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Kansas State University President

James A. McCain

Information

General information about Kansas State University is obtainable from the President.

Prospective undergraduate students should communicate with the Dean of Admissions and Records in 118 Anderson Hall.

Prospective graduate students should communicate with the Dean of the Graduate School in 101 Fairchild Hall.

KANSAS STATE UNIVERSITY BULLETIN

Volume 56

July 1972

Number 2

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CALENDAR 1972-73

Fall Semester 1972

August 24-26, Thursday-Saturday

Registration of all students, including physical examinations, testing and orientation.

August 28, Monday

Classes begin. Late fee, \$2.50 for enrollment.

September 1, Friday

End of first week. Late fee, \$5 for subsequent enrollment.

September 4, Monday

Labor Day. No classes.

September 8, Friday

Last day to enroll without dean's permission.

September 15, Friday

Last day for all students except new undergraduate students to drop course without a Withdrawal or Failure being recorded.



October 6, Friday

Last day to withdraw and receive a partial fee refund.

October 9, Monday

Tentative copies of doctors' dissertations, with abstracts, due in major professor's office. Approval forms may be obtained in graduate dean's office.

October 13, Friday

Mid-semester grade reports due in Admissions and Records.

October 17, Tuesday

Tentative copies of masters' theses and reports, with abstracts, due in major professor's office. Approval forms may be obtained in graduate dean's office.

October 27, Friday

Last day for new undergraduates to drop course without a Withdrawal or Failure being recorded.

November 1, Wednesday

Dissertation approval forms due in graduate dean's office.

November 9, Thursday

Final date of doctors' oral examinations.
Masters' approval forms due in graduate office.

November 15, Wednesday

Final date of masters' oral examinations.

November 20, Monday

Final copies of doctors' dissertations due in graduate dean's office.

November 21, Tuesday

10 p.m. Thanksgiving student recess begins.
Thanksgiving Day is November 23.

November 27, Monday

Classes resume.

November 29, Wednesday

Final copies of masters' theses and reports due in graduate dean's office.

December 1, Friday

Last day course may be dropped before end of semester.

December 11-19, Monday-Tuesday

Semester examinations for all students.

December 20, Wednesday Noon

Deadline for grades to Admissions and Records.

Spring Semester 1973

January 11-13, Thursday-Saturday

Registration of all students, including physical examinations, testing and orientation.

January 15, Monday

Classes begin. Late fee, \$2.50 for enrollment.

January 19, Friday

End of first week. Late fee, \$5 for subsequent enrollment.

January 26, Friday

Last day to enroll without dean's permission.

February 2, Friday

Last day for all students except new undergraduate students to drop course without a Wd or Failure being recorded.

February 23, Friday

Last day to withdraw and receive a partial fee refund.

March 2, Friday

Mid-semester grade reports due in Admissions and Records.

March 6, Tuesday

Tentative copies of doctors' dissertations, with abstracts, due in major professors' office. Approval forms may be obtained in graduate dean's office.

March 12-16, Monday-Friday

Spring Break.

March 20, Tuesday

Tentative copies of masters' theses and reports, with abstracts, due in major professor's office. Approval forms may be obtained in graduate dean's office.

March 23, Friday

Last day for new undergraduate students to drop course without a Wd or Failure being recorded.

April 4, Wednesday

Dissertation approval forms due in graduate dean's office.

April 11, Wednesday

Masters' approval forms due in graduate office.

April 13, Friday

Final date of doctors' oral examinations.



April 18, Wednesday

Final copies of doctors' dissertations due in graduate dean's office.

April 20, Friday

Final date of masters' oral examinations.

April 23, Monday

Holiday. No classes. Easter is April 22.

April 24, Tuesday

Classes resume.

April 26, Thursday

Final copies of masters' theses and reports due in graduate dean's office.

April 27, Friday

Last day course may be dropped before end of semester.

May 7-15, Monday-Tuesday

Semester examinations for all students.

May 11, Friday

Commencement.

May 16, Wednesday Noon

Deadline for grades to Admissions and Records.

Summer Term 1973

June 4-July 27

Sessions of eight, three and one week's duration.

THE UNIVERSITY

The University, founded February 16, 1863, was established under the Morrill Act, by 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 in northern Manhattan, convenient to both business and residential sections. The campus consists of 315 acres. Most buildings are constructed of native limestone.

Manhattan is situated in the rolling flint hills of northeast Kansas, 125 miles west of Kansas City via Interstate Highway 70. Located five miles north of the city is Tuttle Creek Lake, one of the largest lakes in the Midwest.

Beyond the campus are more than 4,000 acres of University land used for experimental work in agriculture.

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.



GENERAL INFORMATION

Accrediting

Kansas State University is fully accredited by the North Central Accrediting Association and by various professional accrediting agencies. Credit earned at K-State is transferable to other institutions.

Admission of Undergraduates

Students interested in attending Kansas State University should write to the Admissions Office for an application form. The student should complete the form and return it to the Admissions Office. All correspondence about admission should be addressed to this office.

Admissions Counseling

The Admissions Office is open weekdays during the academic year for admissions counseling. Campus offices are closed Saturday.

Students and parents are always welcome, and are encouraged to visit the campus for individual counseling. However, it is advisable to write two weeks in advance for an appointment. Normally several counselors are available for consultation concerning educational plans.

The Admissions Office is located in the center of the main administration building, Anderson Hall.

High School Graduates

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

No academically qualified applicant will be denied admission to the University on the basis of race, color, sex, religion, or national origin.

Specific admission procedures are given to each student at the time he inquires about admission. Students should apply early in the 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 section on undergraduate degrees. See pages 12-14.

- (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 at least a 2.0 (C) average in previous academic work to be considered for admission to the University. This applies to Kansas and out-of-state transfer students.

Most credits from 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. Only one-half of the hours required for a KSU degree can be taken at a two-year college.

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

American College Test (ACT)

Freshmen 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 principal.

Advanced Placement Examinations

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 May of the senior year in high schools offering advanced placement courses. Subjects include 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 June and July of each year. Students are scheduled in groups of approximately 200 in number for enrollment sessions in July. 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 adviser is available to him any time he needs help. Faculty advisers assist students in defining goals to be reached in college, give information regarding appropriate curriculums and courses, and discuss personal problems students may have, especially problems related to the student's progress and plans for subsequent work.

Late Admission

A student who seeks to enter the University later than ten calendar days after the start of the 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 \$5 late enrollment fee.

Physical Examinations

Board of Regents' regulations require all new students to take a physical examination prior to registration.

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 high school students are admitted for the summer only as special students to take several courses between their junior and senior years. 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 they completed 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, and are responsible for 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 Examination

Credit may be granted to entering freshmen and other students in any subject if a

comprehensive course content examination is passed.

The fee for taking an examination to obtain college credit (in lieu of attending classes) is \$3 per semester credit hour in which examined for residents of Kansas and staff members, and \$9 per semester credit hour for non-residents.

Permission to take such an 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. Grades received on these examinations will be recorded on the student's permanent record.

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.

Assignment to Classes

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 "General 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, it may be purchased.

No student can 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 near the front of the catalog. Later assignments to courses are made during regular office hours by the student's dean or adviser. A student may not enroll later than ten class 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.

A student may not enroll for more than 18 hours including correspondence and extension study unless granted permission to do so by his dean or dean's representative. 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 ask to take additional hours. In no case may the total assignment including correspondence and extension work exceed 21 hours.

No more than 16 semester hours of non-graded credit may be assigned for any one academic year. At least five-sixths of the credit hours taken at KSU and applied toward a Bachelors Degree must be graded hours. Required courses of an internship or practicum nature, offered on a credit-no credit basis only are to be considered as graded hours in implementing the five-sixths' policy. A non-graded class is one in which no traditional "letter grade" is given. The grades of CR (credit) and NCr (no credit) are given.

A regularly enrolled student must have the permission of his dean to take correspondence or extension courses while enrolled and this is counted as part of the student's semester load.

Dropping and Adding Courses

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

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

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.

During the last two weeks of a term, courses may not be dropped.

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

Class Attendance

Every student is encouraged to attend the classes to which he has been assigned. Each instructor shall establish the manner in which work missed may be made up.

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 before or on 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. Beginning undergraduate students have nine weeks for this purpose.

Auditing Classes

Auditing consists of attending 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 full-time University faculty members and employees. Laboratory courses may not be audited.

Grades

The University uses the following grades:

A, for excellent work

B, for good work

C, for fair work

D, for poor work

F, for failure

Cr, for credit in courses for which no letter grade is given, (non-graded courses).

NCr, for no credit in courses for which no letter grade is given, (non-graded courses).

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 non-graded 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.

Examinations

A final examination period during which no regular classes meet is scheduled at the end of the fall and spring semesters. Final examinations are given during this period. There is no specially scheduled period for final examinations in the summer session.

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

Permission for special examinations in subjects not taken in class, or for advanced credit, or to make up failures must be obtained, on recommendation of the department head in which the course is given, from the dean of the college in which the student is enrolled. Permission is granted only if the student has prepared for the examination. The examination must be taken under the 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 examinations is \$2.50 per credit hour for residents, \$7.50 per credit hour for non-residents.

Report of Grades

As shown on the academic calendar, midsemester grade reports for freshmen are sent to deans' offices and to parents at the close of the 7th week.

Other 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.

If a student other than a beginning undergraduate drops a subject not later than the 18th day of classes, no mark is reported to the director of records. Beginning undergraduates have nine weeks for this purpose. An official drop slip from the student's dean is required.

If a student other than a new undergraduate drops a subject after the 18th day of classes,

either a mark of WD or a semester grade of F is reported, depending on whether the student was passing or failing at the time of dropping the subject. No course may be dropped after the 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 for Incomplete. 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 graded work a student earns points, according to the grades he makes, as follows: A, 4; B, 3; C, 2; D, 1; F, 0.

Scholarship Deficiencies

Probation, Dismissal

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 graded hours at Kansas State University with less than a 2.0 (C) overall or semester grade-point average. A student with less than 60 hours is placed on probation whenever he has more than five grade points less than needed for a 2.0 (C) overall or semester grade-point average.

