., 1964, University of Michigan; Diplomate, American College of Veterinary Pathologists, 1963.

MILLER, RICHARD E., Instructor in Surgery and Medicine (1967). D. V. M., 1954, Cornell University.

*MILLERET, ROY JOSEPH, Assistant Professor of Surgery and Medicine (1960, 1964). D. V. M., 1944, M. S., 1959, Kansas State University.

*MOSIER, JACOB EUGENE, Professor; Head, Department of Surgery and Medicine (1945, 1954). D. V. M., 1945, M. S., 1948, Kansas State University.

*NOORDSY, JOHN LEROY, Professor of Surgery (1966). B. S., 1943, South Dakota State College; D. V. M., 1946, M. S., 1962, Kansas State University.

*OEHME, FREDERICK W., Associate Professor of Medicine (1959). B. S., 1957, D. V. M., 1958, Cornell University; M. S., 1962, Kansas State University.

*OSBALDISTON, GEORGE W., Associate Professor of Pathology (1967). B. V. Sc., 1956, Queensland University; M. R. C. V. S., 1960, London; M. A., 1963, Ph. D., 1965, Cantab.

RAILSBACK, LEE T., Assistant to the Dean; Assistant Professor (1961). B. S., 1936, D. V. M., 1937, Kansas State University (AID Nigeria).

RAPP, WILLIAM R., Instructor in Pathology (1967). B. S., 1964, D. V. M., 1966, Kansas State University.

ROGERS, VERA POHLENA, Instructor in Anatomy (1963). B. S., 1960, D. V. M., 1962, M. S., 1967, Kansas State University (AID Nigeria).

SCHONEWEIS, DAVID A., Instructor in Surgery and Medicine (1967). B. S., D. V. M., 1956, Kansas State University.

SCHONING, POLLY A., Instructor in Anatomy (1967). B. S., 1962, D. V. M., 1964, Kansas State University.

SHIPLEY, WAYNE D., Assistant Professor of Pathology, Parasitology and Public Health (1965). D. V. M., 1935, Colorado State University.

STRAFUSS, ALBERT C., Associate Professor of Parasitology (1968). B. S., 1952, D. V. M., 1954, M. S., 1958, Kansas State University; Ph. D., 1963, University of Minnesota.

TAUSSIG, ROBERT A., Instructor in Medicine (1966). D. V. M., 1945, Colorado State University.

*TROTTER, DONALD McLEAN, Associate Dean; Professor of Anatomy (1946, 1957). Diplomate, 1951, American College of Veterinary Pathologists; D. V. M., 1946, M. S., 1957, Kansas State University.

*UNDERBJERG, GRAVERS K. L., Professor, Physiologist, Agr. Exp. Sta. (1948). B. S., 1926, Royal Veterinary and Agricultural College, Copenhagen; D. V. M., 1943, Ph. D., 1939, Iowa State University.

*UPSON, DAN W., Instructor in Physiology (1959). D. V. M., 1952, M. S., 1962, Kansas State University.

VESTWEBER, JEROME G. E., Instructor in Surgery and Medicine (1967). B. S., 1962, D. V. M., 1964, University of Minnesota.

*WALLACE, LARRY J., Assistant Professor of Surgery and Medicine (1967). B. S., 1960, D. V. M., 1962, M. S., 1964, Michigan State University.

*WESTFALL, JANE A., Assistant Professor of Anatomy (1967). A. B., 1950, College of Pacific; M. A., 1952, Mills College; Ph. D., 1965, University of California.

WREN, WALLACE B., Instructor in Pathology, Parasitology and Public Health (1965). B. S., 1958, D. V. M., 1958, M. S., 1961, Kansas State University.

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AHLSCHWEDE, GEORGE ALLEN, Assistant Professor; Extension Specialist in Meats (1965). B. S., 1962, M. S., 1965, Kansas State University.

ALLEN, GERTRUDE EDNA, Professor Emeritus; Specialist in Foods and Nutrition (1929, 1947). B. S., 1923, University of Minnesota; M. S., 1936, Kansas State University.

AMSTEIN, WILLIAM GERALD, Professor; Extension Specialist in Horticulture (1929, 1965). B. S., 1927, University of Massachusetts; M. S., 1928, Kansas State University.

ANDERSON, ELINOR, Assistant Professor; Extension Specialist, Home Management (1957, 1963). B. S., 1939, M. S., 1952, Kansas State University.

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APEL, J. DALE, Associate Professor; Associate State Club Leader (1962, 1967). B. S., 1950, Kansas State University; M. S., 1961, The American University; Ph. D., 1966, University of Chicago.

APPLEBY, MARIELLEN J., Assistant Professor; District Extension Home Economist (1955, 1965). B. S., 1955, Kansas State University; M. S., 1965, University of Maryland.

APPLEBY, THOMAS E., Instructor; Extension Economist in Farm Management (1960, 1963, 1967). B. S., 1959, M. S., 1967, Kansas State University.

AREA, MARJORIE JOANN, Assistant Professor; Extension Specialist, 4-H Club Work (1964). B. S., 1956, M. S., 1961, Kansas State University.

ATCHISON, FRED DOWNS, Instructor; District Extension Forester (1964). B. S., 1954, University of Georgia.

ATKINSON, DAISY ELIENE, Assistant Professor; Extension Specialist in Foods and Nutrition (1959). B. A., 1938, University of Iowa; M. S., 1954, University of Alabama.

BAIRD, HARRY CHARLES, Professor Emeritus; District Agricultural Agent (1920, 1952). B. S., 1914, Kansas State University.

BAKER, E. KIRK, Assistant Professor; Extension Economist, Resource Development (1955, 1966). B. S., 1949, Oklahoma State University; M. S., 1966, Kansas State University.

BALDING, JAMES LEWIS, Extension Assistant Manufacturing Specialist in Extension Formula Feeds (1965). B. S., 1960, Kansas State University.

BARTLETT, CLARENCE EDWARD, Instructor; Extension Economist in Farm Management (1947). B. S., 1929, University of Nebraska.

BATES, JR., CHARLES THOMAS, Assistant Professor; Extension Specialist in 4-H Club Work (1956, 1961). B. S., 1951, Oklahoma A and M; M. S., 1960, University of Wisconsin.

BERGSRUD, FREDERICK GORDON, Assistant Professor; Area Extension Irrigation Engineer (1964). B. A., 1960, University of Minnesota; M. S., 1968, Kansas State University.

BIEBERLY, FRANK GEARHARD, Professor; Section Leader, Extension Specialist in Agronomy (1941, 1949). B. S., 1938, M. S., 1949, Kansas State University.

BILES, LARRY E., Instructor; Area Extension Forester, Watershed Project (1967). B. S., 1967, University of Missouri.

BISWELL, CLIFFORD R., Assistant Professor; Assistant State Extension Forester (1957, 1965, 1967). B. S., 1954, M. S., 1965, University of Missouri.

BLANKENHAGEN, ELMER W., Assistant Professor; District Extension Supervisor (1950, 1956). B. S., 1948, Kansas State University.

BLECHA, FRANK OTTO, Professor Emeritus; District Agricultural Agent (1919, 1948). B. S., 1918, M. S., 1924, Kansas State University.

BOHANNON, ROBERT ARTHUR, Professor; Director of Extension (1951, 1968). B. S., 1949, Michigan State University; M. S., 1951, Kansas State University; Ph. D., 1957, University of Illinois.

BONEWITZ, EDWIN RALPH, Associate Professor; Extension Specialist in Dairy Science (1943, 1949). B. S., 1941, M. S., 1955, Kansas State University.

BORST, WILLIAM H., Assistant Professor; Area Extension Specialist, 4-H Club Work (1953, 1955, 1967). B. S., 1950, Kansas State University; M. S., 1962, Colorado State University.

BRATTON, GERALD F., Instructor; Area Extension Forester, Watershed Project (1967). B. S., 1966, Colorado State University.

BREWER, DONALD I., Instructor; Extension Specialist, Radio and TV (1967). B. A., 1953, University of Tulsa.

BRIGGS, VIVIAN BAHR, Assistant Professor Emeritus; Extension Specialist in Family Life (1946, 1951). B. S., 1942, University of Nebraska; M. S., 1952, Kansas State University.

BRILL, MARTHA E., Assistant Professor; Extension Specialist in Health (1946, 1948). B. S., 1940, Kansas State University; R. N., 1940, University of Kansas.

BROOKS, HOWARD LEROY, Assistant Professor; Extension Specialist, Insecticides (1965). B. S., 1960, M. S., 1963, University of Arkansas; Ph. D., 1967, Kansas State University.

BURKE, JACK M., Associate Professor; Director of Radio Station KSAC (1958). B. S., 1953, M. E., 1963, North Dakota State University.

BUSSET, GLENN M., Professor; Department Head and State Club Leader (1941, 1966). B. S., 1941, Kansas State University; M. S., 1957, Cornell University; Ph. D., 1965, University of Wisconsin.

CALEY, HOMER K., Associate Professor; Extension Specialist in Veterinary Medicine (1965). D. V. M., 1952, Kansas State University.

CALL, EDWARD P., Associate Professor; Extension Specialist, Dairy Science (1963). B. S., 1951, Ohio State University; M. S., 1963, Ph. D., 1967, Kansas State University.

CARLSON, JEAN K., Assistant Professor; District Extension Specialist, Home Management (1950, 1966). B. S., 1950, Kansas State University; M. S., 1965, Oklahoma State University.

CLEAVINGER, EUGENE A., Professor Emeritus; Extension Specialist in Crops and Soils (1926, 1947). B. S., 1925, Kansas State University.

COLLINS, BILL D., Instructor; Extension Economist, Farm Management (1954, 1965). B. S., 1951, Kansas State University; M. S., 1962, University of Wisconsin.

COOLIDGE, JOHN H., Professor; Extension Economist in Farm Management (1926, 1948). B. S., 1925, M. S., 1932, Kansas State University.

COPPERSMITH, ROBERT L., Professor; Extension Economist, Livestock Marketing (1960). B. S., 1948, Kentucky State College; M. S., 1950, University of Kentucky; Ph. D., 1953, University of Illinois.

COX, LAWRENCE J., Associate Professor: District Extension Supervisor (1952, 1959). B. S., 1948, Oklahoma State University; M. S., 1960, Kansas State University.

CRIST, ROSEMARY A., Assistant Professor; District Extension Home Economist (1950, 1965). B. S., 1947, Kansas State University; M. A., 1967, University of Nebraska.

DELANO, FREDRICK D., Instructor; Extension Economist in Farm Management (1964, 1967). B. S., 1961, Kansas State University.

DEUTSCH, HENRY A., Assistant Professor: District Extension Forester (1964). B. S., 1957, M. S., 1964, University of Missouri.

DeWEESE, PAUL F., Assistant Professor: Extension Specialist, Radio and Television (1948, 1966). B. S., 1947, Kansas State University.

DEXTER, MIRIAM L., Associate Professor; Assistant Extension Editor (1944, 1959). B. S., 1926, M. S., 1933, Kansas State University.

DICKEN, D. DEAN, Assistant Professor: Area Extension Agronomist (1942, 1963). B. S., 1937, Kansas State University; M. S., 1942, University of Illinois.

DICKINSON, ANNABELLE J., Assistant Professor; Assistant to State Leader, Home Economics (1940, 1959). B. S., 1933, Fort Hays Kansas State College; M. S., 1954, University of Missouri.

DICKSON, WILLIAM M., Instructor: Extension Economist in Farm Management (1961, 1966). B. S., 1956, M. S., 1961, Kanssa State University.

DIERKING, GARY R., Instructor; Extension Specialist, Visual Aids (1961). B. F. A., 1958, University of Kansas.

EDELBLUTE, DALE HENRY, Assistant Professor; Area Extension Agriculturist (1947, 1955). B. S., 1934, Kansas State University.

ELLING, CARL GEORGE, Professor Emeritus: Extension Specialist in Animal Husbandry (1907, 1951). B. S., 1904, Kansas State University.

ELLITHORPE, VERA MAY, Associate Professor; Extension Specialist in Home Management (1938, 1947). B. S., 1935, M. S., 1939, Kansas State University; Ph. D., 1963, Ohio State University.

ERICKSON, DONALD B., Associate Professor: Section Leader and Extension Economist, Resource Development (1966). B. S., 1955, M. S., 1960, University of Wyoming; Ph. D., 1964, Purdue University.

ESSLINGER, DONALD L., Assistant Professor: Assistant Extension Editor (1957, 1966). B. S., 1955, Kansas State University; M. S., 1962, University of Maryland.

EYESTONE, CECIL L., Associate Professor: Extension Specialist in 4-H Club Work (1943, 1958). B. S., 1944, Kansas State University; M. S., 1958, Colorado State University.

FAIDLEY, DONALD L., Instructor: Extension Economist in Farm Management (1956, 1966). B. S., 1953, Kansas State University.

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FRANCIS, EUGENE N., Associate Professor; Area Extension Specialist, Animal Husbandry (1967). B. S., 1949, Kansas State University; M. S., 1953, Iowa State University.