The student automatically is taken off probation when his overall grade-point average reaches the required level.

A student on academic probation, who has completed 20 or more graded hours at Kansas

State University, will be dismissed when his total resident grade points are not within 18 points of a 2.0 (C) overall average on his resident work.

A student who neglects his academic responsibility may be dismissed at any time on 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.

Reinstatement

A dismissed student will be readmitted only when approved for readmission by the academic standards committee of the college from which he was dismissed or is attempting to enter. Normally a student must wait at least one semester before he will be considered for readmission.

The application 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.

A student who earns a "C" (2.0) or better average on 12 or more credits during the semester he is dismissed may be considered for immediate reinstatement.

Scholastic Honors

To be eligible for scholastic honors, awarded each semester, an undergraduate must receive a letter grade in a minimum of 12 semester hours of undergraduate work in residence and earn a grade-point average of 3.30 or better for that semester's work. Students in the Graduate School are not considered for this recognition.

Bachelors degree candidates who have completed a minimum of 60 hours in residence, with at least 50 hours in graded courses, are considered for graduation with scholastic honors as follows: Students with a 3.950 or above academic average are eligible

for “Summa Cum Laude.” Those with 3.70 or above will receive diplomas inscribed “Magna Cum Laude.” The remaining candidates with 3.3 or above are graduated “Cum Laude.”

For the unofficial Commencement Program, honors will be determined on a minimum of 45 hours in residence completed prior to the semester of graduation with at least 36 credit hours in graded courses.

Credits for Extracurricular Work

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

Subject	Semester	Total
Orchestra	1	4
Band	1	4
Concert Choir	1	4
Collegiate Chorale	1	4
K-State Singers	1	4
Varsity Men’s Glee Club	1	4
Women’s Glee Club	1	4
Madrigal Singers	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
K-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 no 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 credit toward graduation.

Course Description Key

Courses carrying no credit (pre- or non-collegiate in effect) are numbered 0-99; those carrying no prerequisites, generally aimed at non-majors 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. means concurrent.

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 sufficient credit hours to meet the requirements as listed below:

Sophomore	Junior	Senior	Fifth-year student
25	58	90	120

Undergraduate Degree Requirements

To be graduated, a student must complete a prescribed curriculum. Under special conditions substitutions are allowed as the interests of the student warrant. The total credit requirement for bachelor’s degrees ranges from 120 to 160 hours, according to the curriculum taken. To be awarded an undergraduate degree a student must have earned a grade-point average of at least 2.0 (C) on all Kansas State University courses taken for resident graded credit and applied toward the degree. Not more than 20 semester hours of non-graded credit may be applied toward a degree. Professional curriculums may impose additional degree requirements.

Up to one-half of the credit required for an undergraduate degree may be completed at an accredited two-year college.

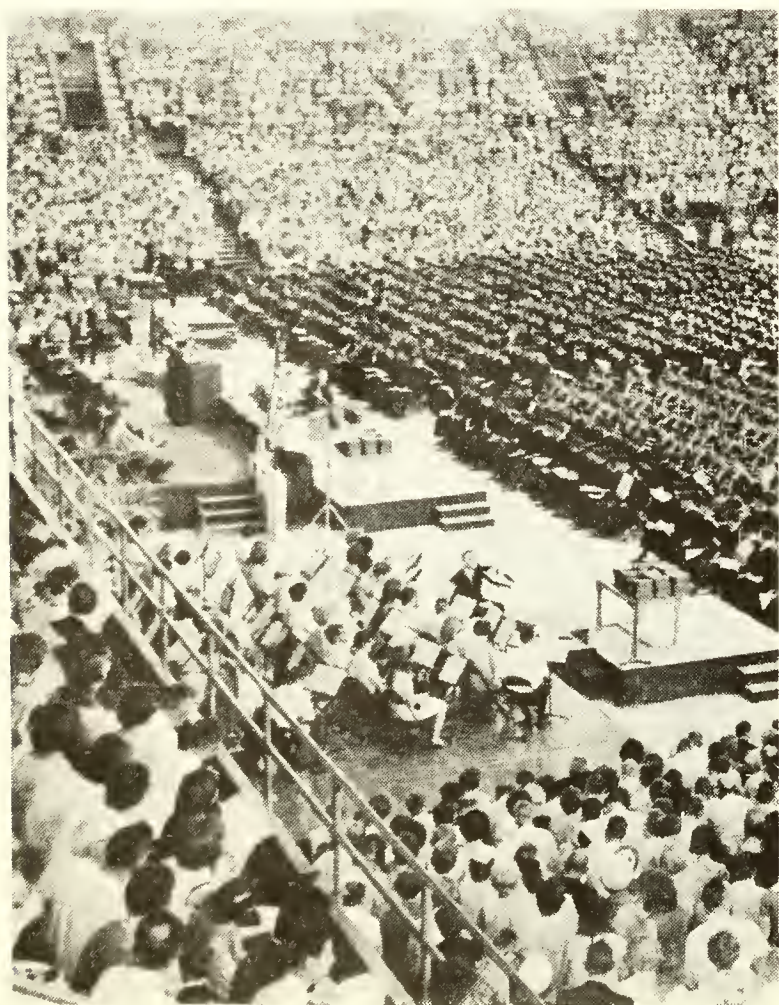
Further, the student must complete 20 of his last 30 undergraduate hours in residence with not fewer than 30 hours of resident undergraduate credit at this institution. Courses in the student’s major field shall be taken in residence unless an exception is granted by the major department on petition of the student. That department shall have

jurisdiction over the acceptance of major courses by transfer for fulfillment of the major requirement.

Exceptions to the residence requirement of the final year may be made by the dean of the college and the department head in the student's major field if the student has completed a total of three years of work acceptable to Kansas State University; the student must submit satisfactory plans and reasons for completing his degree requirements at another institution as for medicine, dentistry, law, medical technology and physical therapy prior to earning a degree here.

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.

Candidates for spring graduation are urged to attend commencement. Summer and fall graduates are invited to participate in the following spring commencement exercises. Also, prospective graduates may participate in the spring exercises prior to graduation. All participants must wear the appropriate cap and gown.



DEGREES

The degrees shown below are conferred on completion of the prescribed curriculums: The letter which precedes each curriculum indicates the prerequisite high school courses as listed on page 6. It is recommended that entering freshmen complete the prerequisite mathematics courses.

College of Agriculture

- (E) Agriculture, BS in Agriculture.
 - Agricultural Economics major, page 35.
 - Agricultural Journalism major, page 40.
 - Agricultural Mechanization major, page 40.
 - Agronomy major, page 40.
 - Animal Science and Industry major, page 43.
 - Dairy Production major, page 48.
 - Entomology major, page 51.
 - Horticulture major, page 57.
 - Plant Pathology major, page 62.
 - Poultry Science major, page 48.
 - Pre-Veterinary Medicine major, page 35.
- (E) Agricultural Education (Teachers), BS in Agriculture, page 39.
- (E) Bakery Science and Management, BS in Bakery Science and Management, page 54.
 - Administration option.
 - Chemistry option.
 - Operations option.
- (F) Biochemistry, BS in Biochemistry, page 45.
- (E) Dairy Foods Science and Industry, BS in Agriculture, page 48.
- (E) Feed Science and Management, BS in Feed Science and Management, page 54.
 - Administration option.
 - Chemistry option.
 - Operations option.
- (E) Horticultural Therapy, BS in Agriculture, page 58.
- (E) Milling Science and Management, BS in Milling Science and Management, page 55.
 - Administration option.
 - Chemistry option.
 - Operations option.

College of Architecture and Design

- (F) Architecture (five years), Bachelor of Architecture, page 70.
- (F) Architectural Structures option (five years), Bachelor of Architecture, page 70.
- (F) Bachelor of Interior Architecture, page 70.
- (F) Landscape Architecture (five years), Bachelor of Landscape Architecture, page 70.
- (F) Building Construction, BS in Building Construction, page 71.

College of Arts and Sciences

Bachelor of Arts, page 82.

AB

- (B) Anthropology
- (A) Art
- (E) Biology
- (E) Chemistry
- (A) Computer Science
- (B) Economics
- (A) English
 - General Majors:
 - (D) Biological Sciences
 - (A) Humanities
 - (E) Physical Science
 - (A) Social Science
- (E) Chemistry
- (B) Geography
- (E) Geology
- (E) Geophysics
- (A) History
- (B) Journalism & Mass Communications
- (F) Mathematics
- (A) Modern Languages
- (A) Music
- (A) Philosophy
- (B) Political Science
- (B) Psychology
- (B) Radio and TV
- (B) Sociology
- (A) Speech
- (A) Statistics

Bachelor of Science, page 83

BS

- (B) Anthropology
- (E) Biology
- (E) Chemistry
- (E) Computer Science
- (B) Economics
 - General Majors:
 - (D) Biological Science
 - (A) Humanities
 - (E) Physical Science
 - (A) Social Science
- (E) Geochemistry
- (B) Geography
- (E) Geology
- (E) Geophysics
- (B) History
- (B) Journalism & Mass Communications
- (F) Mathematics
- (E) Physics
- (B) Political Science
- (B) Psychology
- (B) Radio and TV
- (B) Speech
- (E) Statistics

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AB

- (D) Physical Therapy
 - (E) Pre-Dentistry
 - (B) Pre-Law
 - (E) Pre-Medicine
- BS
- (E) Medical Technology

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Pre-Professional (Cont.)

- (D) Physical Therapy
 - (E) Pre-Dentistry
 - (A) Pre-Elementary Education
 - (B) Pre-Law
 - (E) Pre-Medicine
 - (B) Pre-Nursing
 - (B) Pre-Pharmacy
 - (A) Pre-Secondary Education
 - (E) Pre-Veterinary
- (A) Bachelor of Fine Arts, page 83.
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 - (A) Bachelor of Music Education, page 84.
 - (A) Bachelor of Physical Education, page 84.

College of Business Administration

- (E) Business Administration, BS in Business Administration, page 176.
- (E) Accounting, BS in Business Administration, page 177.

College of Education.

- (A) Elementary Education, BS in Elementary Education, page 186.
- (A) Secondary Education, BS, page 187.

College of Engineering

- (F) Agricultural Engineering, BS in Agricultural Engineering, page 203.
 - (F) Chemical Engineering, BS in Chemical Engineering, page 204.
 - (F) Civil Engineering, BS in Civil Engineering, page 204.
 - (F) Electrical Engineering, BS in Electrical Engineering, page 205.
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College of Home Economics

- (C) Home Economics with options, BS in Home Economics, page 237.
 - Home Economics Education-Vocational Teaching, page 237.
 - Extension, page 239.
 - Radio and Television, page 237.
 - Clothing and Retailing, page 238.
 - Textile Research, page 238.
 - Fashion Design, page 238.
 - Interior Design, page 238.
 - Community Services, page 239.
 - Early Childhood Education, page 239.
 - Consumer Interest, page 240.
 - Housing and Equipment, page 240.
 - Foods and Nutrition in Business, page 240.
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 - Dietetics and Institutional Management, page 241.

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College of Home Economics (Cont.)

- (C) Home Economics and Journalism, BS in Home Economics and Journalism, page 242.
- (C) Home Economics with Liberal Arts, BS in Home Economics, page 243.
- (C) Restaurant Management, BS in Restaurant Management, page 242.

College of Veterinary Medicine

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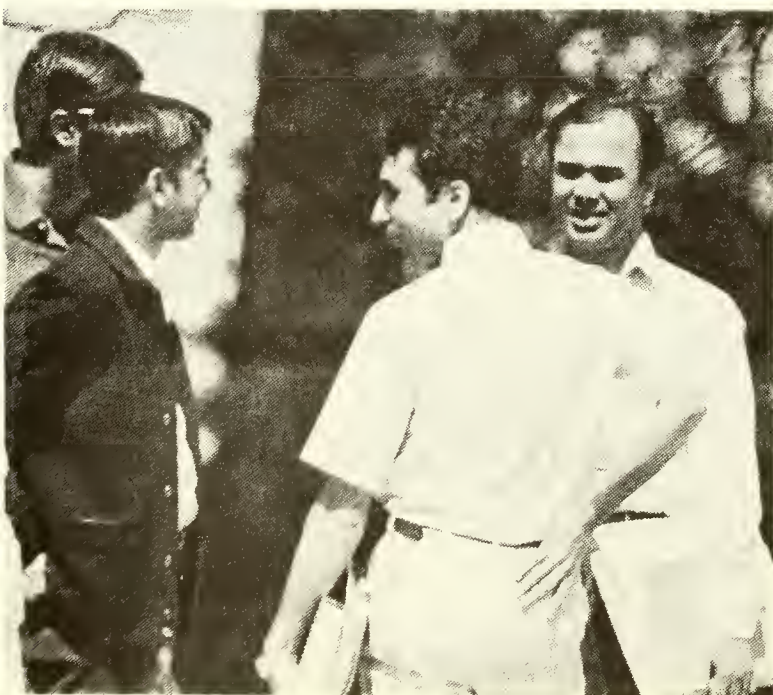
(For completion of six-year combination of pre-veterinary curriculum and veterinary medicine curriculum)

(See Colleges of Agriculture and Arts and Sciences for BS degrees in connection with College of Veterinary Medicine.)

FEES

Fees Subject to Change. The following schedule of fees was in effect when this catalog was prepared. However, there is no guarantee this schedule will not be changed without notice prior to the beginning of any semester or summer session.

Payment of Fees. Each student must pay the total amount of his semester or summer session fees on the day he registers, 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 to the Aids and Awards Office prior to registration or they will be required to pay the full amount of their fees from personal resources.



Incidental Fee. The incidental fee is the student's contribution toward the costs of instruction and covers approximately 20 to 25 percent of the instructional costs.

Student Health Fee. For a description of the services provided by this fee, see page 26.

Student Union Annex I Fee. This fee is used to retire the K-State Union Annex I 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 KSU Stadium revenue bonds.

Student Activities Fee. The student activities fee is used for student publications, K-State Union operations, musical groups, fine arts, intramural sports, open houses, University for Man, Student Governing Association, and for judging, debate, rifle, rowing and soccer teams, 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 and certain student events without additional payment nor to student athletic ticket rates.

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

Fees for Regular Semesters

The following schedule of fees was in effect when this catalog was prepared. However, there is no guarantee this schedule will not be changed without notice prior to the beginning of any semester or summer session.

For students enrolled in seven or more semester credit hours.

	Resident Fees	Non- resident Fees
Incidental Fee:		
All except Veterinary		
Medicine students	\$180.00	\$475.00
Veterinary Medicine students	220.00	535.00
Student Health	25.00	25.00
Student Union Annex I	2.25	2.25
Student Union Annex II	10.25	10.25
Stadium Bonds	4.25	4.25
Student Activities (including Union operations)	16.25	16.25
Totals—All except Veterinary		
Medicine students	238.00	533.00
Totals—Veterinary		
Medicine students	278.00	593.00

For students enrolled in six or less semester credit hours.

	Resident Fees	Non- resident Fees
Incidental Fee:		
All except Veterinary Medicine students per credit hour	\$12.00	\$32.00
Veterinary Medicine students per credit hour	15.00	35.00
Student Health total fee	25.00*	25.00*
Student Union Annex I total fee	1.50	1.50
Student Union Annex II total fee	6.50	6.50
Stadium Bonds total fee	.50	.50
Student Activities (including Union operations) total fee	4.50**	4.50**

For employees enrolled in Graduate School.

Incidental Fee per credit hour	\$12.00
Campus Privilege Fees:	
A. If enrolled in seven or more credit hours:	
Student Health total fee	25.00
Student Union Annex I total fee	2.25
Student Union Annex II total fee	10.25
Stadium Bonds total fee	4.25
Student Activities (including Union operations) total fee	16.25
B. If enrolled in six or less semester credit hours:	
Student Health total fee	25.00*
Student Union Annex I total fee	1.50
Stud. Union Annex II total fee	6.50
Stadium Bonds total fee	.50
Student Activities (including Union operations) total fee	4.50**

Fees for Summer Sessions

The following schedule of fees was in effect when this catalog was prepared. However, there is no guarantee this schedule will not be changed without notice prior to the beginning of any semester or summer session.

These fees include the Incidental, Student Health, Student Union Annex I and II, Stadium Bonds, Student Activities fees and parking fees.

	Resident Fees	Non- resident Fees
Per semester credit hour:		
Incidental Fee	\$12.00	\$32.00
Campus Privilege Fees*	5.00	5.00

*Full time employees, and spouses of full time Kansas State University employees, may elect to be exempted from this fee and thereby not be eligible for Student Health Center services.

**Not a full activity fee and does not entitle payee to the yearbook and certain student events without additional payment nor to student athletic ticket rates.



Persons Eligible for Resident Fees

1. **Residents.** Usually includes adults and minors of parents who have been residents of Kansas for six months or more prior to registering for any semester or session. The official residency determination for fee purposes is made by the Dean of Admissions and Records.

2. **Staff Members.** Unclassified and classified employees of universities or colleges under the Kansas Board of Regents working four-tenths time or more during at least a part of each of the following months:

For fall semesters—September,
October and November.

For spring semesters—January,
February and March.

For summer sessions—June or the
preceding January, February and
March.

3. **Federal Employees.** Federal employees given courtesy appointments at Kansas State University.

4. **Military.** Military personnel stationed and living in Kansas.

5. **Dependents.** Dependents of the staff members, federal employees and military personnel described above.

6. **Employees.** Same as "Staff Members" defined above except that for this purpose only Kansas State University employees are included, plus "Federal employees" defined above and ROTC staff members of Kansas State University. No dependents are entitled to the fees for employees.

Special Fees and Refund Policy

Private Music Lessons and Practice Facilities. University students enrolled in a bachelor's or master's degree program with a major in music, music education or applied 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 below):

	University Students	Non-University Students
Two 30-minute lessons a week, per semester	\$42	\$70
One 30-minute lesson a week, per semester	24	36
Two 30-minute lessons a week, summer session	21	35
One 30-minute lesson a week, summer session	12	18
Single lessons, each	4	4
Practice piano, 1 hour daily, per semester	5	5
Practice piano, 2 hours daily, summer session	5	5
Practice organ:		
Two-manual, 1 hour daily, per semester	10	10
Two-manual, 2 hours daily, summer session	10	10
Three-manual, 1 hour daily, per semester	20	20
Three-manual, 2 hours daily, summer session	20	20

Field Geology Fee. The fee for the summer geology field camp is \$80, which is the additional amount required from all students enrolled in this course to pay for their transportation and lodging for the field camp.

Refund Policy. (Applicable only to refundable fees—incidental, health, union, stadium, activities, field geology and private music lessons.) Refunds will not be made until sufficient time has elapsed to insure that fee payment checks have been honored—usually 15 days after students register. If an enrollee withdraws 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 fee receipt card.

	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 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 charge for the original card is included in the Student Activities fee. A \$2 fee is assessed for each card replaced.

Special Examination Fee. The fee for taking an examination to obtain college credit (in lieu of attending classes) is \$3 per semester credit hour in which examined for residents of Kansas and staff members; \$9 per semester credit hour for non-residents of Kansas. (Not subject to refund; not applicable to Continuing Education courses and this service available only to students who are or have been regularly enrolled).

Auditing Fee. An auditor who is neither an enrollee paying full incidental fee nor a staff member shall be assessed \$1 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 chemistry laboratory courses, geology field camps, and for excessive usage, breakage or losses due to personal negligence on the part of the student. Charges then can only be for

*Not applicable to students enrolled in off-campus instruction and assessed only on the first six credit hours for each summer session enrollment on campus.

the actual fair value of supplies used or lost and are 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 applicable 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. Costs will vary each semester, but are estimated to approximate the following:

Enrollment fees for a Kansas resident	\$238*
Books and supplies, about	50
Room and board in University housing	482
Clothing, laundry, postage, travel, extra meals, & social activities (varies with the individual)	230
Total estimated expenses per semester (half of academic year)	\$1,000

*Non-resident fees are \$533 per semester.