FRAZIER, LESLIE PAUL, Assistant Professor; Extension Specialist, Area Development Studies (1943, 1965). B. S., 1942, Oklahoma State University; M. A., 1962, Colorado State University.

FREDERICK, HOBART, Instructor; Extension Economist in Farm Management (1941, 1960). B. S., 1941, Kansas State University.

GALLAHER, HAROLD G., Professor; Assistant Department Head of Horticulture, Extension, and State Extension Forester (1951, 1965). B. S., 1949, University of Missouri; M. S., 1959, Kansas State University.

GATES, DELL E., Associate Professor; Extension Specialist in Entomology (1948, 1964). B. S., 1948, M. S., 1952, Kansas State University.

GEISLER, JAMES C., Instructor: Area Extension Forester (1966). B. S., 1964, University of Missouri.

GLOVER, OTIS BENTON, Associate Professor Emeritus: District Agricultural Agent (1929, 1963). B. S., 1917, Kansas State University.

GOULD, LEONARD KEITH, Instructor: Area Extension Forester, Utilization and Marketing (1963, 1965). B. S., 1956, Colorado State University.

GRAHAM, RALF O., Associate Professor; Assistant Extension Editor (1961). A. B., 1948, Peru State Teachers College; M. A., 1955, University of Minnesota.

GREENE, LAURENZ S., Instructor: Extension Economist in Farm Management (1952, 1960). B. S., 1950, Kansas State University.

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HOLMES, ELWYN S., Associate Professor; Extension Agricultural Engineer (1966). B. S., 1943, M. S., 1953, Texas A and M University.

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LANGEMEIER, LARRY N., Assistant Professor; Extension Economist, Farm Management Studies (1968). B. S., 1963, University of Nebraska; M. S., 1965, Ph. D., 1968, University of Missouri.

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McCLELLAND, EVERETT L., Instructor Emeritus; Extension Economist in Farm Management (1936, 1954). B. S., 1928, Kansas State University.

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McREYNOLDS, KENNETH L., Assistant Professor; Extension Economist in Farm Management (1949, 1960). B. S., 1950, M. S., 1954, Kansas State University.

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MORRISON, FRANK D., Associate Professor; Extension Specialist, Horticulture (1966). B. S., 1951, M. S., 1959, University of Idaho; Ph. D., 1966, Michigan State University.

MOYER, WENDELL A., Professor; Section Leader, Extension Specialist, Animal Husbandry; (1941, 1956). B. S., 1941, M. S., 1955, Kansas State University.

MULLEN, W. GALE, Instructor; Extension Economist in Farm Management (1961). B. S., 1950, Kansas State University.

MYERS, GLADYS, Associate Professor Emeritus; Extension Specialist in Home Management (1930, 1947). B. S., 1923, Kansas State University; M. S., 1939, Cornell University.

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NIGHSWONGER, JAMES J., Instructor; Extension Specialist, Landscape Architecture (1961, 1965). B. S., 1960, Kansas State University.

NILSON, ERICK B., Assistant Professor; Extension Specialist, Herbicides (1965). B. S., 1950, M. S., 1955, University of Nebraska; Ph. D., 1963, Kansas State University.

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PECK, ERNEST G., Assistant Professor; Extension Specialist, Visual Aids (1955, 1961). B. S., 1950, M. S., 1965, Kansas State University.

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PETERSON, GERALD W., Instructor; Extension Specialist, Visual Aids (1968). B. A., 1962, Kearney State Teachers College.

PETERSON, VERLIN H., Assistant Professor; Area Extension Specialist, Crops and Soils (1948, 1965). B. S., 1948, M. S., 1949, Kansas State University.

PHAR, PHILIP A., Assistant Professor; Extension Specialist, Nutrition and Management (1967). B. S., 1959, University of Illinois; M. S., 1961, Ph. D., 1967, University of Kentucky.

PINKERTON, LESTER R., Assistant Professor; Area Extension Forester, Watershed Project (1964, 1967). B. S., 1963, M. S., 1967, Colorado State University.

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PRETZER, DON D., Instructor; Extension Economist, Grain Marketing (1958, 1964, 1967). B. S., 1955, Kansas State University.

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REGNIER, ROGER E., Professor Emeritus; Extension Specialist, Resource Development (1934, 1966). B. S., 1924, M. S., 1932, Kansas State University.

RICHARDS, JACK A., Associate Professor; Extension Economist, Marketing Information (1967). B. S., 1954, University of Wyoming; M. S., 1963, Montana State University; Ph. D., 1967, Oregon State University.

RINGLER, WILBER E., Professor; Assistant Director (1957). B. S., 1948, M. S., 1949, University of Nebraska; Ph. D., 1958, University of Wisconsin.

ROSS, EUGENE, Professor; District Extension Supervisor (1955, 1966). B. S., 1952, Oklahoma State University; M. S., 1962, Kansas State University; Ph. D., 1966, University of Wisconsin.

SCHINDLER, DALE E., Associate Professor; Extension Architect (1955, 1961). B. Arch., 1953, M. S., 1960, Kansas State University. Registered Architect, M. A., 1960, Kansas State University.

SCHLENDER, JOHN R., Assistant Professor; Extension Economist in Farm Management (1961). B. S., 1951, Kansas State University; M. S., 1960, Oregon State University.

SCHOEFF, ROBERT W., Professor; Section Leader, Extension Economist in Marketing and Utilization of Formula Feeds (1960). B. S., 1942, M. S., 1947, Ph. D., 1952, Purdue University.

SCHROEDER, MARY M., Instructor; District Extension Supervisor (1961, 1966). B. S., 1938, Kansas State University.

SELBY, WALTER E., Assistant Professor; Extension Agricultural Engineer (1944, 1947). B. S., 1929, Kansas State University; M. S., 1957, University of Nebraska.

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SHANKLAND, HAROLD G., Associate Professor Emeritus; Associate Extension Editor (1943, 1949). A. B., 1924, College of Emporia.

SHREVE, LOY W., Instructor; Area Extension Forester, Fire Control (1964, 1965). B. S., 1951, West Virginia University.

SHUYLER, LYNN R., Extension Assistant; Extension Irrigation Engineer (1965). B. S., 1961, Kansas State University.

SLUSHER, JOHN P., Instructor; Area Extension Forester, Tree Distribution (1961, 1965). B. S., 1957, University of Missouri.

SMERCHEK, JOHN F., Instructor; Extension Economist in Farm Management (1942, 1950). B. S., 1929, Kansas State University.

SMURTHWAITE, GEORGIANA HOPE, Professor Emeritus; Extension Specialist, Home Economics Program Development (1924, 1954). B. S., 1911, Utah State College; M. S., 1931, Kansas State University.

SMYTHE, PATRICK E., Assistant Professor; Extension Economist, Resource Development (1956, 1966). B. S., 1953, M. S., 1958, Kansas State University.

SPRINGER, DONALD M., Assistant Professor; Extension Television Producer (1957, 1962). B. S., 1957, M. S., 1966, Kansas State University.

STARKEY, WINONA M., Assistant Professor; Extension Specialist, Home Furnishings (1944, 1956). B. S., 1947, M. S., 1954, Kansas State University.

STOCKARD, JOHN R., Extension Assistant; Extension Motion Picture Producer (1966). B. S., 1955, University of North Carolina.

STOVER, HAROLD EARL, Professor Emeritus; Extension Agricultural Engineer (1936, 1954). B. S., 1929, Kansas State University.

STRICKLER, JOHN K., Assistant Professor; Associate State Extension Forester (1961, 1965, 1967). B. S., 1957, University of Missouri; M. S., 1967, Kansas State University.

SUGHRUE, KATHRYN E., Associate Professor; Associate State Leader, Extension Home Economics (1937, 1961, 1967). B. S., 1936, Kansas State University; M. S., 1963, Colorado State University.

TEAGARDEN, EARL HICKS, Professor Emeritus; Coordinator, Extension Studies (1929, 1952). B. S., 1920, Kansas State University.

TENNANT, MARJORIE A., Assistant Professor; Assistant Extension Editor (1947, 1952). B. S., 1946, M. S., 1957, Kansas State University.

THOMAS, KENNETH E., Professor; Head, Department of Extension Information (1951, 1963). A. B., 1951, Southwestern College; M. S., 1952, Kansas State University; Ph. D., 1961, University of Wisconsin.

THOMAS, WILTON B., Associate Professor; Section Leader, Extension Economist in Farm Management (1946, 1960). B. S., 1937, M. S., 1960, Kansas State University.

TITUS, RALPH S., Associate Professor; Assistant Manager, Radio Station KSAC (1951, 1965). B. S., 1955, M. S., 1964, Kansas State University.

TOBIN, LESLIE W., Assistant Professor; Extension Specialist, Soil Fertility (1967). B. S., 1948, M. S., 1951, Ph. D., 1960, Michigan State University.

TOMKINSON, RICHARD B., Assistant Professor; Extension Specialist in 4-H Club Work (1961). B. S., 1959, Manchester College; M. S., 1961, Purdue University.

TRAYER, DANNY D., Instructor, Extension Economist in Farm Management (1950, 1960). B. S., 1951, M. S., 1967, Kansas State University.

TREAT, JAY L., Assistant Professor; Extension Economist in Farm Management (1960). B. S., 1949, University of Arkansas; M. A., 1952, University of Missouri.

TRENT, CURTIS, Professor; Coordinator, Extension Personnel Training (1961, 1964). B. S., 1948, Oklahoma State University; M. S., 1960, Ph. D., 1961, University of Wisconsin.

TRIEB, SYKES E., Professor; Extension Economist, Retail Marketing (1954, 1964). B. S., 1950, M. S., 1960, Kansas State University; Ph. D., 1967, Ohio State University.

UNRUH, CHESTER R., Associate Professor; Assistant Extension Editor (1961). A. B., 1940, Bethel College; M. S., 1956, Kansas State University.

URBAN, KENNETH E., Instructor; Extension Economist in Farm Management (1954, 1966). B. S., 1952, M. S., 1957, Kansas State University.

VACIN, GARY L., Assistant Professor; Extension Economist, Resource Development Information (1966). B. S., 1960, M. S., 1964, Kansas State University.

WALKER, MILDRED L., Assistant Professor; Extension Economist, Consumer Marketing (1956). B. S., 1952, Kansas State University; M. S., 1960, Pennsylvania State University.

WARNER, EUGENE D., Professor; Extension Editor (1935, 1947). B. S., 1934, Kansas State University.

WELLS, RUTH I., Assistant Professor; District Extension Home Economist (1953, 1958). B. S., 1943, Central Missouri State College; M. S., 1948, Kansas State University.

WENDLING, LEO T., Professor; Extension Agricultural Engineer (1947, 1958). B. S., 1947, M. S., 1956, Kansas State University.

WESTMEYER, HERMAN W., Assistant Professor; Extension Specialist, Animal Husbandry (1936, 1961). B. S., 1936, University of Missouri; M. S., 1965, Kansas State University.

WHIPPS, LOREN E., Assistant Professor; District Extension Economist (1946, 1966). B. S., 1938, Kansas State University; M. S., 1953, Colorado State University.

WHITE, SHIRLEY A., Professor; State Leader, Home Economics (1965). B. S., 1953, University of Nebraska; M. S., 1960, University of Wisconsin; Ph. D., 1966, Michigan State University.

WHITEHAIR, NORMAN V., Professor; Assistant Head, Department of Economics, State Leader in Marketing (1946, 1961). B. S., 1943, M. S., 1953, Kansas State University; Ph. D., 1964, Purdue University.

WHITNEY, DAVID A., Assistant Professor; Extension Specialist, Soil Testing (1966). B. S., 1961, M. S., 1963, University of Nebraska; Ph. D., 1966, Iowa State University.

WIGGINS, M. CHRISTINE, Associate Professor; Extension Specialist, Clothing and Textiles (1930, 1947). B. S., 1929, Kansas State University; M. A., 1938, Columbia University.

WILCOX, ROBERT A., Professor; Quality Control Specialist, Formula Feeds (1965). B. S., 1945, M. S., 1949, Ph. D., 1960, South Dakota State University.

WILKINS, HOWARD D., Associate Professor; Extension Specialist, Crops and Soils (1959). B. S., 1953, M. S., 1954, Kansas State University.

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GRIGGS, OTIS R., Reno County (1951, 1960, 1967). Hutchinson.

HALL, C. T., Johnson County (1934, 1939, 1967). Olathe.

HAMILTON, DONALD F., Saline County (1960, 1964, 1967). Salina.

INGLE, DONALD W., Sedgwick County (1930, 1947, 1967). Wichita.

NEWSOME, B. W., Riley County (1955, 1960, 1967). Manhattan.

County Extension Agricultural Agents

ALBRIGHT, KENNETH B., Ellis County (1955, 1957). Hays.

AUFDENGARTEN, CHARLES H., Washington County (1963). Washington.

BAKER, EDWARD F., Marshall County (1968). Marysville.

BARBER, ARNOLD, Atchison County (1955). Effingham.

BARNES, CARL L., Clark County (1964). Ashland.