SERVICES AND FACILITIES

Postal Service

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

Manhattan Post Office personnel deliver U.S. mail directly to University buildings and residence halls and pick up outgoing U.S. mail from various locations on the campus.

A self-service postal unit is located on the ground floor of the K-State Union.

The University Postal Center in Anderson Hall sells stamps, money orders and other postal supplies; weighs, insures and registers mail, and receives outgoing U.S. mail.

Computing Center

TOM L. GALLAGHER, Director

The Computing Center is a service department of the University and functions directly under the authority of the Vice-President for Academic Affairs. The Kansas State University Computing Center IBM 360-50 computer, peripheral equipment and supporting services are intended for the research and instructional computer needs of the faculty, staff and students.

The IBM 360-50 has 128K bytes of main core and 1,000K bytes of extended core; as such, it is able to meet a wide variety of research and instructional needs. This machine, installed in June of 1967, includes tape and disk drives, two card readers, a card punch, two line printers and card-processing equipment as supporting gear. Attached to the machine are slow-speed typewriter remote terminals for interactive computing. During the high usage hours a printer and card reader are made directly available to users for immediate access batch entry.

The Computing Center is located on the ground floor of Cardwell Hall. The professional staff provides assistance in use of the hardware and software. A library of manuals and programs is available.

Programming languages in current use include FORTRAN, COBOL, PL-I, RPG, WATFIV PLC, LISP and assembler language. A series of non-credit seminars and classes are held during the inter-semesters for users and prospective users.

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

Scientific Equipment

Kansas State University in cooperation with the Atomic Energy Commission operates one of the major facilities in the United States for accelerating atomic particles. The largest accelerator is a 12-MeV tandem Van de Graaff which became operational in 1969. Also, there are several smaller accelerators which together with the 12-MeV tandem accelerator provide the University and the State of Kansas with particle accelerator capabilities over an unusually large range of energies and projectiles.

The accelerator laboratory is housed in Cardwell Hall. A professional staff and graduate students maintain an active research program which extends beyond conventional nuclear structure studies to include experiments in astrophysics and physics of the solid state. For further information about the Accelerator Laboratory write to the Director, Nuclear Science Laboratories, Physics Department.

Another major scientific facility is the TRIGA Mk II nuclear reactor and related equipment. In addition to basic research involving neutron spectroscopy and neutron cross-section studies, the Reactor Laboratory affords the entire University community neutron activation analysis capabilities for sensitive, non-destructive analysis. For further information, write the Director, Reactor Laboratory, Nuclear Engineering Department.

The Speech and Hearing Clinic

The clinical facilities and services of the Speech and Hearing Clinic, 23 Eisenhower Hall, are available for consultation, examination and therapy. Services are extended to University students who have impairments of their speech, hearing or language functions. These clinical services are also available to children and adults of the surrounding communities. A purpose of the clinic is to provide educational and clinical experiences to students at Kansas State University who are preparing for careers in speech pathology and audiology. Students may call for information or they may be referred by instructors or other interested persons.

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 366 Watson Library, The University of Kansas, Lawrence 66044.

Kansas State University Publications

University Publications

General Catalog
This Is Kansas State University
(information for prospective students)
Summer Catalog
Biennial Report
Financial Report
Extension Bulletins
Agricultural Experiment Station Bulletins
Engineering Experiment Station Bulletins

Student Publications

The Kansas State Collegian—newspaper published five days a week during regular semesters and three days a week in summer.
The Royal Purple—yearbook.
The University Directory—published annually.

Other Publications

The Agriculturist—published quarterly.
The Kansas State Engineer—published six times annually.
The K-Stater — published eight times a year by the Alumni Association.

Library System

RICHARD A. FARLEY, Director

The Francis David Farrell Library, named after Kansas State University's eighth President, is the central unit of the university library system. It is supplemented by six branch libraries located in other buildings: Architecture, Chemistry, Physics, Veterinary Medicine, and two dormitory libraries, Derby and Kramer.

The Libraries contain 600,000 cataloged volumes. Growth is at 30 to 40,000 volumes per year. In addition to the cataloged volumes, the libraries contain a full government depository collection, including the publications of the Atomic Energy Commission, a teaching materials collection, an extensive microform collection and 50,000 records, tapes and slides. The Library subscribes to a current list of 9,000 journals.

With the completion of the second addition to Farrell Library in the fall of 1970, the central building now provides over 200,000 square feet of space. Seating is available for 3,000 students and there is sufficient shelf space for over one million volumes. One hundred locked study carrels are provided for faculty and doctoral candidates. Five hundred additional individual study spaces are available to graduate and undergraduate students.

Except for the rare book room, the library is entirely open shelf. Collections are organized into three subject divisions: Humanities, Social Science and Science. These divisions are supplemented by a general reference and bibliography division, a documents division and a special collections division.

With its land-grant background the library has always had a superior science collection. During the past five years, to meet its multi-purpose university responsibility, significant additions have been made to the collections in the humanities and the social sciences. Much of this material has been in microform as evidenced by the need for a microform reading room in each of the divisions.

The Library has made rapid strides in automation. Serials check-in and the production of the serials holdings list are now automated. The acquisitions and bookkeeping operations were automated during 1970. The University's IBM 360-30 computer is in the basement of the library building.

To take advantage of the library resources in the region, the Library operates a courier service that travels three times a week east to Kansas City and twice a week south to Wichita. Much use is made of the collections in the Linda Hall Library and the University of Kansas Library. The six state-supported institutions of higher education belong to a teletype network. They also permit direct borrowing by students and faculty. The Library is a member of the Kansas Information Circuit—a teletype network of the larger public and system libraries of the state. Direct teletype connection is also available to other "Big 8" libraries, the Library of Congress and the National Medical and Agricultural Libraries.

THE SUMMER SCHOOL

E. NORMAN HAROLD, Director

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 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 K-State 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 Summer School consists of an eight-week session in which a student may earn as many as nine semester hours of credit. Full credit two, three and four-week concentrated courses are offered to accommodate students who cannot attend the eight-week session.

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 week to four weeks.

The Summer School Bulletin gives complete and detailed information about 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.

Through the University Telenetwork system, a unique two-way, teaching-learning device, some K-State summer courses are offered at 15-20 state-wide locations. The special telephone hookups allow classes originated on the K-State campus to be taught simultaneously, and for credit, to the various locations of the Telenetwork system in the state.

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

STUDENT PERSONNEL SERVICES

CHESTER E. PETERS, Vice President for Student Affairs

Kansas State University has developed a complete program of student personnel

services because education involves many experiences outside the classroom.

This philosophy stresses the importance of providing the student with a variety of opportunities and services aimed at improving and supporting his academic activities; his intellectual development; his vocational interests, aptitudes, and skill; 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 faculty and administrative staffs in helping to interpret student needs.

He has general responsibility for the administration and coordination of the following eight divisions comprising the Student Personnel Program: Aids, Awards, and Veterans Services; Career Planning and Placement Center; Center for Student Development; Housing and Food Service; Intramurals and Recreation; K-State Union; Lafene Student Health Center and University Hospital; and Residence Halls Programs.

The Vice President also has a special assistant for university human relations who is responsible for counseling and programs with minority groups.

Center for Student Development

GENE C. KASPER, Director

MARGARET L. NORDIN, Associate Director

Staff members of the Center for Student Development work in a variety of ways with individual students and student groups, and also serve as liaison to all elements of the University community. Therefore, units within the Center are organized to identify and meet the needs of K-State students.

Responsibilities include a working relationship with residence halls, fraternities and sororities, student government, student organizations, campus religious groups, and the university judicial system.

Also, major direction for many programs comes from the Center for Student Development including: summer enrollment

and orientation, special assistance to minority and foreign students, student leadership and staff training, workshops for housemothers, freshman seminars, discussion groups in study skills, vocational and occupational information, and interpersonal relations.

Another major emphasis is on individual development. Counseling assistance is available and students are encouraged to examine their potentials and to increase their ability to become self-directed individuals.

The various programs are evaluated by research staff members who also study characteristics of K-State students and changes which occur. Several staff members hold part-time academic appointments in addition to their positions in the Center.

Program Development and Implementation Unit

If students have questions about any subject relating to K-State, there is one spot on campus, Holtz Hall, where they can find out what is going on. The University Learning Network is one established way to try to answer any question asked. If the staff members do not have the information readily available, they will direct students to someone on campus who can help. Students should feel free to drop in at Holtz Hall any time.

The new student orientation program assists approximately 3,000 new students during summer pre-enrollment. The summer program usually is the students' initial encounter with the University and helps get their university education off to a meaningful start. Parents' Orientation is a concurrent program to acquaint parents of new students with the University, its programs and facilities.

The freshman seminar program gives new students a chance to meet with small groups of other entering students and upperclass student leaders. The weekly meetings provide opportunities for self-examination and for learning more about the University.

Religious life at the University finds expression in many church-sponsored student religious organizations in more than 30 church congregations in Manhattan. On campus there are two memorial chapels—Danforth and All Faith—which are available

for student religious services and private meditation.

Minority and Cultural Program Unit

To help provide greater educational opportunities to a larger number of minority students residing in Kansas, recruitment of minority group students is encouraged. Special services are provided to these students including individual guidance and counseling, academic advisement, individualized instruction and other tutorial services, leadership training programs, specialized financial assistance including budget information, and part-time employment.

Individual Development Unit

Most students find counseling services useful. In the Individual Development Unit of the Center for Student Development, counselors are available to discuss with students a wide variety of concerns. These often are regarding decision-making or planning, such as vocational uncertainty or difficulty in choosing a major. Sometimes students develop new habits and attitudes through counseling, such as better study habits and improved attitudes toward academic or social performance. Students use the counseling service to learn more about themselves and to increase understanding of their own goals, values, interests, and abilities.

Whatever his reason for calling upon the Center, the student will find a friendly, interested counselor. In a relaxed, completely confidential setting the counselor helps students learn to handle their specific situations. Together they explore attitudes, feelings and motivations, and gain new insights from a variety of sources such as students' experiences, psychological tests, occupational data, university requirements and others. Discussion groups are available to help students explore interests.

High school seniors also are eligible to use the Center's services before they enter college and may make appointments by writing to the Center or by coming to Holtz Hall.