BARNES, JOHN H., Harvey County (1953, 1965). Newton.

BIBY, VIRGIL H., Rice County (1966). Lyons.

BLAIR, W. LAWRENCE, Linn County (1960, 1961). Mound City.

BLISS, FRANCIS E., Elk County (1946, 1966). Howard.

BLUME, WILLIS L., Haskell County (1948). Sublette.

BOZWORTH, ROBERT W., Franklin County (1960, 1965). Ottawa.

BRANSON, ROBERT B., Labette County (1966). Altamont.

BULK, HERBERT W., Shawnee County (1949). Topeka.

BURKHART, PEYTON H., Nemaha County (1962, 1966). Seneca.

BYARLAY, LOWELL H., Osborne County (1959, 1960). Osborne.

CARLSON, VIRGIL P., Ellsworth County (1957, 1966). Ellsworth.

CARSON, JAMES D., Stevens County (1967). Hugoton.

COX, M. LESTER, Gove County (1955, 1962). Gove.

COX, WILLIAM E., Crawford County (1957, 1958). Girard.

DAUBER, DONALD D., Hodgeman County (1968). Jetmore.
DAVIES, DAVID R., Kiowa County (1960, 1961). Greensburg.
DIEHL, JOHN R., Doniphan County (1968). Troy.
DUNAVAN, WILBUR J., Smith County (1960). Smith Center.
ETHERIDGE, RAY W., Barber County (1954, 1959). Medicine Lodge.
FINLEY, PHILIP B., Decatur County (1967). Oberlin.
FISH, G. KEITH, Trego County (1958, 1959). WaKeeney.
FORD, ROY D., Stanton County (1964). Johnson.
FROMM, KENNETH W., Mitchell County (1953, 1965). Beloit.
GEBHART, JEWELL O., Sheridan County (1945, 1963). Hoxie.
GEIST, WAYNE D., Osage County (1962, 1965). Lyndon.
GOERTZ, HARVEY E., Brown County (1937). Hiawatha.
GOLLADAY, RICHARD E., Hamilton County (1957). Syracuse.
GOTTSCH, ALBERT HAROLD, Butler County (1954, 1964). El Dorado.
GREENWOOD, WILLIAM L., Scott County (1960, 1962). Scott City.
GRIFFITH, LESTER E., Marion County (1949, 1960). Marion.
HARDING, WARREN G., Rooks County (1955). Stockton.
HARRINGTON, MAURICE C., Anderson County (1958, 1960). Garnett.
HARRIS, A. EUGENE, Meade County (1938, 1940). Meade.
HENDERSHOT, ROGER L., Harper County (1941, 1951). Anthony.
HENDERSHOT, ROYAL C., Morton County (1956, 1967). Elkhart.
HENRY, LARRY G., Cheyenne County (1956, 1966). St. Francis.
HOLLINGSWORTH, CLARENCE A., Greenwood County (1937, 1953). Eureka.
HOSIE, DARREL D., Jewell County (1968). Mankato.
JEFFREY, FORREST DUANE, Chautauqua County (1965, 1966). Sedan.
JEPSEN, DELBERT D., Russell County (1962, 1966). Russell.
JOHNSON, ARTHUR R., Jefferson County (1958, 1960). Oskaloosa.
KELLY, PAUL W., Chase County (1966, 1967). Cottonwood Falls.
KIVETT, HARRY L., Rawlins County (1957, 1966). Atwood.
KRAISINGER, WILBUR S., Pratt County (1951). Pratt.
KUBIK, RICHARD W., Thomas County (1949). Colby.
LINE, MERLIN E., Kearny County (1946, 1949). Lakin.
LINN, JACK A., Wilson County (1966). Fredonia.
LOHMANN, VERNON E., Neosho County (1968). Erie.
LOTZ, WILLIAM R., Edwards County (1964, 1967). Kinsley.
LOYD, DONALD G., Greeley County (1968). Tribune.
McKAY, BEN D., Ness County (1954, 1960). Ness City.
McWILIAMS, DONALD D., Wallace County (1956, 1966). Sharon Springs.
MADDUX, ALBERT G., Finney County (1959, 1965). Garden City.
MALEY, ALVIN E., Lyon County (1953, 1963). Emporia.
MANRY, E. CLIFFORD, Pawnee County (1940, 1947). Larned.
MARLOW, DAROLD DEAN, Wabaunsee County (1950). Alma.
MAXWELL, THOMAS R., Allen County (1954, 1956). Iola.
McCAMMON, RONALD W., Lincoln County (1968). Lincoln.
MEIREIS, CLIFFORD L., Norton County (1955, 1967). Norton.
NEILL, JOE P., Cloud County (1946, 1960). Concordia.
NELSON, ROSS M., Logan County (1959, 1966). Oakley.
NEWCOMER, GLENN A., Bourbon County (1965, 1966). Fort Scott.
NUTTELMAN, R. F., Montgomery County (1941, 1944). Independence.
ORR, BRYCE, Coffey County (1952, 1953). Burlington.
ORWIG, THOMAS W., Dickinson County (1955, 1960). Abilene.
PETERSON, DONALD K., Stafford County (1955, 1961). St. John.
PHERIGO, DAN L., Douglas County (1958, 1966). Lawrence.
PHIPPS, DONALD M., Morris County (1968). Council Grove.
PLILER, JAMES A., Lane County (1964, 1967). Dighton.
REIMER, ERVIN C., Gray County (1965, 1967). Cimarron.
ROBERTSON, JOHN F., Comanche County (1956, 1959). Coldwater.
ROLPH, RICHARD D., Saline County (1967). Salina.
ROWE, JR., SAMUEL S., Sumner County (1965). Wellington.
SALLEE, LESLIE H., Clay County (1957, 1960). Clay Center.
SCHLESENER, NORMAN E., Kingman County (1965, 1967). Kingman.
SISK, ENSLEY J., Miami County (1960). Paola.
SMITH, CHARLES W., Cowley County (1955). Winfield.
SMITH, JIMMIE W., Graham County (1958, 1966). Hill City.

SMITH, JOHN F., Leavenworth County (1956). Leavenworth.
SPENCER, ALBERT E., Pottawatomie County (1960, 1962). Westmoreland.
STAGG, BEVERLY R., McPherson County (1940, 1960). McPherson.
STRAWN, AUBREY L., Cherokee County (1962, 1966). Columbus.
STROUD, NELSON E., Geary County (1952). Junction City.
TOWNSEND, JR., LAWRENCE W., Ottawa County (1962). Minneapolis.
VAN CLEVE, JOSEPH E., Seward County (1948). Liberal.
VAN METER, EARL L., Rush County (1960, 1964). La Crosse.
WAGNER, VERNON D., Sherman County (1961, 1966). Goodland.
WALKER, JR., MARSHALL F., Grant County (1951). Ulysses.
WAREHAM, ROBERT E., Jackson County (1968). Holton.
WARY, JR., RAYMOND E., Woodson County (1958, 1960). Yates Center.
WHITE, CHARLES R., Riley County (1966, 1967). Manhattan.
WILES, DON K., Ford County (1956, 1964). Dodge City.
WILSON, JACK H., Wichita County (1951). Leoti.
WILSON, PAUL H., Barton County (1946, 1947). Great Bend.
YAUK, DON O., Phillips County (1963, 1966). Phillipsburg.

County Extension Home Economists

ADAMS, ELEANOR O., Mitchell County (1960). Beloit.
ARGANBRIGHT, MAHALA M., McPherson County (1949, 1960). McPherson.
AUGUSTINE, SANDRA L., Ellsworth County (1965). Ellsworth.
BAKER, SHIRLEY F., Jefferson County (1959, 1961). Oskaloosa.
BARNES, HELEN L., Linn County (1964). Mound City.
BERGDALL, NANCY J., Seward County (1963, 1967). Liberal.
BIEHL, FLORENCE F., Johnson County (1962). Olathe.
BLACKWOOD, HELEN H., Reno County (1960, 1962). Hutchinson.
BLATTNER, LYLA M., Rooks County (1964, 1966). Stockton.
BLEVINS, OLETHA L., Douglas County (1959). Lawrence.
BRANDEN, ELSIE PAINTER, Finney County (1955, 1961). Garden City.
BRAZLE, REBA S., Sheridan County (1967). Hoxie.
BURDEN, KAREN ANN S., Kearny County (1966). Lakin.
CAIN, MARCIA J., Saline County (1965). Salina.
CARLSON, LOIS O., Neosho County (1964). Erie.
CARR, LINDA J., Montgomery County (1963). Independence.
CLINE, LUCILE G., Pawnee County (1951, 1963). Larned.
CONLEY, JOSEPHINE, Johnson County (1955). Olathe.
CRESS, JEANICE A., Allen County (1955, 1956). Iola.
CURRIE, TRELLA, Cloud County (1955). Concordia.
DANSEL, RHODA J., Trego County (1968). Wakeeney.
DAVIS, OLIVE, Morton County (1955). Elkhart.
DAWES, MARILYN J., Gove County (1967). Gove.
DE GEER, KATHARINE A., Comanche County (1966, 1968). Coldwater.
DE LANGE, BETTY M., Bourbon County (1968). Fort Scott.
DOBSON, MARCIA E., Anderson County (1967, 1968). Garnett.
DOMSCH, L. ANN, Rawlins County (1959). Atwood.
DUERKSEN, DOROTHY M., Hodgeman County (1967). Jetmore.
DUGGAN, MARGARET H., Thomas County (1963, 1966). Colby.
EDWARDS, MARY LEE, Woodson County (1961). Yates Center.
FAIR, LINDA C., Pottawatomie County (1963, 1966). Westmoreland.
FISHER, SHARON GAY, Meade County (1959). Meade.
FREY, ALICE L., Grant County (1968). Ulysses.
GASTON, GLORIA J., Marshall County (1960). Marysville.
GEMAEHLICH, MARGARET J., Ellis County (1963, 1967). Hays.
GRABER, VIVIAN E., Kingman County (1955). Kingman.
GRIGSBY, CAROLE M., Franklin County (1966). Ottawa.
HAYES, MARY M., Smith County (1962, 1967). Smith Center.
HEINLY, FREDA K., Riley County (1957, 1968). Manhattan.
HERNDON, MAY BETH, Rush County (1953). La Crosse.
HESTER, MARION V., Barton County (1953). Great Bend.
HODGES, R. JEAN, Sedgwick County (1964). Wichita.
HOLDREN, MARY F., Jewell County (1964). Mankato.
HOWERTON, PHYLLIS Y., Reno County (1966). Hutchinson.
HUND, MARGARET ANN, Jackson County (1960). Holton.
IRVIN, VICKY N., Pratt County (1966). Pratt.

JACKSON, RUTH A., Rice County (1968). Lyons.
JOHNSON, JUANITA B., Crawford County (1948). Girard.
JOHNSTON, VIRGINIA C., Lane County (1966). Dighton.
JONES, MARY LOU, Greenwood County (1967). Eureka.
KANDT, BETTY L., Geary County (1964). Junction City.
KATZER, CAROL A., Doniphan County (1965). Troy.
KELLER, SHIRLEY D., Sherman County (1968). Goodland.
KENT, NANCY JO, Ford County (1959, 1964). Dodge City.
KINDLER, BEVERLY L., Norton County (1951, 1960). Norton.
KNIGHT, PERRY C., Sedgwick County (1965). Wichita.
KRUMSICK, MARY E., Brown County (1963, 1966). Hiawatha.
LAWLESS, VIVIAN J., Lincoln County (1964). Lincoln.
LEACH, GLINDA B., Shawnee County (1967). Topeka.
LEACH, LUCILLE H., Osborne County (1967). Osborne.
LEIKAM, ELEANORA, Gray County (1954). Cimarron.
LILAK, RITA K., Harvey County (1968). Newton.
LINDBERG, CASANDRA S., Lyon County (1966). Emporia.
LYDICK, SALLY J., Chase County (1966, 1967). Cottonwood Falls.
McKINNEY, MARJORIE H., Edwards County (1966). Kinsley.
MANINGER, SHARON H., Russell County (1966). Russell.
MANSFIELD, EVA P., Leavenworth County (1953). Leavenworth.
MEEK, MARY E., Dickinson County (1953). Abilene.
MEISINGER, JANET N., Marion County (1954). Marion.
MERIWETHER, NANCY A., Nemaha County (1958, 1960). Seneca.
MEYER, KATHERINE K., Butler County (1967). El Dorado.
MITCHELL, VIRGINIA K., Phillips County (1967). Phillipsburg.
MOLZ, DIXIE IRENE, Stafford County (1953). St. John.
MORTON, MARILYN, Stanton County (1968). Johnson.
MOSHER, SHEILA G., Hamilton County (1967). Syracuse.
MURET, JEANNE L., Republic County (1965, 1967). Belleville.
NEUSCHWANDER, OCIE A., Greeley County (1957). Tribune.
PALMER, RACHEL F., Sedgwick County (1941). Wichita.
PARTSCH, SUE L., Scott County (1967). Scott City.
PEARSON, GLENDA N., Washington County (1965, 1967). Washington.
PELTIER, STELLA A., Atchison County (1964). Effingham.
PEMBER, SHARON H., Ness County (1966). Ness City.
PILAND, JANICE, Wichita County (1968). Leoti.
PRICE, BETTY J., Wyandotte County (1961, 1963). Kansas City.
PRICE, MARJORIE E., Coffey County (1957, 1960). Burlington.
PROFFITT, JOANNA M., Rice County (1953). Lyons.
REDIKER, JANET B., Morris County (1966). Council Grove.
RICHARD, BARBARA K., Clay County (1966). Clay Center.
ROBBINS, EMILY R., Logan County (1964, 1965). Oakley.
SCHROEDER, DOROTHEA A., Wyandotte County (1942, 1943). Kansas City.
SMITH, BEVERLY B., Saline County (1961). Salina.
SPEARS, MARY CAROL B., Cowley County (1960). Winfield.
STAUTH, CAROL M., Shawnee County (1966, 1967). Topeka.
THODEN, NADA F., Miami County (1965). Paola.
THORSELL, CATHERINE, Clark County (1968). Ashland.
TOOT, JANICE, Haskell County (1966). Sublette.
TRUAX, RUBY C., Sedgwick County (1959). Wichita.
VICE, FAYE E., Labette County (1946, 1947). Altamont.
WARREN, ROSEMARY, Wilson County (1968). Fredonia.
WEAVER, MAE E., Barton County (1952). Great Bend.
WEIR, RUTH W., Douglas County (1968). Lawrence.
WILLCOCKSON, PATRICIA L., Cheyenne County (1964, 1967). St. Francis.
WILLIAMS, KAY S., Cherokee County (1961, 1965, 1967). Columbus.
WILSON, REITA B., Stevens County (1966). Hugoton.
WONER, ELIZABETH, Harper County (1949, 1950). Anthony.
YOUNG, CAROL H., Sumner County (1966, 1968). Wellington.

County Extension 4-H Agents

BACHMAN, DALE L., Kingman County (1968). Kingman.
BILES, JIMMY L., Cherokee County (1966). Cherokee.
CALDWELL, KEITH, Ellis County (1968). Hays.

CHUMBLEY, JOHN C., Sedgwick County (1967). Wichita.
CLAWSON, ELDON L., Shawnee County (1965, 1967). Topeka.
COLLINS, BILLY D., Ellsworth County (1967). Ellsworth.
DAVIDSON, LLOYD A., Saline County (1964, 1967). Salina.
DAVIS, ROBERT J., Sumner County (1967). Wellington.
DUNNING, BEVERLY K., Sedgwick County (1964). Wichita.
FLORY, JOSEPH R., Harvey County (1965). Newton.
FRICK, GALEN G., Ford County (1968). Dodge City.
GILLMORE, RALPH E., Marion County (1966). Marion.
GOTTLOB, GLENN R., Crawford County (1968). Girard.
HENSLEY, DALE, Montgomery County (1957). Independence.
HUNDLEY, JR., WILLIAM C., Butler County (1965, 1966). El Dorado.
JUSTICE, RONALD G., Wyandotte County (1968). Kansas City.
KEELER, GARRY L., Washington County (1967). Washington.
LOWRY, DAVID P., Lyon County (1968). Emporia.
MERHOFF, BILLY R., Franklin County (1966). Ottawa.
OLTMANNS, PAUL G., Rice County (1964). Lyons.
PURDY, RAY E., Greenwood County (1967). Eureka.
RECTOR, RALPH B., Leavenworth County (1949, 1956). Leavenworth.
RIAT, LARRY D., Dickinson County (1961). Abilene.
SMITH, JOSEPH M., Miami County (1967). Paola.
STUDER, RAYMOND L., McPherson County (1966). McPherson.
THOMPSON, MELVIN E., Marshall County (1967). Marysville.
UMSCHEID, JR., SYLVESTER C., Reno County (1962, 1966). Hutchinson.
UTERMOEHLEN, RALPH E., Douglas County (1964, 1965). Lawrence.
VOELKER, MARILYN, Riley County (1968). Manhattan.
WEAVER, ELDON R., Cowley County (1968). Winfield.
WOOLVERTON, MICHAEL W., Labette County (1967). Altamont.

County Extension Horticultural Agents

KIBBY, JIMMY R., Wyandotte County (1966, 1967). Kansas City.
MORRIS, MAX B., Shawnee County (1965, 1967). Topeka.
PAIR, JOHN C., Sedgwick County (1961, 1966). Wichita.
STOUSE, LAWRENCE D., Johnson County (1966). Olathe.
THOLE, H. THOMAS, Barton County (1966). Great Bend.

Division of Continuing Education

Residence Staff

BILLINGS, ADA GRACE, Professor Emeritus (1921, 1946). B. S., 1916, M. S., 1927, Kansas State University.

BOWMAKER, LEE E., Instructor; Civil Defense Training Contract (1963). B. S., 1951, Kansas State University.

DEYOE, DUANE RALPH, Instructor; Assistant Coordinator, Extension Classes (1965). B. S., 1964, Kansas State University.

HAROLD, E. NORMAN, Assistant Professor; Acting Director, Division of Continuing Education (1963, 1966). B. A., 1960, Kansas State Teachers College; M. A., 1962, Vanderbilt University.

LARSEN, EMERSON W., Itinerant Teacher; Job Training and Safety Program (1963).

LOCKE, KENNETH N., Instructor; Civil Defense Training Contract (1965). B. S., 1958, Sam Houston State College; M. A., 1964, University of Texas.

MILLER, MAX BYRON, Assistant Professor; Coordinator of Conferences and Short Courses (1946, 1964). B. S., 1946, M. S., 1950, Kansas State University.

MORDY, LUCILLE ERNA, Assistant Professor; Conferences (1947, 1966). B. S., 1928, Kansas State Teachers College (Emporia); M. S., 1951, Kansas State University.

PATTISON, FLOYD HOLMES, Professor Emeritus (1919, 1927). B. S., 1912, Kansas State University; M. S., 1929, Massachusetts Institute of Technology.

REICHOW, RONALD W., Instructor; Civil Defense Training Contract (1964). B. S., 1963, M. S., 1967, Kansas State University.

SAVAGE, RUSSELL FRANK, Itinerant Teacher; Job Training and Safety Program (1957).

SWEGLE, WILLIAM FORREST, Instructor; Coordinator, Community Services (1966). B. A., 1950, University of Kansas; M. B. A., 1965, University of Missouri at Kansas City.

WILLIAMSON, MICHAEL M., Assistant Professor; Coordinator, Extension Classes (1962, 1966). B. S., 1956, M. S., 1962, Kansas State University.

Statistical Summary for 1965-66

Students by States, Foreign Countries, and Kansas Counties

States

Alabama	9	Kentucky	11	Ohio	49
Alaska	4	Louisiana	14	Oklahoma	61
Arizona	13	Maine	4	Oregon	9
Arkansas	22	Maryland	18	Pennsylvania	60
California	85	Massachusetts	36	Puerto Rico	17
Canal Zone	1	Michigan	28	Rhode Island	8
Colorado	63	Minnesota	34	South Carolina	6
Connecticut	13	Mississippi	15	South Dakota	38
Delaware	4	Missouri	315	Tennessee	9
District of Columbia	6	Montana	8	Texas	67
Florida	18	Nebraska	165	Utah	5
Georgia	8	Nevada	4	Vermont	1
Hawaii	16	New Hampshire	7	Virginia	32
Idaho	8	New Jersey	106	Washington	11
Illinois	172	New Mexico	35	West Virginia	13
Indiana	31	New York	231	Wisconsin	51
Iowa	85	North Carolina	9	Wyoming	11
Kansas	10,426	North Dakota	10	Total	12,482

Foreign Countries and Territories Outside the Continental United States

Africa	2	Honduras	2	Philippines	22
Alberta	1	Hong Kong	9	Puerto Rico	2
Australia	1	India	110	Rizal	1
Austria	1	Indonesia	3	Rumania	1
Belgium	2	Iran	18	Saudi Arabia	1
Brazil	8	Iraq	13	South Africa	1
Cambodia	1	Israel	2	South America	1
Canada	7	Italy	1	South Rhodesia	3
China	132	Jamaica	1	Spain	1
Colombia	5	Japan	5	Sudan	2
East Africa	2	Jordan	1	Swaziland	1
East Pakistan	1	Kenya	1	Switzerland	1
Ecuador	1	Korea	6	Syria	1
Egypt	9	Lebanon	3	Taiwan	17
England	4	Malaya	1	Tanzania	3
Ethiopia	3	Mexico	7	Thailand	3
Formosa	14	Netherlands	1	Turkey	7
France	2	New Zealand	2	U. A. R.	3
Germany	9	Nicaragua	2	Uganda	1
Ghana	2	Nigeria	24	Venezuela	5
Greece	2	Ontario	2	Vietnam	1
Guatemala	1	Pakistan	11	West Indies	2
Haiti	1	Peru	2	Total	526

Kansas Counties

Allen	40	Greeley	11	Osborne	43
Anderson	38	Greenwood	37	Ottawa	61
Atchison	122	Hamilton	12	Pawnee	53
Barber	46	Harper	42	Phillips	41
Barton	183	Harvey	114	Pottawatomie	186
Bourbon	39	Haskell	18	Pratt	48
Brown	64	Hodgeman	14	Rawlins	44
Butler	104	Jackson	88	Reno	210
Chase	20	Jefferson	51	Republic	107
Chautauqua	22	Jewell	57	Rice	86
Cherokee	35	Johnson	772	Riley	1569
Cheyenne	47	Kearny	27	Rooks	41
Clark	28	Kingman	59	Rush	35
Clay	170	Kiowa	38	Russell	79
Cloud	117	Labette	50	Saline	365
Coffey	44	Lane	22	Scott	53
Comanche	15	Leavenworth	131	Sedgwick	669
Cowley	117	Lincoln	37	Seward	55
Crawford	43	Linn	33	Shawnee	392
Decatur	53	Logan	32	Sheridan	23
Dickinson	249	Lyon	57	Sherman	42
Doniphan	32	McPherson	133	Smith	67
Douglas	69	Marion	84	Stafford	56
Edwards	46	Marshall	184	Stanton	8
Elk	12	Meade	28	Stevens	15
Ellis	44	Miami	45	Sumner	98
Ellsworth	78	Mitchell	92	Thomas	65
Finney	87	Montgomery	88	Trego	23
Ford	69	Morris	77	Wabaunsee	74
Franklin	55	Morton	26	Wallace	16
Geary	341	Nemaha	116	Washington	128
Gove	18	Neosho	46	Wichita	22
Graham	12	Ness	45	Wilson	39
Grant	16	Norton	82	Woodson	18
Gray	20	Osage	66	Wyandotte	286
				Total	10,426

Statistical Summary for 1966-67

Students by States, Foreign Countries, and Kansas Counties

States

Alabama	9	Louisiana	10	Oklahoma	78
Alaska	3	Maine	2	Oregon	10
Arizona	9	Maryland	21	Pennsylvania	57
Arkansas	33	Massachusetts	47	Puerto Rico	12
California	84	Michigan	34	Rhode Island	5
Colorado	67	Minnesota	44	South Carolina	14
Connecticut	16	Mississippi	16	South Dakota	39
Delaware	5	Missouri	307	Tennessee	4
District of Columbia	8	Montana	9	Texas	60
Florida	23	Nebraska	172	Utah	7
Georgia	8	Nevada	3	Vermont	2
Hawaii	21	New Hampshire	3	Virginia	30
Idaho	9	New Jersey	131	Washington	15
Illinois	178	New Mexico	28	West Virginia	8
Indiana	24	New York	274	Wisconsin	48
Iowa	90	North Carolina	11	Wyoming	10
Kansas	10,965	North Dakota	10		
Kentucky	9	Ohio	58	Total	13,140

Foreign Countries and Territories Outside the Continental United States

Australia	1	India	99	Rhodesia	1
Austria	2	Iran	14	Saudi Arabia	1
Belgium	1	Iraq	4	South Africa	1
Brazil	6	Ireland	1	Spain	2
British Honduras	1	Israel	2	Sudan	1
Cambodia	1	Japan	4	Swaziland	1
Canada	13	Jordan	1	Switzerland	2
Ceylon	1	Kenya	3	Syria	1
China	155	Korea	11	Tanzania	1
Colombia	5	Lebanon	3	Thailand	5
Cyprus	1	Malaysia	2	Turkey	3
Denmark	1	Mexico	4	U. A. R.	2
Ecuador	2	Netherlands	1	Uganda	5
Egypt	5	Nicaragua	1	United Kingdom	5
Ethiopia	4	Nigeria	18	Venezuela	5
France	1	Pakistan	15	West Africa	1
Germany	9	Peru	1	West Indies	1
Ghana	2	Philippines	19	Zanzibar	1
Greece	1	Poland	1		
Guatemala	1	Portugal	1	Total	457