International Student Center

The International Student Center serves more than 400 foreign students on the Kansas

State University campus. Frequently it is called upon to advise the student about renewals of stay, passports, work permits, and general status questions. It also serves in developing programs for foreign students. The International Student Center works with all facets of the university to implement and support the goals of the student and the University in international education.

The Foreign Student Adviser advises all international students on campus. He helps promote mutual concern between foreign and American students, as well as concern among the foreign students, the faculty and the community.

Evaluation and Research Unit

Students and faculty members find current information and recent publications on student development in the Research Unit. General impressions and observations of campus trends and concerns are collected in this office. The Research Unit (Fairchild Hall 212) sponsors studies of KSU students and publishes **Higher Education Briefs**, a monthly newsletter. This unit also maintains an Information Center with books, journals and free materials about college students, higher education, student development and related subjects.

Aids, Awards and Veterans Services

GERALD R. BERGEN, Director

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 are provided through the Guaranteed Loan Program under Title IV of the Higher Education Act of 1965.

To qualify for most long-term loans, an undergraduate or graduate student 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 April 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.

Scholarship Programs

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

Students desiring scholarship applications or information relative to scholarships should write to the Aids, Awards, and Veterans Services Office. The deadline for submitting completed applications is the February 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 immediately after arriving 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.

Services for Veterans

The University maintains a Veterans Service Office to aid 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, the Korean Campaign, or Viet Nam.

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

State Vocational Rehabilitation Program

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.

Career Planning and Placement Center

J. BRUCE LAUGHLIN, Director

One vital criterion in the selection of a college or university should be the career development services it provides. On this basis Kansas State University compares most favorably with other institutions.

The Career Planning and Placement Center, in Anderson Hall, assists prospective freshmen, undergraduates, graduating seniors, graduate students, and alumni with career planning and employment. However, the Office of Aids, Awards, and Veterans Services is responsible for part-time employment.

In business and industry, education, alumni, and summer employment the Center is particularly effective in attracting employers from throughout the state and nation. Considerable emphasis is placed upon career counseling and guidance. Supplementing this effort is the Center for Student Development, particularly in student self-evaluation, interest and aptitude testing, etc.

As its name implies, the Career Planning and 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.

A Graduate Study information section assists in planning for advanced study.

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

One of the leading offices of its kind in the nation, the Career Planning and Placement Center is designed to promote wise and responsible career planning.

Housing and Food Service

A. THORNTON EDWARDS, Director
JEAN M. RIGGS, Associate Director

Residence Halls Program

THOMAS J. FRITH, Director

Kansas State University considers the housing of students as part of the total educational plan. All students are invited to live in the University residence halls. All single minor freshmen are required to live in a residence hall or Greek chapter house. General exceptions to this policy are veterans of the armed forces or students living at home.

Other exceptions to this policy must be cleared through the Residence Hall Program Director.

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, and 576 apartments and 52 mobile home lots for married couples. Sororities provide 600 places for women, and fraternities have accommodations for 1,400 men. Others find privately owned rooms and apartments from University-approved listings.

Self-Government in Residence Halls

Learning to manage your 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 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.

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 the 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 residence hall room application and \$25 non-refundable application fee for fall enrollees and \$12.50 for those entering in the spring.

When the hall application and fee are received by the Office of Housing and Food Service, a nine-month housing contract is forwarded to the student.

Students may elect either the full payment plan or installment plan.

Payment Schedule

A. Full payment of \$468 or

B. Payment schedule (if not paid in full) below:

Fall Semester		Spring Semester	
Payment with contract		January 10	\$118
September 10	\$118	February 10	118
October 10	118	March 10	118
November 10	118	April 10	118

Rates are subject to change.

Applications and further detailed information are available through the Office of Housing and Food Service.

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 Scholarship Houses 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 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 Office of Aids, Awards, and Veterans Services for applications and information.

Married Student Housing

Married students have not been overlooked in the housing program 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 married couples.

The furnished apartment rates are \$80 a month for a one-bedroom apartment and \$95 for a two-bedroom apartment. A limited number of unfurnished apartments are available; one-bedroom \$75 per month, two-bedroom \$87.50. The trailer parking lot rental is \$25 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. Rates are subject to change.

Applications are available at the Office of Housing and Food Service, Pittman Building.

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 \$80 a month for a one-bedroom and \$95 a month for a two-bedroom. These are furnished and all bills are paid up to 140 KWH of electricity. Applications are available from the Office of Housing and Food Service.

Off-Campus Housing

The Office 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 \$30 to \$45 a month for one person to a room and \$30 to \$35 a month per person when two or more reside in a room. Meals at the K-State Union Cafeteria and local cafes will cost \$70-90 a month. Apartments rent from \$60-250 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.

Sororities

Booklets describing sororities and setting forth the provisions regulating selection of new members are provided to all prospective freshman and interested upperclass women by Panhellenic Council. These may be obtained by writing to the Faculty Adviser to Sororities.

House bills in sororities will average approximately \$540 per semester. This includes

room, board, and sorority dues. Freshman members, however, live in residence halls and pay sorority dues of approximately \$25 a month. The following national sororities have established chapters at K-State:

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

Fraternities

Fraternities select new members primarily during the summer months. High school seniors are often guests at fraternity houses during their senior years, and throughout the spring and summer months each fraternity has representatives visiting high school seniors and their parents in Kansas and surrounding states.

Freshman men may live in a fraternity house if they accept an invitation to membership before classes start and if they do not sign a residence hall contract. Costs will average \$540 per semester. For more information, write to the Faculty Adviser to Fraternities. The following national fraternities are established at K-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 Alpha Psi, 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, Theta Xi, and Triangle.

Clovvia

Clovvia 4-H House provides accommodations for 62 upperclass women. Although 4-H members are given preference, any coed is eligible for membership. Freshman members live in a residence hall their first year. Since Clovvia 4-H House is a cooperative unit with the members supplying the labor for cooking and cleaning, monthly housebills are approximately \$75 including social fees. The women spend about six hours a week at their house duties. Applications are made through the County Extension Offices, the State 4-H Department at Kansas State University, or the Clovvia Membership Chairman, 1200 Pioneer Lane, Manhattan, Kansas, 66502.

Lafene Student Health Center

ROBERT E. SINCLAIR, M.D., Director

The Lafene Student Health Center and University Hospital is a Joint Commission accredited hospital serving the health needs of K-State students. It is located conveniently in the center of the campus just west of the Library. It is made up of a large outpatient clinic and a 40-bed hospital unit where students may be hospitalized when necessary. It is a modern facility, caring for all needs of the students with the exception of major surgery and contains a pharmacy, physical therapy department, medical laboratory, and X-ray department.

The Mental Health Section located on the lower level of the center provides diagnostic, consultative treatment and referral services to students experiencing emotional or psychological problems. As the Center is also responsible for the environment of the campus, the Environmental Health and Safety Section also is housed in this unit, along with a health educator.

The Center is staffed by full-time physicians with adequate medical supporting personnel. When necessary, the student is referred to specialists for treatment. If, for example, surgery is necessary, the patient has a choice of several able Manhattan surgeons. Treatment is at the student's expense and can be performed at one of the two local hospitals.

Medication, laboratory tests, and X-rays are available at the Center at reduced rates. Many services are offered at no cost. Hospitalization in the University Hospital is provided at special rates for the first 21 days—thereafter, the charge is reasonable and comparable to that of other Kansas hospitals.

After regular clinic hours a student who is ill or injured may receive medical care through the emergency room of the Lafene Health Center. Home calls are not made.

It is strongly recommended that all students at Kansas State University carry medical insurance, either through the parent's plan at home or through the health insurance program available to students at special rates. This plan supplements the coverages provided free or at reduced costs by the Lafene Student Health Center on campus and pays for medical expenses if the

student requires care away from the campus. The student may purchase this insurance at the time of class enrollment.

By rule of the State Board of Regents a complete medical and physical examination is required of all new students or transfer students at Kansas State University. There are no exceptions and the examination should be filled out on the official Kansas State University forms. This examination should be done by the family medical doctor and the completed history and physical forms sent to Lafene Student Health Center where they become part of the confidential record. These medical examinations are reviewed by the staff of the Health Center and if special problems present themselves the student will be asked to visit with a physician upon arrival in Manhattan. Each entering student is required to present himself at the Health Center for the purpose of ruling out communicable disease.

Students who have been out of KSU longer than three years must present a current physical examination to the Health Center for evaluation. Students returning within three years must visit the Lafene Health Center for an evaluation and necessary tests, but a current physical examination is not required.

Students are welcome to visit the Health Center any time for a personal view of the facilities and are urged to bring their medical questions or concerns to the professional staff.

K-State Union

RICHARD D. BLACKBURN, Director

The K-State Union is the "campus community center," offering extensive facilities for social, recreational, and cultural life. The five-level structure includes a cafeteria-snack bar, a ballroom divisible into five areas, 35 meeting rooms, banquet and party rooms, recreation facilities (bowling, billiards, table tennis, etc.), a little-theatre, activities center, lounges, and a central information desk.

A \$2.8 million addition was opened in the fall of 1970. The new areas include a 576-seat auditorium, bookstore, enlarged space for student activities, a completely renovated and expanded cafeteria-snack bar, a spacious interior courtyard, private dining rooms and meeting rooms.

Financed by a bond issue paid by student fees, the Union was opened in 1956. No tax funds were used in its construction. It is operated on a self-supporting basis with income from operating units and student fees.

The K-State Union provides about 150 student organizations with 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 more than 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 program committees are: Campus Entertainment, K-Purrs, Magic Lantern Company, News and Views, Open Circle, Recreation, and Trips and Tours. All students are invited to apply for membership on one of these committees.

Intramurals and Recreation

DONALD L. ROSE, Director

The intramural athletic and recreational program at KSU encompasses many sports. It ranks in the top 20 universities in terms of outdoor facilities and is striving to increase its indoor facilities.

Record student interest and participation make the intramural programs an important part of the University. Students can participate in the following intercollegiate sports: Men—soccer, judo, crew, and sports parachuting; Women — basketball, gymnastics, field hockey, volleyball, softball, and tennis.