Kansas Counties

Allen	36	Greenwood	47	Pawnee	57
Anderson	43	Hamilton	8	Phillips	52
Atchison	138	Harper	44	Pottawatomie	189
Barber	53	Harvey	103	Pratt	41
Barton	187	Haskell	15	Rawlins	61
Bourbon	37	Hodgeman	13	Reno	200
Brown	84	Jackson	105	Republic	125
Butler	102	Jefferson	49	Rice	78
Chase	26	Jewell	50	Riley	1713
Chautauqua	31	Johnson	843	Rooks	46
Cherokee	33	Kearny	24	Rush	33
Cheyenne	49	Kingman	50	Russell	84
Clark	26	Kiowa	26	Saline	380
Clay	178	Labette	58	Scott	63
Cloud	127	Lane	22	Sedgwick	655
Coffey	44	Leavenworth	150	Seward	62
Comanche	10	Lincoln	34	Shawnee	393
Cowley	130	Linn	34	Sheridan	36
Crawford	37	Logan	32	Sherman	45
Decatur	43	Lyon	74	Smith	74
Dickinson	266	McPherson	124	Stafford	62
Doniphan	37	Marion	89	Stanton	13
Douglas	76	Marshall	194	Stevens	19
Edwards	42	Meade	37	Sumner	88
Elk	16	Miami	56	Thomas	73
Ellis	48	Mitchell	88	Trego	25
Ellsworth	64	Montgomery	103	Wabaunsee	77
Finney	78	Morris	78	Wallace	17
Ford	80	Morton	20	Washington	133
Franklin	51	Nemaha	143	Wichita	19
Geary	368	Neosho	48	Wilson	43
Gove	26	Ness	52	Woodson	11
Graham	21	Norton	68	Wyandotte	289
Grant	19	Osage	77		
Gray	22	Osborne	48	Total	10,965
Greeley	12	Ottawa	63		

Degrees Conferred in the Year 1966

College or School	Men	Women	Total
College of Agriculture	150		150
Agriculture	132		132
Feed Technology	12		12
Milling Technology	6		6
College of Architecture and Design	57	1	58
Architecture	31	1	32
Architectural Engineering	8		8
Landscape Architecture	18		18
College of Arts and Sciences	340	176	516
Bachelor of Arts	127	104	231
Bachelor of Science	175	51	226
Music Education	8	9	17
Bachelor of Music	1		1
Physical Education	29	12	41
College of Commerce	152	10	162
Business Administration	152	10	162
College of Education	67	215	282
Bachelor of Science	54	49	103
Elementary Education	13	166	179
College of Engineering	202		202
Agricultural Engineering	6		6
Chemical Engineering	16		16
Civil Engineering	26		26
Electrical Engineering	72		72
Industrial Engineering	10		10
Mechanical Engineering	50		50
Nuclear Engineering	22		22
College of Home Economics		138	138
Home Economics		132	132
Home Economics and Journalism		5	5
Restaurant Management		1	1
College of Veterinary Medicine	74	2	76
Veterinary Medicine	74	2	76
Graduate School (Master of Architecture)	5	1	6
Graduate School (Master of Arts)			
Art	4		4
Economics	5		5
English	4	6	10
History	4	3	7
Mathematics	1		1
Modern Language		3	3
Philosophy	1		1
Political Science	7	1	8
Sociology	1	1	2
Speech	7	4	11
Graduate School (Master of Regional Planning)	4		4
Graduate School (Master of Science)			
Accounting			
Agricultural Economics	7		7
Agricultural Education	11		11
Agricultural Engineering	1		1
Agronomy	11		11
Anatomy	1		1
Animal Husbandry	13		13
Applied Mechanics	1		1
Bacteriology	5	2	7
Biochemistry	3		3
Botany	2		2
Business Administration	5	1	6
Chemical Engineering	3		3
Chemistry	3		3
Civil Engineering	8		8
Clothing and Textiles		6	6
Dairy Foods Processing	1		1
Dairy Production	1		1
Education	30	9	39
Electrical Engineering	24		24

Degrees Conferred in the Year 1966—Concluded

College or School	Men	Women	Total
Entomology	6		6
Family and Child Development	1	4	5
Family Economics		1	1
Farm Mechanics	2		2
Feed Science and Management	2		2
Foods and Nutrition		2	2
General Home Economics		1	1
Genetics	1		1
Geology	3		3
Home Economics Education		1	1
Horticulture	4		4
Industrial Engineering	11		11
Institutional Management	1	7	8
Mathematics	9	2	11
Mechanical Engineering	17		17
Milling Industry	1	2	3
Music	3	1	4
Nuclear Engineering	7		7
Parasitology	3		3
Pathology	3		3
Physical Education	19		19
Physics	7		7
Physiology		1	1
Plant Pathology	1		1
Poultry Science	1		1
Psychology	15		15
Statistics	10	2	12
Surgery and Medicine	2		2
Technical Journalism	1		1
Zoology	7	3	10
Graduate School (Doctor of Philosophy)			
Agricultural Economics	1		1
Agronomy	3		3
Animal Breeding	3		3
Animal Nutrition	2		2
Applied Mechanics	3		3
Bacteriology	2		2
Chemical Engineering	2		2
Chemistry	22		22
Electronics	1		1
English	369	61	430
Entomology	5	1	6
Foods and Nutrition		1	1
Horticulture	1		1
Mechanical Engineering	6		6
Milling Industry	7		7
Parasitology	1		1
Pathology	1		1
Physics	1		1
Physiology	2		2
Plant Pathology			
Psychology	5		5
Grand Total	1,411	603	2,014

Degrees Conferred in the Year 1967

College or School	Men	Women	Total
College of Agriculture	188	5	193
Agriculture	162	4	166
Bakery Management	5		5
Biochemistry		1	1
Feed Technology	13		13
Milling Technology	8		8
College of Architecture and Design	68		68
Architecture	43		43
Architectural Engineering	13		13
Landscape Architecture	12		12
College of Arts and Sciences	378	145	523
Bachelor of Arts	146	95	241
Bachelor of Science	195	29	224
Bachelor of Music		3	3
Music Education	3	9	12
Physical Education	34	9	43
College of Education	39	203	242
Bachelor of Science	29	65	94
Elementary Education	10	138	148
College of Commerce	154	14	168
Business Administration	154	14	168
College of Engineering	177		177
Agricultural Engineering	17		17
Chemical Engineering	12		12
Civil Engineering	25		25
Electrical Engineering	51		51
Industrial Engineering	11		11
Mechanical Engineering	43		43
Nuclear Engineering	18		18
College of Home Economics	3	140	143
Home Economics		136	136
Home Economics and Journalism		4	4
Restaurant Management	3		3
College of Veterinary Medicine	68	1	69
Veterinary Medicine	68	1	69
Graduate School (Master of Architecture)	2		2
Graduate School (Master of Arts)			
Art	1	1	2
Economics	8	1	9
English	5	7	12
Geography	3		3
History	7	1	8
Mathematics	1	1	2
Philosophy	3		3
Political Science	4		4
Sociology	2	2	4
Speech	8	7	15
Graduate School (Master of Regional Planning)	2		2
Graduate School (Master of Science)			
Accounting			
Agricultural Economics	11		11
Agricultural Education	11		11
Agricultural Engineering	2		2
Agronomy	12		12
Anatomy	2		2
Animal Husbandry	7		7
Applied Mechanics	2		2
Architectural Engineering	2		2
Bacteriology	7		7
Biochemistry	2		2
Botany	4		4
Business Administration	2		2
Chemical Engineering	6		6
Chemistry	3		3
Civil Engineering	16		16
Clothing and Textiles		11	11
Dairy Foods Processing	1	1	2

Degrees Conferred in the Year 1967—Concluded

College or School	Men	Women	Total
Education	28	17	45
Electrical Engineering	9	1	10
Entomology	6		6
Extension Education	3	1	4
Family and Child Development		5	5
Family Economics	1	5	6
Feed Technology	3		3
Food Science	1		1
Foods and Nutrition		9	9
General Home Economics	1		1
Genetics	4	1	5
Geology	4		4
Home Economics Education		2	2
Horticulture	9		9
Industrial Education	1		1
Industrial Engineering	19		19
Institutional Management		3	3
Landscape Architecture	1		1
Mathematics	5	1	6
Mechanical Engineering	19		19
Milling Industry	5	1	6
Music	1		1
Nuclear Engineering	6		6
Pathology	2		2
Physical Education	8	3	11
Physics	8		8
Physiology	2		2
Plant Pathology	2	1	3
Poultry Science	2		2
Psychology	9	2	11
Statistics	15	3	18
Surgery and Medicine	5		5
Technical Journalism	2		2
Zoology	10	1	11
Graduate School (Doctor of Philosophy)			
Agricultural Economics	2		2
Agronomy	4		4
Animal Breeding	1		1
Animal Nutrition	3		3
Applied Mechanics	3		3
Bacteriology	3	1	4
Biochemistry	3		3
Botany	1		1
Chemical Engineering	3		3
Chemistry	12	1	13
Economics	1		1
Electronics	1		1
English	1		1
Entomology	9		9
Foods and Nutrition		1	1
Genetics	1		1
History	1		1
Horticulture	2		2
Mechanical Engineering	2		2
Milling Industry	2		2
Parasitology	1		1
Pathology	1		1
Physics	4		4
Plant Pathology	5		5
Psychology	1		1
Statistics	1		1
Zoology	1		1
Grand Total	1,459	607	2,066

Tabulation for First Semester 1965-66

COLLEGE OF AGRICULTURE

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Agriculture	224	16	136	9	113	4	116	2	(4)	(1)	593	32	625
Agricultural Economics	23		23		27		22		(2)		97		97
Agricultural Education	20		31		21		35		(2)		109		109
Bakery Science and Mngt.	15		10		1		3		(1)		30		30
Dairy Foods Processing	4		2		4		10				20		20
Feed Science and Mngt.	15		11		10		24				60		60
Flour Science and Mngt.	14		7		9		9				39		39
Special Students									3	1	3	1	4
TOTAL	315	16	220	9	185	4	219	2	(9)3	(1)1	951	33	984

COLLEGE OF ARCHITECTURE AND DESIGN

	Freshmen 1st Year		Sopho-mores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Architectural Engineering	33		15		18		19	1			(1)		86	1	87
Architecture	149	2	97	4	71	3	63	1	50	1	(6)		436	11	447
Landscape Architecture	14	2	11	1	13		25				(2)		65	3	68
TOTAL	196	4	123	5	102	3	107	2	50	1	(9)		587	15	602

COLLEGE OF ARTS AND SCIENCES

	Freshmen		Sopho-mores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Biological Science	52	17	47	10	42	3	58	12	(2)		201	42	243
Humanities	33	79	23	67	26	59	22	49	(4)		108	254	362
Physical Science	84	16	59	15	42	10	73	13	(1)		259	54	313
Social Science	63	63	76	55	63	27	67	20	(3)	(2)	272	167	439
Professional and Pre-Professional	437	362	305	98	95	53	103	41	(10)	(3)	950	557	1507
General	230	160	119	80	37	12	9	6	(3)	(4)	398	262	660
Special Students									31	59	31	59	90
TOTAL	899	697	629	325	305	164	332	141	(23)31	(9)59	2219	1395	3614

COLLEGE OF COMMERCE

Business Administration	133	27	102	21	117	12	107	8	(6)		465	68	533
Accounting	50	10	49	7	43	9	49	3	(1)		192	29	221
Special Students									6	4	6	4	10
TOTAL	183	37	151	28	160	21	156	11	(7)6	4	663	101	764

COLLEGE OF EDUCATION

Elementary Education	1	11	6	134	7	143	15	156		(3)1	29	448	477
Secondary Education													
Art				9	5	5	4	3			9	17	26
Business	2	8	1	11	3	16	4	17			10	52	62
English and Journalism		1	5	17	4	12	4	10	(1)	(2)	14	42	56
Industrial Arts			7		4		6				17		17
Mathematics	1		13	6	3	3	8	5	(1)		26	14	40
Modern Language		2	2	2	1	5	1	2		(1)	4	12	16
Psychology			3	2	4	1					7	3	10
Science	1		4	3	10	6	20	5			35	14	49
Social Science		1	12	7	11	7	24	6	(1)		48	21	69
Speech		1		8	1	7	2	5			3	21	24
General			4	2		1	1	2			5	5	10
Special Students									2	9	2	9	11
TOTAL	5	24	57	201	53	206	89	211	(3)2	(6)9	209	658	867

COLLEGE OF ENGINEERING

Agricultural Engineering	25		14		7		20				66		66
Chemical Engineering	37		28	2	26		25				116	2	118
Civil Engineering	87	1	37		40		44		(3)		409		409
Electrical Engineering	122		87		79		119		(2)		409		409
Industrial Engineering	19		15		13		15				62		62
Mechanical Engineering	112		58		49		82		(1)		302		302
Nuclear Engineering	32	1	35		23		41		(2)		133	1	134
Special Students									1		1		1
TOTAL	434	2	274	2	237		346		(8)1		1300	4	1304

Tabulation for First Semester 1965-66—Concluded

COLLEGE OF HOME ECONOMICS

	Freshmen		Sopho-mores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Home Economics	2	324	2	200	.....	140	1	118	(1)	(4)	6	786	792
Dietetics and Inst. Mngt.	1	12	.....	5	.....	10	.....	10	.....	.....	1	37	38
Home Econ. and Journ.	.....	13	.....	12	.....	2	.....	5	.....	.....	.....	32	32
Home Econ. and Nursing	.....	46	.....	31	.....	8	.....	.....	.....	.....	.....	85	85
Restaurant Management	6	1	.....	.....	2	.....	.....	1	.....	.....	8	2	10
Special Students	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	.....	11	11
TOTAL	9	396	2	248	2	160	1	134	(1)	(4)11	15	953	968

COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine	71	5	73	4	68	3	74	2	.....	.....	286	14	300

SUMMARY

	Freshmen 1st Year		Sopho-mores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Undergraduate	2041	1176	1456	818	1115	563	1323	505	192	6	(24)79	(13)92	6230	3173	9403
Graduate Shool	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1037	241	1278
Evening on Campus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	108	131	239
TOTAL	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7375	3545	10920

Tabulation for Second Semester 1965-66

COLLEGE OF AGRICULTURE

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Agriculture	223	16	125	7	118	6	88	2	(5)	(1)	559	32	591
Agricultural Economics	18		41		29		15		(2)		105		105
Agricultural Education	20		35		21		25		(2)		103		103
Bakery Management	13		6		3		3				25		25
Dairy Foods Processing	3		2		3		9				17		17
Feed Science and Mngt.	13		8		11		21				53		53
Flour Science and Mngt.	11		7		11		4				33		33
Special Students									3		3		3
TOTAL	301	16	224	7	196	6	165	2	(9)3	(1)	898	32	930

COLLEGE OF ARCHITECTURE AND DESIGN

	Freshmen 1st Year M	Freshmen 1st Year W	Sophomores 2nd Year M	Sophomores 2nd Year W	Juniors 3rd Year M	Juniors 3rd Year W	Seniors 4th Year M	Seniors 4th Year W	5th & 6th Years M	5th & 6th Years W	Specials (Prov.) M	Specials (Prov.) W	Totals M	Totals W	Total
Architectural Engineering	18		11		13		16	1	1				59	1	60
Architecture	125	1	94	2	73	3	60	1	37		(4)		393	7	400
Landscape Architecture	10	3	9	1	14		22		1		(1)		57	4	61
Building Construction	3		2		2		1						8		8
TOTAL	156	4	116	3	102	3	99	2	39		(5)		517	12	529

COLLEGE OF ARTS AND SCIENCES

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Biological Science	45	15	42	9	48	2	52	15	(4)		191	41	232
Humanities	35	77	24	72	37	65	25	46	(1)	(4)	122	264	386
Physical Science	74	14	61	17	48	8	73	11	(3)		259	50	309
Social Science	72	54	77	52	73	35	48	18	(3)	(5)	273	164	437
Professional and Pre-Professional	385	336	283	103	99	49	94	36	(11)	(10)	872	534	1406
General	209	153	103	55	19	9	6	3	(3)	(4)	340	224	564
Special Students									25	67	25	67	92
TOTAL	820	649	596	308	324	168	292	129	(25)25	(23)67	2082	1344	3426

COLLEGE OF COMMERCE

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Business Administration	149	32	106	25	120	13	79	5	(5)	(5)	459	80	539
Accounting	48	6	49	11	47	4	36	2	(7)	(1)	187	24	211
Special Students									2	3	2	3	5
TOTAL	197	38	155	36	167	17	115	7	(12)2	(6)3	648	107	755

COLLEGE OF EDUCATION

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Elementary Education		4	8	140	8	148	13	127		(5)	29	424	453
Secondary Education													
Art				9	4	5	2	2			6	16	22
Business		1	2	9	1	19	3	13			6	42	48
English and Journalism	1	1	4	14	3	12	3	8			11	35	46
Industrial Arts			7		4		4				15		15
Mathematics			12	2	4	3	9	3			25	8	33
Modern Language		1	2	3	1	7	1	2			4	13	17
Psychology			3	2	3	1					6	3	9
Science	2		7	4	8	6	13	4			30	14	44
Social Science			14	8	10	9	15	5			39	22	61
Speech				6	2	11	2	5			4	22	26
General			3	1		2	1	1			4	4	8
Special Students									8		8		8
TOTAL	3	7	62	198	48	223	66	170	8	(5)	179	611	790

Tabulation for Second Semester 1965-66—Concluded

COLLEGE OF ENGINEERING

Agricultural Engineering	21		8		9		17				55			55
Chemical Engineering	36		25		22		21				104			104
Civil Engineering	61	1	34		41		30		(3)		169	1		170
Electrical Engineering	100		78		65		93		(3)		339			339
Industrial Engineering	19		12		13		10				54			54
Mechanical Engineering	83		57		51		62				253			253
Nuclear Engineering	29	1	24		21		37		(1)		112	1		113
Special Students									2		2			2
TOTAL	349	2	238		222		270		(7)2		1088	2		1090

COLLEGE OF HOME ECONOMICS

Home Economics	3	302		183	1	130	1	105		(7)	5	727		732
Dietetics and Inst. Mngt.		13		5		8		10				36		36
Home Econ. and Journ.		14		9		2		2				27		27
Home Econ. and Nursing		40		18		6						64		64
Restaurant Management	6	1	1		2					9		9		9
Special Students											9	1		10
TOTAL	9	370	1	215	3	146	1	117		(7)9	14	864		878

COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine	73	5	75	5	67	2	74	2			289	14		303

SUMMARY

	Freshmen 1st Year		Sophomores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Undergraduate	1835	1086	1392	767	1135	568	1083	432	180	4	(48)42	(39)90	5715	2986	8701
Graduate School													1077	257	1334
Evening on Campus													59	106	165
TOTAL													6851	3349	10200

Tabulation for Summer School 1966

COLLEGE OF AGRICULTURE

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Agriculture	36	1	19	1	27	3	11	2	(2)		95	7	102
Agricultural Economics	2		2		4		2		(1)		11		11
Agricultural Education	1		1		3		2				7		7
Bakery Science and Mngt.					1		2				3		3
Dairy Foods Processing			1		1		2				4		4
Feed Science and Mngt.	2				2		4				8		8
Flour Science and Mngt.	1				1		3				5		5
Special Students									7		7		7
TOTAL	42	1	23	1	39	3	26	2	(3)7		140	7	147

COLLEGE OF ARCHITECTURE AND DESIGN

	Freshmen 1st Year		Sophomores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Architectural Engineering					3		4	1					7	1	8
Architecture	19	1	7	2	15	1	23		12		(2)6		84	4	88
Landscape Architecture		1	2	1	4		9						15	2	17
Building Construction	3		2				1						6		6
TOTAL	22	2	11	3	22	1	37	1	12		(2)6		112	7	119

COLLEGE OF ARTS AND SCIENCES

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Biological Science	16	4	9	4	15		9	2	(2)		51	10	61
Humanities	10	29	10	23	9	25	8	8		(2)	37	87	124
Physical Science	16	6	11	6	12	3	24		(4)		67	15	82
Social Science	11	13	22	19	31	15	12	3	(2)	(1)	78	51	129
Professional and Pre-Professional	84	106	40	40	28	13	11	5	(2)	(1)	165	165	330
General	45	56	13	8	3	3	4		(1)	(3)	66	70	136
Special Students									61	91	61	91	152
TOTAL	182	214	105	100	98	59	68	18	(11)61	(7)91	525	489	1014

COLLEGE OF COMMERCE

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Business Administration	25	10	16	12	39	3	16	1	(4)	(1)	100	27	127
Accounting	9	3	11	3	8	3	7	1			35	10	45
Special Students									6	5	6	5	11
TOTAL	34	13	27	15	47	6	23	2	(4)6	(1)5	141	42	183

COLLEGE OF EDUCATION

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Elementary Education			3	46	4	65	5	42	(1)	(6)	13	159	172
Secondary Education													
Art				2	1	2		1	(1)		2	5	7
Business			1	4		11	1	2			2	17	19
English and Journalism	1			4		7		2		(1)	1	14	15
Industrial Arts			1		2		2		(1)		6		6
Mathematics			1		2						3		3
Modern Language			2	1	2	6		1			4	8	12
Psychology				1	1						1	1	2
Science			1	2	4	4	2	1			7	7	14
Social Science	1		3	4	6	2	5	3	(1)		16	9	25
Speech				2		3		4				9	9
General													
Special Students									3	16	3	16	19
TOTAL	2		12	66	22	100	15	56	(4)3	(7)16	58	245	303

COLLEGE OF ENGINEERING

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Agricultural Engineering	4				2		1				7		7
Chemical Engineering	4		4		6		3		(2)		20		20
Civil Engineering	10		5		7		9		(1)		32		32
Electrical Engineering	27		12		27		21				87		87
Industrial Engineering	2		2		1						5		5
Mechanical Engineering	12		7		9		11				39		39
Nuclear Engineering	5		10		6		11		(1)		33		33
Special Students									5		5		5
TOTAL	64		40		58		57		(4)5		228		228

Tabulation for Summer School 1966—Concluded

COLLEGE OF HOME ECONOMICS

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Home Economics		72	1	51		70	1	14		(8)	2	215	217
Dietetics and Inst. Mngt.		5		2		2		3		(1)		13	13
Home Econ. and Journ.		1		2		2						5	5
Home Econ. and Nursing		13		8						(2)		23	23
Restaurant Management	2		1								3		3
Special Students									2	51	2	51	53
TOTAL	2	91	2	63		74	1	17	2	(11)51	7	307	314

COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine	20		2	1	1						23	1	24

SUMMARY

	Freshmen 1st Year		Sophomores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Undergraduate	348	321	220	248	306	243	229	96	13		(28)90	(26)163	1234	1097	2331
Graduate School													999	440	1439
Evening on Campus													50	52	102
TOTAL													2283	1589	3872

NEW AND DIFFERENT STUDENTS ENROLLED FOR FIRST AND SECOND SEMESTER AND SUMMER SESSION

Freshmen	3811
Sophomores	2515
Juniors	1869
Seniors	1919
5th and 6th Years	53
Provisional and Special	508
Graduate	2333
TOTAL	13008

Tabulation for First Semester 1966-67

COLLEGE OF AGRICULTURE

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Agriculture	232	13	170	14	132	5	153	5	(10)	(1)	702	38	735
Agricultural Economics	14		24		42		35		(1)		116		116
Agricultural Education	24		24		36		22		(1)		107		107
Bakery Management	16	1	11		5		5				37	1	38
Dairy Foods Processing	2		3		5		8				18		18
Feed Science and Mngt.	9		10		6		19				44		44
Flour Science and Mngt.	5		8		8		12				33		33
Special Students									5		5		5
TOTAL	302	14	250	14	234	5	254	5	(12)5	(1)	1057	39	1096

COLLEGE OF ARCHITECTURE AND DESIGN

	Freshmen 1st Year M	Freshmen 1st Year W	Sophomores 2nd Year M	Sophomores 2nd Year W	Juniors 3rd Year M	Juniors 3rd Year W	Seniors 4th Year M	Seniors 4th Year W	5th & 6th Years M	5th & 6th Years W	Specials (Prov.) M	Specials (Prov.) W	Totals M	Totals W	Total
Architectural Engineering	2		9		1		19		1				32		32
Architecture	133	2	117	4	75	2	50	2	71	1	(5)1	(1)	452	12	464
Landscape Architecture	12		12	4	12	2	18						54	6	60
Building Construction	8		11		4		3						26		26
TOTAL	155	2	149	8	92	4	90	2	72	1	(5)1	(1)	564	18	582

COLLEGE OF ARTS AND SCIENCES

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Biological Science	56	13	54	12	38	9	63	3	(3)	(3)	214	40	254
Humanities	36	82	34	70	25	60	32	48	(4)	(7)	131	267	398
Physical Science	88	19	77	12	56	13	76	8	(1)	(2)	298	54	352
Social Science	57	65	88	52	82	53	79	33	(2)	(4)	308	207	515
Professional and Pre-Professional	396	356	375	320	101	77	96	34	(19)	(14)	960	801	1761
General	211	196	129	96	44	22	11	4	(7)	(2)	402	320	722
Special Students									28	78	28	78	106
TOTAL	817	731	757	562	346	234	357	130	(36)28	(32)78	2431	1767	4108

COLLEGE OF COMMERCE

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Business Administration	135	36	136	38	99	16	123	14	(8)	(1)	501	105	606
Accounting	51	7	54	7	45	11	46	2	(3)		199	27	226
Special Students									2	6	2	6	8
TOTAL	186	43	190	45	144	27	169	16	(11)2	(1)6	702	138	840