Intramural competition is available in the following activities:

Men. Flag football, swimming, golf, cross country, horseshoes—singles & doubles, handball—singles & doubles, tennis—singles & doubles, volleyball, bowling, wrestling, badminton, basketball, table tennis, softball, free throw tourney, and track.

Women. Table tennis, golf, kickball, swimming, bowling, volleyball, badminton, basketball, softball, tennis, track, and canoeing.

While competition is keen in intramurals, you don't have to be a skilled player to

compete and enjoy the sports. The physical activities and social contacts are more important than winning or losing, and sportsmanship and fair play are stressed. There are opportunities to be employed on the student payroll as a referee or game official.

In addition to organized intramural programs for men and women students, the department sponsors as much free play and recreational use of its facilities for faculty-staff and their families as is possible. Intramural facilities include the Nichols Gymnasium pool, Ahearn Gymnasium, the L. P. Washburn Recreational Complex (outdoor) and the canoes and shells at the K-State Boathouse on Tuttle Creek Reservoir, largest lake in the state.

Operation of Motor Vehicles

Possession of cars by students is discouraged. All motor vehicles operated on the campus or in Manhattan must be registered with the University Traffic and Security Office. Students living in residence halls and freshmen cannot secure parking permits for the campus proper. However, residence hall students can purchase a parking permit for their residence hall lot only. Driving and parking of motor vehicles are governed by regulations established by a student-faculty Traffic and Parking Committee, by authority of Chapter 484 of the Laws of Kansas, 1957.

Student Organizations

The traditional concept of extracurricular activities on the University campus has changed quite dramatically in the last few years.

Students have become vitally interested in the processes of higher education and in the great issues facing our society. The kinds of organizations and activities with which they are involved have also changed to reflect these current concerns. Organizations such as the University for Man, Coeds in Service, and Citizens for a Better Environment have been created as organized efforts to solve problems and provide new opportunities for learning.

Certainly the traditional pep clubs and dance groups still play an important part in the student's out-of-class life by providing

recreational opportunities and the chance to make new friends.

The views of faculty members and administrators regarding student organizations and activities also have changed to accommodate student involvement in new roles and levels of participation.

Students have demonstrated both the desire and the ability to accept responsibility for their own activities and to participate in the governance of our institutions of higher education.

Departmental clubs and organizations, which once sponsored the "annual field trip," are now playing active roles in curriculum selection and course evaluation.

The annual Activities Carnival held each fall in the K-State Union provides the University community an opportunity to meet many of the recognized campus organizations. Organizations set up booths and displays to explain and promote their activities and to solicit new members.

Interest Groups (Membership Open)

AFROTC Cadet Ladies Club
Agricultural Education Wives
Amateur Radio Club
Anaschematisme Ephemeris
Arab-American Club
Associated Married Students
Bahai Club
Cadet Ladies Club (Air Force Auxiliary)
Chaparajos Club
Chinese Student Association
Citizens for Better Environment
Classical Guitar Club
Collegiate FFA
Collegiate 4-H
Collegiate Young Democrats
Committee for Student Awareness
Community Sisters
Cosmopolitan Club
Dames Club (Student Wives)
Flying Club
Forensic Club
Graduate Chemistry Wives
Hoedowners (Square Dance)
Intramurals, All Sports
Judo Club
Kappa Alpha Psi
K-State Players (Drama)
KSU Travel Association
Korean Student Association
Latin American Association
Off-Campus Women
Pakistan Association
People to People

Persian Association
Phi Delta Gamma (Graduate Women)
Ski Club
Sports Car Club
Statesmates
Sports Parachute Club
University Extension Club
University for Man
Women's Recreation Association
Young Americans for Freedom
Young Republicans

Interest Groups (Membership Selected)

African Student Association
Angel Flight
Campus Girl Scouts
Cheerleaders
Diamond Darlings
Engin-Dears
Formosan Association
Gibson Girls
Grid Getters
India Association
Iranian Student Organization
K-State Boosters Club
K-State Fencing Club
K-State Union Committees
K-Steppers (Twirlers)
Light Brigade
Orchesis (Dance)
Pershing Rifles (Military)
ROTC Band
ROTC Chorus
Soccer Club
Statesmen (Men's Pep)
Students for Positive Action
The Commune
Touchstone (Student Magazine)
Varsity Rifle Team

Music Interest Groups

A Cappella Choir
Band
 Marching
 Basketball Pep
 Concert
 Varsity
Ensembles
 Brass, Percussion
 String, Woodwind
Jazz Workshop Ensemble
K-State Singers
Madrigal Ensemble
Men's Glee
 Apollo
 Varsity
Oratorio Choir
Orchestra
Women's Glee

Home Economics Interest Groups

Clothing and Textiles
 Family and Child Development
 General Journalism
 Nursing
 Professional Foods
 Teaching

Professional

Alpha Chi Sigma (Chemical Engineering, Biochemistry)
 Alpha Kappa Psi (Business Administration)
 Alpha Tau Alpha (Agricultural Education)
 American Chemical Society
 American Institute of Aeronautics and Astronautics
 American Institute of Architects
 American Institute of Chemical Engineers
 American Institute of Industrial Engineers
 American Institute of Physics
 American Nuclear Society
 American Society of Agricultural Engineers
 American Society of Civil Engineers
 American Society of Landscape Architects
 Bakery Management Club
 Gamma Theta Upsilon (Geography)
 Institute of Electrical and Electronics Engineers
 Kappa Alpha Mu (Photojournalism)
 Music Educators National Conference (MENC)
 Phi Chi Theta
 Phi Delta Kappa (Men's Education)
 Phi Epsilon Delta (Women's Physical Education)
 Phi Epsilon Kappa (Men's Physical Education)
 Sigma Delta Chi (Journalism)
 Society of American Military Engineers
 Steel Ring (Engineering and Architecture)
 Theta Sigma Phi (Women Journalists)

Student Chapters

American Society of Landscape Architects
 American Veterinary Medical Association
 Associated General Contractors of America
 Wildlife Society

Departmental

Agricultural Economics Club
 Agricultural Education Club
 Agricultural Mechanization Club
 Alpha Pi Mu
 Block and Bridle (Animal Husbandry)
 Dairy Science Club
 Entomology Club
 Geography Club
 German Club
 Horticulture Club
 KSU Association of Student Foresters
 Little American Royal Association
 Microbiology Club
 Milling Association
 Poultry Science Club
 Pre-Veterinary Medical Club
 Psychology Club
 Student Education Association
 Theta Alpha Phi
 Wheat State Agronomy Club

Student Government

All-College Councils
 Associated Women Students
 Board of Student Publications
 Campus Political Parties
 Graduate Students Association
 Interfraternity Council
 International Coordinating Council
 Junior Panhellenic Council
 K.S.U. Association of Residence Halls
 Panhellenic Council
 Pep Coordinating Council
 Student Governing Association
 Union Governing Board

Service

Alpha Phi Omega (Scouting)
 Circle-K
 Coeds in Service



AGRICULTURE

GLENN H. BECK, Vice President for
Agriculture

Agriculture at Kansas State University includes instruction, research, extension, and international agriculture. County agents, branch experimental stations, experimental fields throughout the state, and programs of agricultural education in other countries are a part of agriculture. Under the vice president for agriculture are four administrators: the dean of the College of Agriculture, the director of the Experiment Station, the director of Cooperative Extension, and the director of International Agriculture.

THE COLLEGE OF AGRICULTURE

CARROLL V. HESS, Dean
FRANK R. CARPENTER, Assistant Dean
DAVID J. MUGLER, Assistant Dean

Objectives

The College of Agriculture offers 22 academic programs. Most have four options: production, science, services, and business-industry. Other curricula, namely, those in Grain Science & Industry, Natural Resource Management, and Dairy Foods Science and Industry, offer three options. The many curricula and options provide flexibility to meet the needs of students who will be entering the broad field of professional agriculture. All programs are designed to bring about changes in students in the following areas:

1. Knowledge and understanding. Here the student is directed toward the mastery of one

or more important areas of scientific agriculture. He gains understanding of supporting areas so that he can reason and grasp new technological developments, and assist in solving practical problems.

2. Professional attitudes and orientation. This phase of the student's education helps him identify with and understand professional agriculture, its ethics, and goals, and how to continue learning through life.

3. Skills. Part of the student's training is the development of abilities and skills to perform tasks efficiently and expertly in his area of professional agriculture.

4. Personal and leadership development. An important part of each student's training is the development of an appreciation for the present day civilization. The student needs to understand that many subject areas are required to solve some problems. He needs to develop and understand his philosophy of life and values, and develop his abilities to work with others in the role of leadership as well as being a supporter of others.

The Profession

Professional agriculture is the application of the physical, biological and social sciences and 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, economics development and related fields. This broad profession also includes areas such as soil physics, animal nutrition, cereal chemistry, and land economics.

Examples of positions held by recent agriculture 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, USDA
13. Commission salesman, livestock market
14. Editor, flower and garden magazine
15. Assistant manager, pork department of meat
16. Economist, Foreign Agricultural Service, USDA
17. Farm or ranch manager
18. Owner, city flower shop
19. Medical entomologist
20. Meat inspector

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 work closely with extension specialists. Such integration of teaching, research, and extension helps insure that courses are current, factual and relevant.

Facilities

Effective instruction in the application of basic sciences to modern agricultural industries requires land, buildings, livestock, and equipment. Over 4,000 acres of land are used for experimental work and for instruction.

A feed mill, flour mill, and bakery include modern equipment from eight countries. Well-equipped drafting rooms are used by milling students. Greenhouses and field plots provide plants for horticulture courses.

Modern Animal Industry and Dairy and Poultry buildings 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. Poultry and livestock of many breeds, plus various soil types, field crops, fruits, vegetables, and ornamentals are used in teaching and research.

Student Selection of a Major

A majority of students select a curriculum or major at the time they enter the College. They are provided an academic adviser in their major field. A student enrolls in General Agriculture if he wants to enter some part of professional agriculture but is not yet ready to identify a particular major. He is assigned an academic adviser who is a representative of the dean's office. These students are urged to choose a 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.

Some programs are closely related to agricultural resources and products. For example agronomy is related to crops and soils, and animal science and industry to livestock and livestock products.

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.

Many students work part time in the laboratories, greenhouses and on the farms. This experience adds greatly to students' learning and understanding.

Professional Programs in Agriculture

1. Agricultural Economics; B.S., M.S., Ph.D., p. 35.
2. Agricultural Education (teaching); B.S., M.S., p. 39.
3. Agricultural Journalism; B.S., p. 40.
4. Agricultural Mechanization; B.S., M.S., p. 40.
5. Agronomy (Crops and Soils); B.S., M.S., Ph.D., p. 40.
6. Animal Science & Industry; B.S., M.S., Ph.D., p. 43.
7. Bakery Science & Mgmt.; B.S., M.S., Ph.D., p. 54.
8. Biochemistry; B.S., M.S., Ph.D., p. 45.
9. Dairy Foods Science & Industry; B.S., M.S., p. 48.
10. Dairy Production; B.S., M.S., p. 48.
11. Entomology; B.S., M.S., Ph.D., p. 51.
12. Feed Science & Mgmt.; B.S., M.S., Ph.D., p. 54.
13. Milling Science & Mgmt.; B.S., M.S., Ph.D., p. 55.
14. Horticulture; B.S., M.S., Ph.D., p. 57.
15. Horticultural Therapy; B.S., p. 58.
16. Natural Resources Management; B.S., p. 61.
17. Plant Pathology; B.S., M.S., Ph.D., p. 62.
18. Poultry Science; B.S., M.S., p. 48.
19. Pre-Forestry (2 years); p. 58.
20. Pre-Veterinary Medicine (2 years), p. 35.

Options and Courses Required

Courses	Science	Business and Industries	Production	Services
Agriculture:				
Soils Plant Sci. Prin. An. Sci. or Basic An. Sci. & Ind. Prin. Ag. Econ. Engg. in Ag. Econ. Entom. Plant Path. Natural Resources and Man Intro. Food Sci. & Tech.	Five of the courses listed (three for Ag. Econ. and Entomol- ogy majors).	Prin. Ag. Econ., a second Ag. Econ. course, and 12 credits in other courses listed.	Four of the courses listed.	Prin. of Ag. Econ. plus four other courses listed.
Biological Science:				
Gen. Botany ¹ Gen. Zoology ¹ Genetics Microbiol. Envir. Biol.	Gen. Botany or Gen. Zoology plus two ² other courses listed.	Gen. Bot. or Gen. Zoology plus one ³ other course listed.	Gen. Bot. or Gen. Zoology plus one ³ other course listed.	Gen. Bot. or Gen. Zoology plus one ³ other course listed.
Mathematics, Statistics, and Computer Science:				
Plane Trig. Calc. I Elem. Stat. ⁴ Elem. Dig. Comp. Fund. Comp. Prog.	Plane Trig. plus two other courses listed.	Two of courses listed.	One of courses listed.	Elem. Stat. ⁵ plus one other course listed.
Physical Science:				
Desc. Physics Physics I Physics II Physical Geol. Chem II Chem Anal. Elem. Org. Chem. Gen. Org. Chem. Org. Chem. I Intro. Org. Chem. & Biochem. Elem. Biochem. Gen. Biochem.	One course from each of three of the four groups (one course from two of the four groups for Ag. Econ. majors).	One of courses listed.	Two of courses listed, including one Org. Chem. course or the course Intro. to Org. & Biochem.	One physical science listed, plus: Gen. Psych. Social Psych. Intro. to Soc. Comm. Org. & Lead. Adm. Process or Adm. Policy Pub. Finance Ethics or Prof. Ethics Elem. Logic Acctg. Meth. of Ext. Teaching Persuasion Group Discussion
Business Administration and Agricultural Economics:				
Managerial Accounting Small Bus. Operations Business Finance Business Law I Production Mgmt. Money and Banking Labor Economics Prin. of Transportation All courses in Ag. Econ. with a 400 or higher course number	Fund. of Accounting or Mgmt. Concepts.	Fund. of Accounting and Mgmt. Concepts plus 3 courses listed.	Fund. of Accounting or Mgmt. Concepts	

1. The combination of Prin. of Biol. and Organismic Biology may be substituted for the combination of Gen. Bot. and Gen. Zool. Principles of Biology may substitute for Gen. Bot. or Gen. Zool.
2. One of these may be General Botany or General Zoology.

3. May be General Botany or General Zoology.
4. Stat. Meth. I may substitute.
5. Ag. Econ. Stat. may substitute.

Science Option

(Preparation for Research & Graduate Study)

Nearly 30 per cent of recent graduates are in graduate school, aiming for M.S. or Ph.D. degrees. Graduate students will do best if their undergraduate programs were strong in the basic sciences — mathematics, botany, zoology, physics, chemistry, statistics, computer science, economics, and in communications.

Business and Industries Option

About 25 per cent of recent graduates of the College of Agriculture are now employed in industry as salesmen, plant superintendents, buyers, and writers. This shows that many students should take courses to prepare them to compete in industry. Suggested course areas include: accounting, labor relations, corporation law, sales psychology, and journalism.

Production Option

Those who plan to farm or ranch should consider their future community responsibilities and the changing characteristics of farming as they select their courses. Farmers will want to understand state and local government, principles of taxation, and corporation law as applied to farms, in addition to the technology of crop and livestock production.

Services Option

This option is for personnel who will be working in administration, education and services. These areas require a broad understanding of agriculture, including production, assembly, processing and distribution. In addition future workers in these areas must develop some knowledge of the social sciences and humanities. Fields of employment which majors in this option enter include: cooperative extension, economic planning and development, recreation administration, and positions in many other public agencies and private businesses.

In addition to one of the options each student will complete courses prescribed by his major department.

Suggested Humanities and Social Science Electives

Art—Courses in appreciation and theory
 Economics (above Economics I)
 English—Any except courses in composition
 Geography—Any except Physical Geography I and II
 Philosophy—Any course
 Modern Languages—Any course
 Music—Any course in theory or appreciation of music
 Speech—Any course in theater and interpretation
 History—Any course
 College of Architecture and Design—Any course in history or appreciation of architecture
 Sociology and Anthropology—Any course
 Political Science—Any course
 Psychology—Any course

Suggested Communications Courses

035 110 Agricultural Student Magazine (1-2)
 229 200 English Composition III (3)
 281 176 Argumentation and Debate (3)
 281 200 Oral Communications II (2)
 281 608 Persuasion (3)
 281 616 Group Discussion Methods (3)
 289 306 Reporting I (3)
 289 350 Agricultural Journalism (3)
 290 152 Radio-Television Speech Procedures (3)
 (Recommended but currently available to
 radio-tv majors only)
 305 310 Administrative Communications (3)
 305 343 Sales Communications (3)

Agriculture and Business Administration Degree Combinations

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 professionally trained personnel in increasing numbers. 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. degree to the Ph.D. degree.

Agricultural businesses have expanded in size and number in Kansas. The College of Business Administration and College of Agriculture have identified the following programs that will prepare young people for some of the jobs in this vast complex. Academic years listed are estimates.

1. A Bachelor of Science degree in some discipline within the College of Agriculture followed by a Master's degree in Business Administration (see p. 178). 5½ academic years.
2. A Bachelor of Science degree in some discipline within the College of Agriculture, followed by a B.S. degree in Business Administration (see p. 177). 5 academic years.
3. A Bachelor of Science 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 178). 4 academic years.
4. A Bachelor of Science degree in Business Administration, including in the degree program a group of elective courses in some discipline within Agriculture.
5. A Bachelor of Science 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 Business Administration. 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 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.

For Prospective 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 63 semester hours listed below, with exceptions and variations footnoted, can be transferred to any of the professional programs listed below and a degree earned in four semesters by capable students with good academic records.

Course	Semester Hours
English I & II	6
Speech	2
Other communications such as Journalism or a second speech course	3 ^{1,2}
College Algebra	3 ³
Trigonometry	3 ⁴
Calculus	5 ⁵
Chemistry (Inorganic)	8 ⁶
Organic Chemistry	3 ⁶
Economics I	3 ²
General Physics	5 ⁷
Humanities	6
Social Sciences	6 ¹
General Botany	5 ⁸
General Zoology	5 ⁹
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Professional Programs in Agriculture

1. Agricultural Economics; B.S., M.S., Ph.D.
2. Agricultural Education (teaching); B.S., M.S.
3. Agricultural Journalism; B.S.
4. Agricultural Mechanization; B.S., M.S.
5. Agronomy (Crops and Soils); B.S., M.S., Ph.D.
6. Animal Science & Industry; B.S., M.S., Ph.D.
7. Bakery Science & Management; B.S., M.S., Ph.D.
8. Biochemistry; B.S., M.S., Ph.D.
9. Dairy Foods Science & Industry; B.S., M.S.
10. Dairy Production; B.S., M.S.
11. Entomology; B.S., M.S., Ph.D.
12. Feed Science & Management; B.S., M.S., Ph.D.
13. Milling Science & Management; B.S., M.S., Ph.D.
14. Horticulture; B.S., M.S., Ph.D.
15. Horticultural Therapy; B. S.
16. Natural Resource Management; B.S.
17. Plant Pathology; B.S., M.S., Ph.D.
18. Poultry Science; B.S., M.S.
19. Pre-Forestry (2 years)
20. Pre-Veterinary Medicine (2 years)

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 organic chemistry and two hours engineering graphics.

2. For Biochemistry, replace with one semester of quantitative analysis and or a second semester of Organic Chemistry, Physics, or Calculus.