COLLEGE OF EDUCATION

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Elementary Education		2	2	26	8	150	12	143	(2)	(4)	24	325	349
Secondary Education													
Art			1	2	1	7	3	7			5	16	21
Business				4	2	9	2	20			4	33	37
English and Journalism				5	1	16	2	8			3	29	32
Industrial Arts					6		7		(1)		14		14
Mathematics			2		15	6	5	2			22	8	30
Modern Language				1	1	3	3	8			4	12	16
Psychology				1		2	3	1			3	4	7
Science			2	1	12	7	9	8			23	16	39
Social Science			9		16	14	14	6	(1)	(1)	40	21	61
Speech		1	1	1		7	3	12			4	21	25
General					1						1		1
Special Students									4	8	4	8	12
TOTAL		3	17	41	63	221	63	215	(4)4	(5)8	151	493	644

COLLEGE OF ENGINEERING

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Agricultural Engineering	20		17		11		22		(1)		71		71
Chemical Engineering	29	1	34		23	1	28				114	2	116
Civil Engineering	67	1	52	2	49	2	49		(2)		219	5	224
Electrical Engineering	100	1	90		76		98		(5)		369	1	370
Industrial Engineering	17	1	16		14		15				62	1	63
Mechanical Engineering	101	1	81		58	1	69		(4)		313	2	315
Nuclear Engineering	35	1	31		19		32		(1)		118	1	119
Special Students									9		9		9
TOTAL	369	6	321	2	250	4	313		(13)9		1275	12	1287

Tabulation for First Semester 1966-67—Concluded

COLLEGE OF HOME ECONOMICS

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	f	W	M	W	Total
Home Economics	3	335	8	280	.....	145	2	127	.....	(14)	13	901	914
Dietetics and Inst. Mngt.	.....	8	1	13	1	7	1	6	.....	.....	3	34	37
Home Econ. and Journ.	.....	11	.....	19	.....	3	.....	4	.....	(1)	.....	29	29
Home Econ. and Nursing	.....	19	.....	21	.....	3	.....	.....	.....	.....	.....	43	43
Restaurant Management	3	.....	4	.....	5	.....	3	.....	.....	.....	15	.....	15
Special Students	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	.....	7	7
TOTAL	6	373	13	324	6	158	6	137	.....	(15)7	31	1014	1045

COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine	80	1	74	5	72	5	67	2	.....	.....	293	13	306

SUMMARY

	Freshmen 1st Year		Sophomores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Undergraduate	1835	1172	1697	996	1215	654	1326	510	211	8	(81)49	(55)99	6414	3494	9908
Graduate School	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1054	323	1377
TOTAL	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7468	3817	11285

Tabulation for Second Semester 1966-67

COLLEGE OF AGRICULTURE

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Agriculture	215	10	184	15	132	5	101	3	(22)		654	33	687
Agricultural Economics	18		28		48		28		(6)		128		128
Agricultural Education	24		22		31		20		(2)		99		99
Bakery Management	10		12		4		3				29		29
Dairy Foods Processing	2		2		3		4				11		11
Feed Science and Mngt.	8		9		6		10				33		33
Flour Science and Mngt.	6		7		7		12				32		32
Special Students									4		4		4
TOTAL	283	10	264	15	231	5	178	3	(30)4		990	33	1023

COLLEGE OF ARCHITECTURE AND DESIGN

	Freshmen 1st Year M	Freshmen 1st Year W	Sophomores 2nd Year M	Sophomores 2nd Year W	Juniors 3rd Year M	Juniors 3rd Year W	Seniors 4th Year M	Seniors 4th Year W	5th & 6th Years M	5th & 6th Years W	Specials (Prov.) M	Specials (Prov.) W	Totals M	Totals W	Total
Architectural Engineering															
Architecture	107	4	118	2	69	1	68	2	61	1	(7)1	(1)	431	11	442
Landscape Architecture	13		11	3	11	1	18				(3)		56	4	60
Building Construction	8		13		5		3				(1)		30		30
TOTAL	128	4	142	5	85	2	89	2	61	1	(11)1	(1)	517	15	532

COLLEGE OF ARTS AND SCIENCES

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Biological Science	42	12	51	9	39	12	51	3	(5)	(2)	188	38	226
Humanities	25	80	30	82	26	51	30	37	(4)	(11)	115	261	376
Physical Science	78	13	72	9	58	14	59	9	(7)	(3)	274	48	322
Social Science	59	63	94	53	87	55	60	27	(12)	(9)	312	207	519
Professional and Pre-Professional	327	336	333	322	95	69	68	24	(31)	(26)	854	777	1631
General	203	193	98	61	27	16	11	4	(8)	(6)	347	280	627
Special Students									30	79	30	79	109
TOTAL	734	697	678	536	332	217	279	104	(62)30	(51)79	2120	1690	3810

COLLEGE OF COMMERCE

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Business Administration	116	34	137	28	102	13	97	11	(10)		462	86	548
Accounting	44	7	58	8	44	10	37	2	(7)	(1)	190	28	218
Special Students									3	3	3	3	6
TOTAL	160	41	195	36	146	23	134	13	(17)3	(1)3	655	117	772

COLLEGE OF EDUCATION

	Freshmen M	Freshmen W	Sophomores M	Sophomores W	Juniors M	Juniors W	Seniors M	Seniors W	(Prov.) Specials M	(Prov.) Specials W	Totals M	Totals W	Total
Elementary Education		1	2	23	6	151	4	109		(9)	12	293	305
Secondary Education													
Art			1	4	2	6		5			3	15	18
Business			1	6	2	10		18			3	34	37
English and Journalism				3	1	16	2	8	(2)		5	27	32
Industrial Arts			1		5		4				10		10
Mathematics			2		14	6	3	1			19	7	26
Modern Language				1	1	3	1	6		(1)	2	11	13
Psychology			1	2	1	1	4	1			6	4	10
Science			2	1	11	7	6	5			19	13	32
Social Science			6		17	13	8	5		(3)	31	21	52
Speech			1	1		3	1	9			2	13	15
General													
Special Students									1	7	1	7	8
TOTAL		1	17	41	60	216	33	167	(2)1	(13)7	113	445	558

Tabulation for Second Semester 1966-67—Concluded

COLLEGE OF ENGINEERING

	Freshmen		Sopho-mores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Agricultural Engineering	18		16		11		14				59		59
Chemical Engineering	28	1	26		19		24		(2)		99	1	100
Civil Engineering	57		42	1	49		45		(6)		199	1	200
Electrical Engineering	94	1	82		77		75		(4)		332	1	333
Industrial Engineering	20	1	15		12		13		(2)		62	1	63
Mechanical Engineering	90		75		53		54		(4)		276		276
Nuclear Engineering	33	1	22		18		23		(2)		98	1	99
Special Students									2	1	2	1	3
TOTAL	340	4	278	1	239		248		(20) 2	1	1127	6	1163

COLLEGE OF HOME ECONOMICS

Home Economics	3	320	2	264		142	2	92		(14)	7	832	839
Dietetics and Inst. Mngt.		9	1	17	1	7	1	6			3	39	42
Home Econ. and Journ.		12		10		5		4				31	31
Home Econ. and Nursing		16		18		2				(1)		37	37
Restaurant Management	3		3		5		1				12		12
Special Students										8		8	8
TOTAL	6	357	6	309	6	156	4	102		(15) 8	22	947	969

COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine	79	1	70	5	72	5	67	2			288	13	301

SUMMARY

	Freshmen 1st Year		Sopho-mores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Undergraduate	1651	1114	1580	943	1178	620	1035	396	200	8	(147) 41	(87) 98	5832	3266	9098
Graduate Shool													1041	307	1348
TOTAL													6873	3573	10446

Tabulation for Summer School 1967

COLLEGE OF AGRICULTURE

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Agriculture	17	6	26	1	26	2	14	1	(7)		90	10	100
Agricultural Economics	2		3		5		3		(1)		14		14
Agricultural Education	1				2		2				5		5
Bakery Science	3				1						4		4
Dairy Foods Processing			1								1		1
Feed Science and Mngt.			1		1		2				4		4
Flour Science and Mngt.	2				1		2				5		5
Special Students									3	1	3	1	4
TOTAL	25	6	31	1	36	2	23	1	(8)3	1	126	11	137

COLLEGE OF ARCHITECTURE AND DESIGN

	Freshmen 1st Year		Sophomores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Architectural Engineering							1						1		1
Architecture	10		15		17		27	1	25		(3)2	(1)	99	2	101
Landscape Architecture	4		1		2	1	8						15	1	16
Building Construction	1		3		2		1				(1)		8		8
TOTAL	15		19		21	1	37	1	25		(4)2	(1)	123	3	126

COLLEGE OF ARTS AND SCIENCES

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Biological Science	10	3	9	1	5	2	11	2	(1)	(1)	37	9	46
Humanities	4	29	9	22	4	16	1	6	(1)	(5)	19	78	97
Physical Science	28	8	11	4	22	7	13	3			74	22	96
Social Science	13	20	17	11	30	15	13	3	(4)	(5)	77	54	131
Professional and Pre-Professional	43	100	38	45	20	26	14	5	(3)	(6)	118	182	300
General	33	48	5	9	8	7	6	2	(3)		55	66	121
Special Students									62	90	62	90	152
TOTAL	131	208	89	92	90	73	58	21	(12)62	(17)90	442	501	943

COLLEGE OF COMMERCE

Business Administration	19	8	16	3	29	4	28	6	(3)		95	21	116
Accounting	6	3	7	2	13	6	6	1	(1)	(1)	33	13	46
Special Students									3	1	3	1	4
TOTAL	25	11	23	5	42	10	34	7	(4)3	(1)1	131	35	166

COLLEGE OF EDUCATION

Elementary Education		1		35	2	57	3	23		(7)	5	123	128
Secondary Education													
Art			1	1	1	2		1		(1)	2	5	7
Business				3		2	1	2			1	7	8
English and Journalism				5		9		5		(1)		20	20
Industrial Arts			1		1		1				3		3
Mathematics					1	3				(1)	1	4	5
Modern Language				1		3	1	2		(1)	1	7	8
Psychology			1	1	1	1	1				3	2	5
Science		1	1	2	2	3	2	1			5	7	12
Social Science	1		2	2	3	5	2	2	(1)		9	9	18
Speech						2	1			(1)	1	3	4
Special Students									1	13	1	13	14
TOTAL	1	2	6	50	11	87	12	36	(1)1	(12)13	32	200	232

COLLEGE OF ENGINEERING

Agricultural Engineering	2		1		1		2				6		6
Chemical Engineering	10		7		4		6		(2)		29		29
Civil Engineering	14		5	1	5		11		(2)		37	1	38
Electrical Engineering	18		11		17		24		(3)		73		73
Industrial Engineering	1		1		4		2				8		8
Mechanical Engineering	9		5		7		13		(2)		36		36
Nuclear Engineering	3	1	7		6		7		(1)		24	1	25
Special Students									2		2		2
TOTAL	57	1	37	1	44		65		(10)2		215	2	217

Tabulation for Summer School 1967—Concluded

COLLEGE OF HOME ECONOMICS

	Freshmen		Sophomores		Juniors		Seniors		(Prov.) Specials		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	Total
Home Economics		69	3	70		44		16		(10)	3	209	212
Dietetics and Inst. Mngt.		3		5		4		1				13	13
Home. Econ. and Journ.		3		3		3		1				10	10
Home Econ. and Nursing		6		9						(1)		16	16
Restaurant Management			1		1						2		2
Special Students									7	60	7	60	67
TOTAL		81	4	87	1	51		18	7	(11)60	12	308	320

COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine					1		1				2		2

SUMMARY

	Freshmen 1st Year		Sophomores 2nd Year		Juniors 3rd Year		Seniors 4th Year		5th & 6th Years		Specials (Prov.)		Totals		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	Total
Undergraduate	254	309	209	236	246	224	230	84	25		(39)80	(42)165	1083	1060	2143
Graduate School													1043	564	1607
TOTAL													2126	1624	3750

NEW AND DIFFERENT STUDENTS ENROLLED FOR FIRST AND SECOND SEMESTER AND SUMMER SESSION

Freshmen	3493
Sophomores	2863
Juniors	1988
Seniors	1819
5th and 6th Years	217
Provisional and Special	683
Graduate	2534
TOTAL	13597

Record of Enrollment and Degrees Conferred, 1863-1967

Year	Summer school	Housekeepers' short course	Dairy Mfg. short course	Dairy short course	Farmers' short course	Apprentice	Special	Preparatory	Subfreshman	Vocational school	Freshman	Sophomore	Junior	Senior	Graduate	Counted twice	Net total	Degrees granted
1863-'64								92			14						106	
1864-'65								91			14	8	1				114	
1865-'66								99			21	3	5				127	
1866-'67								118			11	7	1	5			142	5
1867-'68								103			6	5	1				115	1
1868-'69								137			10	10	2		1		160	
1869-'70								119			10	12	1				142	
1870-'71								118			13	5	4	5			145	10
1871-'72								129			20	11	3	5	2	2	168	4
1872-'73																	173	3
1873-'74								137			24	14	3	6			184	5
1874-'75								103			26	10	2	2			143	3
1875-'76																	238	5
1876-'77																	232	10
1877-'78								75			42	23	5	5			152	4
1878-'79							1				89	89	16	12			214	11
1879-'80							1				166	61	35	11	2		276	9
1880-'81							6				178	48	24	9	2		267	8
1881-'82							5				227	50	19	11			312	11
1882-'83							4				241	60	30	12			347	15
1883-'84							2				255	92	26	18	2		395	17
1884-'85							2				271	71	36	16	5		401	15
1885-'86							1				273	91	35	24	4		428	23
1886-'87											303	100	44	24	10		481	26
1887-'88											305	92	46	27	2		472	23
1888-'89											266	103	41	28	7		445	26
1889-'90							1				307	105	63	28	10		514	29
1890-'91											343	135	50	53	12		593	54
1891-'92											336	139	62	37	10		584	35
1892-'93											339	110	66	43	29		587	48
1893-'94											275	141	72	42	25		555	45
1894-'95							5				276	108	89	64	39		572	60
1895-'96							3				353	121	67	71	32		647	71
1896-'97							6	67			321	163	69	62	46		734	63
1897-'98				6		9	15	77			316	174	77	82	57	10	803	79
1898-'99				26		35	40	110			396	177	92	65	40	21	871	63
1899-1900		24		57	47	50	32	162			376	163	109	69	27	22	1094	61
1900-'01		47		72	109	79	23	318			348	183	80	74	40	52	1321	69
1901-'02		41		66	125	87	19	298			396	206	120	65	32	59	1396	55
1902-'03		63		38	123	78	36	342			471	229	141	86	24	57	1574	55
1903-'04	17	51		16	122	72	33	443			403	206	161	114	20	36	1605	103
1904-'05	15	88		24	99	12	30	500			289	198	122	117	26	43	1462	109
1905-'06	18	92		28	118		46	598			373	214	145	110	39	64	1690	100
1906-'07	18	134		23	179		48	144	511		411	269	149	133	24	88	1937	124
1907-'08	29	188		26	173	Engineering short course	42	134	528		450	357	202	148	26	82	2192	120
1908-'09	25	168		18	197		42	134	521		491	381	243	171	28	86	2308	151
1909-'10	22	152	4	111	124		87	89	453		456	417	286	170	26	70	2305	146
1910-'11	31	160	9	26	285		107		364		533	412	288	248	34	59	2407	207
1911-'12	94	160	14		280		85	Milling short course	580		337	461	288	261	44	81	2523	236
1912-'13	282	175	11	Lunch room mgt.	289		129		654		444	432	355	268	55	166	2928	234
1913-'14	370	149	12		223		112			658	516	431	324	327	64	159	3027	291
1914-'15	472	127	18		199	98	120		Engineering trade courses	560	575	368	383	321	48	200	3089	229
1915-'16	536	85	17		207	188	175			484	605	454	305	401	76	219	3314	359
1916-'17	586	103	14		228	191	172			422	693	471	378	282	68	279	3339	210
1917-'18	481	84		8	119	135	138			231	483	349	294	238	36	190	2406	233
1918-'19	519	25	5		160	400	199			216	810	322	254	201	34	144	2991	174
1919-'20	415	57	3	6	117	362	271			224	894	400	297	273	44	167	3376	271
1920-'21	604	30	10		96	278	270	8		280	878	602	318	273	42	294	3395	263
1921-'22	820	19	10		59	173	221			297	931	628	422	296	125	813	3560	300
1922-'23	884	19	8		55	83	163	12		220	1004	656	460	401	118	457	3626	372
1923-'24	978	12	7		43	57	161	3		167	1160	657	458	413	171	475	3812	385
1924-'25	1120	14	14		55	54	139	5		47	1391	679	467	347	185	486	4031	388
1925-'26	947	12	11		41	29	89				1494	725	512	344	182	384	4019	392
1926-'27	959		18		52		71		19		1311	854	509	411	179	300	4083	434
1927-'28	966		20		57		88		7		1039	819	584	500	167	418	3878	498
1928-'29	920		18		51		57		9		1084	743	584	537	197	321	3879	545
1929-'30	902		13		59		70		9		1128	787	581	554	*432	548	3987	560
1930-'31	995		24		52		50		7		1077	790	605	528	506	589	4045	515
1931-'32	1059		12		29		54				933	752	633	572	572	688	3928	605
1932-'33	995						72				666	596	552	590	518	630	3359	641
1933-'34	655						61				707	558	520	522	327	422	2928	493
1934-'35	722						52				1081	616	548	557	316	456	3436	522

Record of Enrollment and Degrees Conferred, 1863-1967—Concluded

Year	Summer school	Housekeepers' short course	Dairy Mfg. short course	Dairy short course	Farmers' short course	Apprentice	Special	Preparatory	Subfreshman	Vocational school	Freshman	Sophomore	Junior	Senior	Graduate	Counted twice	Net total	Degrees granted
1935-'36	989						69				1330	820	660	574	391	572	4261	550
1936-'37	917						64				1326	947	774	623	440	634	4457	611
1937-'38	890						67				1297	972	810	787	409	537	4695	729
1938-'39	911						61				1246	959	864	855	463	559	4800	806
1939-'40	920						61				1306	958	926	871	490	622	4910	789
1940-'41	935						40				1284	969	905	900	524	655	4902	819
1941-'42	880						17				1274	926	807	748	417	590	4479	685
1942-'43	1178						21				1234	717	587	717	253	846	3861	674
1943-'44†	1181						21				1234	717	587	717	217	888	3786	...
1943-'44	911						18				483	371	312	440	193	619	2109	418
1944-'45	881						48				601	383	289	260	196	594	2061	288
1945-'46	2785						227				1730	771	524	468	331	1784	5052	519
1946-'47	2859						183				3453	1910	1019	856	383	2849	7814	881
1947-'48	2446						97				2100	2325	1595	1123	456	1976	8166	1106
1948-'49‡	2246						64				1883	1768	1927	1753	550	1825	8366	1666
1949-'50	1808						44				1941	1692	1512	1952	775	82	7834	2121
1950-'51	1582						42				1802	1487	1263	1446	850	58	6867	1643
1951-'52	1043						36				1670	1167	1026	1097	649	47	5598	1210
1952-'53	1032						47				1987	1170	950	1009	650	82	5731	1116
1953-'54	1246						94				1976	1287	916	960	759	62	5930	1098
1954-'55	1513						175				1950	1501	825	1178	812	65	6376	1095
1955-'56	1712						154				2025	1788	912	1411	912	77	7125	1181
1956-'57	1796						164				1939	1912	1519	1308	894		7736	1346
1957-'58	1973						185				1838	1767	1595	1584	1077		8046	1615
1958-'59	2008						251				1814	1626	1473	1576	1188		7928	1731
1959-'60	2135						274				1827	1681	1447	1494	1342		8065	1533
1960-'61	2460						327				2197	1692	1466	1541	1517		8740	1620
1961-'62	2724						364				2363	1871	1517	1486	1634		9225	1521
1962-'63	2930						378				2775	1986	1625	1649	1845		10258	1628
1963-'64	3448						441				2491	2283	1636	1821	2032		10698	1707
1964-'65	3519						352				3256	2317	1841	1667	2258		11771	1791
1965-'66	3872						508				3811	2515	1869	1972	2233		13008	2014
1966-'67	3750						683				3493	2863	1988	2036	2534		13597	2066

[c] Figures above this column include neither graduate students in summer session, nor undergraduate students pursuing undergraduate work.

† Beginning with this year this summary is made at the close of the summer session instead of at the close of the spring semester as before.

‡ Beginning with this year, summer school students are included under the captions: Special, Freshman, Sophomore, Junior, Senior, and Graduate.

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The Kansas Agricultural Experiment Station

GLENN H. BECK, *Vice President for Agriculture*
FLOYD W. SMITH, *Director*
LOWELL BRANDNER, *Editor*
GILBERT R. DODGE, *Administrative Assistant*

The Kansas Agricultural Experiment Station is supported by both Federal and State funds. Acts of Congress authorizing grants (always subject to state legislative assent) have included the Hatch Act of 1887; the Adams Act of 1906; Purnell Act of 1925; Bankhead-Jones Act of 1935; an amendment to the Bankhead-Jones Act; Agricultural Marketing Act of 1946; the 1955 act to consolidate previous acts pertaining to state agricultural experiment stations; and the McIntire-Stennis Act of 1962.

Each session of the Kansas legislature and each session of the U. S. Congress provide funds to operate the experiment station. Fees and commercial organizations also provide some support, as do sales of experimental crops and animals.

The unique responsibility of the Agricultural Experiment Station is to conduct original research in the broad field of agriculture and to publish and to disseminate the results of agricultural research. Attention is devoted largely to the solution of problems related to agriculture, including farm homes.

An annual budget of nearly $5 million and many positions for graduate research assistants make the Kansas Agricultural Experiment Station a strong ally of the Graduate School.

More than 400 projects covering practically all phases of agriculture are being pursued by members of the station staff.

Farms, branch stations, well-equipped laboratories, and scientific equipment are available for the use of experiment station researchers.

Results of research are published in scientific journals, station bulletins, circulars, pamphlets, leaflets, popular journals, news releases to the press, and to radio and television stations, and reports at field days and other special events. All bulletins and other publications of the Agricultural Experiment Station are sent without charge to citizens of the state.

Letters of inquiry and general correspondence should be addressed to the Kansas Agricultural Experiment Station, Kansas State University, Manhattan.

BRANCH AGRICULTURAL EXPERIMENT STATIONS

FORT HAYS BRANCH STATION

Land occupied by this station is 3,560 acres of the former Fort Hays military reservation. A bill was approved by Congress March 28, 1900, setting aside this reservation for experimental and educational purposes. It was accepted by the state legislature February 7, 1901. The same session of the legislature passed an act providing for the organization of a branch experiment station and appropriating funds for preliminary work.

Investigations are confined primarily to problems peculiar to the western half of the state where rainfall is limited. They include beef grazing, feeding, and breeding studies; crop improvement, with special emphasis on wheat, sorghum, and grasses; soil management; studies with yellow streak mosaic in wheat; weed control; insects as related to alfalfa seed production; crop production; and agricultural engineering.

GARDEN CITY BRANCH STATION

In 1906, the county commissioners of Finney County purchased 320 acres 4½ miles from Garden City for agricultural experimentation. The land has been leased for 99 years to the Kansas Agricultural Experiment Station. In 1937 and 1939 the state purchased 235 additional acres adjoining the original tract. In 1958 an 80-acre farm was deeded to

the Kansas Agricultural Experiment Station by the Garden City Irrigation Company. Investigations in irrigation, dryland farming, dairying, crop improvement, horticultural and specialty crops, and lamb feeding are conducted at this station.

COLBY BRANCH STATION

The Kansas legislature of 1913 provided for a branch experiment station near Colby. It is located on a tract of 715 acres. The original tract of land was purchased by Thomas County and deeded to the state. In 1941 the state purchased an additional 320 acres. In 1963 additional land was acquired through an exchange of 39 acres of the original tract for an adjoining quarter section. Operations at the Colby station were begun in March 1914. Investigations include crop improvement, soil and crop management, irrigation, sheep production, and adaptation studies with fruit and shade trees, shrubs and flowers.

TRIBUNE BRANCH STATION

The Tribune Branch Station was established in 1911 by an act of the Kansas legislature.

At the Tribune station experimental work is conducted for the benefit of the surrounding western territory. Special attention is paid to the problems of producing field and specialty crops under conditions of limited rainfall and under irrigation.

SOUTHEAST KANSAS BRANCH STATION

The 1949 Kansas legislature established a Mound Valley Branch Station. It has been concerned with soil, crop and dairy nutrition studies. A major objective of the station has been the study of the relationship of soil and soil treatments to the quality of the feed produced as measured by the performances of dairy cows.

The 1966 legislature consolidated three separate units as the Southeast Branch Station, effective July 1, 1966. As a result, 282 acres of land situated near Mound Valley, 430 acres near Parsons, and 51 acres near Columbus (formerly the Columbus Experiment Field) will be used as a total unit. Research will include agronomic, beef cattle and dairy experiments.

EXPERIMENT FIELDS

The Kansas Agricultural Experiment Station includes experiment fields as follows: Southwestern Kansas (Minneola), East-Central Kansas (Ottawa), Sandyland (St. John), South-Central Kansas (Hutchinson), North-Central Kansas (Belleville and Mankato), Southeast Kansas (Chetopa), Newton, Cornbelt (Powhattan), and Northeast Kansas (Wathena).

THE KANSAS WATER RESOURCES RESEARCH INSTITUTE

HYDE S. JACOBS, *Director*

Cooperating with Water Resources Institute, University of Kansas

The Kansas Water Resources Research Institute was established by the Board of Regents October 31, 1964, at Kansas State University after Congress passed the Water Resources Research Act of 1964. However, the Regents stipulated that Kansas State University and the University of Kansas were to be full partners in the Institute so that maximum benefit would accrue to the citizens of Kansas. Consequently, the Institute can support water resources research in any department at either university. The policy committee governing the Institute is composed of representatives from both Kansas State University and the University of Kansas.

The purpose of the Institute is to conduct both basic and applied research and to train scientists in areas related to water resources. Research and educational interests include the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographical, ecological, and other aspects of water problems.

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