3. Required only in Professional Programs number 4, 7, 8, 9, 12, 13, 16, 17, 19 and 20.

4. Required only in chemistry and operations options of 7, 12, 13 and in 8.

5. Eight hours required in all except that only five hours are required in 1, 2, 3, 4, 6, 10, 15 and 18.

6. Not required in 1, 3, 4, 10, 14, 15, 18, 19 and option "B" of 16.

7. Required only in 4, 7, 8, 9, 12, 13, 16, 17, 19 and 20.

8. Not required in 3, 4, 7, 8, 9, 12, 13 and 20.

9. Not required in 3, 4, 7, 8, 12, 13, 14, 15 and 19.

Pre-Veterinary Medicine Program^{1,2}

Freshman	
Ag Orientation	1
Chemistry I	5
English Composition I	3
Principles of Animal Science	3
Animal Science and Industry	1
Physical Education	0
	13
Prin. of Biology	4
Chemistry II	3
Plane Trigonometry	3
Dairy Science	1
Humanities or Social Science Elec.	3
English Composition II	3
Physical Education	0
	17
Sophomore	
Physics I	4
General Organic Chemistry	5
Humanities or Social Science Elec.	6
Poultry Science	1
	16
Physics II	4
Genetics	3
Humanities or Social Science Elec.	3
Oral Communications I	2
Chemical Analysis	4
General Elective	1
	17

DEPARTMENTS AND COURSE OFFERINGS

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

EDGAR S. BAGLEY,* Assistant Head, Teaching and Graduate Studies

NORMAN V. WHITEHAIR,* Assistant Head, Extension

Professors Kelley*, Coppersmith*, Manuel*, McCoy*, Orazem*, Phillips*, Pine*, Schruben*, Scoville*, Sjo*, Sorenson*, and Whitehair*; Associate Professors Buller*, Erickson*, Knight*, Koudele*, Norman*, Schlender, Thomas and Walker; Assistant Professors Baker, Biere*, Brinkman, Fenwick, Figurski, Flinchbaugh, Frazier, Frederick, Kingsley, Langemeier*, McReynolds, Olsen, Overly, Treat, Vacin, and Whipps; Emeritus: President Farrell*, Dean Howe*, Professors Coolidge, Montgomery*, Jaccard; Associate Professor Otto*.

Undergraduate Study

Bachelor of Science in Agriculture; requires 126 semester hours

Agricultural economics, as a social science, is concerned with the administration and management of agriculture. The curriculum in agricultural economics provides an opportunity to explore these areas in depth. Nearly one-half the requirements are elec-

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

2. Pre-Veterinary Medicine requirements may also be completed in the College of Arts and Sciences.

tives. This provides flexibility for the student and his adviser to develop a program of study meeting the interests, needs, and career objectives of each student. Transfer students from junior colleges, from other majors, and from the general agriculture program should find this flexibility well-suited to their needs.

The curriculum in agricultural economics has three options for specialization: (1) agricultural business (including both farm and agribusiness management), (2) agricultural programs, and (3) professional agricultural economics. The curriculum in Natural Resource Management, with its Resource Administration option, is discussed on page 61.

Agricultural Business. Students interested in combining agriculture and business management for agribusiness management or for farm management careers find this option places emphasis on agriculture, economics, and business administration courses. Those interested in farm management may give more emphasis to livestock production, crop production, or farm machinery than those interested in agribusiness. About 40 percent of agricultural economics graduates will find employment in agribusiness such as banking, management, sales, finance, credit, and insurance. About 20 percent will work with farm production problems as farmers, farm managers or farm advisers.

Agricultural Programs. A student seeking a career in public administration and service in agriculture such as county extension, information (radio, TV, or the press), federal or state agricultural and environmental programs, and international agriculture will find the agricultural programs option provides the opportunity to emphasize courses in administration, communications, and public policy along with courses in agriculture and agricultural economics. Students may use the agricultural programs option as a pre-professional course of study for fields such as law or theology.

Professional Agricultural Economics. Students with good academic backgrounds (B+ or better) who are interested in teaching, research, and extension work as agricultural economists will find the professional agricultural economics option provides the opportunity to study economics

as a science. Complementary to the emphasis on economic theory, the student builds his skills in methods of analysis through courses in mathematics, statistics, and computer science.

General Requirements. All options have the following common course requirements with the special requirements listed separately under each option. It is suggested students follow courses in the sequence as listed:

229	100	English Composition I	3
229	120	English Composition II	3
281	105	Oral Communications I	2
245	100	College Algebra	3
225	110	Economics I	3
221	110	General Chemistry	5
		Physical Education ¹	0
		Physical Education ¹	0
		Humanities ¹	6
269	110	Principles of Political Science	3
227	211	Introduction to Sociology	3
215	198	Principles of Biology	4
		Agriculture ²	12

Department Requirements

Major Courses			
010	100	Principles of Agricultural Economics ³	3
010	400	Production Economics	3
010	405	Agricultural Market Structures	3
		Major Electives ¹	15

Supporting Courses			
		A statistics course ¹	3
		Two communications courses ¹	6
273	110	General Psychology	3
305	275	Fundamentals of Accounting	4
		Fundamentals of Computer Programming	3
		Supporting electives ¹	20

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

Professional Agriculture	
Business Administration	
Extension Education	
Economics, Political Science, Sociology, and Psychology	
General electives	15

These may be selected by student with the consent of his adviser to fulfill the student's personal educational interests and objectives.

Resource Administration Option (Natural Resource Management Curriculum). This option provides an opportunity for students to combine an interest in economic principles with concern for the environment and the conservation of renewable natural resources. Two members of the department serve on a College of Agriculture interdepartmental committee that administers the Natural Resource Management curriculum. This curriculum and the Resource Administration option requirements are described on page 61.

Graduate Study

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

1. To be selected with the advice and consent of the student's adviser.

2. To be selected from 005 102 Principles of Animal Science, 015 200 Plant Science, 015 270 Soils, 035 100 Introductory Food Science & Technology.

3. A second introductory general economics course may be substituted, i.e., Economics II.

offered in the department. Research for these may be in marketing, farm management, finance, land economics, conservation, prices, production economics, taxation, agricultural policy, international development, agricultural business and industry and in 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.

Courses In Agricultural Economics

UNDERGRADUATE CREDIT (no prerequisite - open to all university students)

010 100. Principles of Agricultural Economics. (3) I, II. A course suggested for all students interested in the agricultural economy. A study of economic principles, with emphasis on their application to the solution of farm, agribusiness, and agricultural industry problems in relationship to other sectors of the United States economy and foreign countries. No prerequisite. Three hours lecture a week.

010 101. Economics of Population, Food and Environment. (3) I. A course suggested for all students interested in population, food, and environmental problems. Survey of the impact of economic activity on ecology; the population explosion and world food problems; the effect of economic advancement on the rate of resource utilization. No prerequisite. Three hours lecture a week.

010 102. Rural Poverty. (3) II. A course suggested for all students concerned with rural poverty problems. The American experience will serve as a laboratory for student study. Survey the nature and extent of rural poverty and its changes, and relate to location, occupation, race, migration, industrialization, education, vocational training and public policies. No prerequisite. Three hours lecture a week.

010 170. Natural Resources and Man. (3) I,II. An introductory course that assesses the environment to acquaint students with the kinds and extent of natural resources, their availability, and utilization. No prerequisite. Three hours lecture a week. See also 015 170, Agronomy and 040 170, Horticulture.

UNDERGRADUATE CREDIT

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.

UNDERGRADUATE CREDIT AND GRADUATE CREDIT IN MINOR FIELD

010 400. Production Economics. (3) I. Application of economic principles to problems of agriculture. Economic structure and aspects of American

agriculture; analysis of demand, supply, production of agricultural products with particular reference to the farm. Ag. Econ. 405 is a continuation of this course and they are intended to be taken in consecutive semesters. Three hours recitation a week. Pr.: Ag. Econ. 100 or Econ. 120.

010 405. Agricultural Market Structures. (3) II. Continuation of Ag. Econ. 400. Theory and application of economic principles to marketing problems in agriculture. Pricing of agricultural output and productive services under various forms of economic organization and competition; regional specialization location, and trade; determinants of economic change; evaluation of economic and consumer welfare. Three hours recitation a week. Pr.: Ag. Econ. 400.

010 410. Agricultural Policy (3) II. Analytical treatment of recent and current economic problems and governmental policies and programs affecting American agriculture, will include price and income problems, rural development, and rural poverty. Three hours recitation a week. Pr.: Junior standing.

010 411. Consumption Economics in Agriculture. (3) I. Factors determining consumption patterns of individuals and households; contributions of economics and other social sciences in study of consumer behavior; macroeconomics of food consumption and distribution; consumption analyses related to problems of agriculture. Three hours recitation a week. Pr.: Econ. 110.

010 412. Farm Management. (3) II. Principles and practices of organization and management; nature and structure of business; functions and operations; management tools; decision making processes. Two hours recitation and two hours laboratory a week. Pr.: Econ. 110 and Ag. Econ. 100 or Econ. 120.

010 413. Farm Resource Acquisition and Finance. (3) I. Acquisition of resources needed for farms and ranches through purchasing, leasing, and other contractual arrangements; financing resource acquisition; resource market structure and pricing; financial management. Three hours recitation a week. Pr.: Econ. 110.

010 414. Economics of Food Marketing. (3) I. Problems of assembly of farm products for processing and the marketing of the final food products. Special attention will be given to purchasing and distributing problems of dairy, poultry and meat processing. Three hours recitation a week and field trips. Pr.: Econ. 110.

010 415. International Agricultural Development. (3) II. A study of principles of economic development and national and international policies that will stimulate development. Individual study is encouraged to meet student interests for understanding the problems and policies for agricultural development and the influence of such development on international policies of the United States. Three hours recitation a week. Pr.: Econ. 110.

010 416. Agricultural Law and Economics. (3) I. The legal framework impinging upon decision making by farm firms, families and individuals; liabilities, real and personal property, contracts, uniform commercial code, organization of farm firms, intergeneration property transfers, water law, fence law, federal and state regulatory power, insurance, income tax and social security. Three hours recitation a week. Pr.: Econ. 110 and Junior standing.

010 417. Rural Banking. (3) II. Management of banks in rural areas including organization and personnel, sources and uses of funds, credit, and services, particularly farmers and agricultural businesses; the role of rural banks in the U.S. banking system. Two hours recitation and two hours laboratory a week, including field trips and guest bankers. Pr.: Econ. 110, B.A. 275, and Junior standing.

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 management of marketing and farm supply firms. Three hours recitation a week. Pr.: Ag. Econ. 100 or Econ. 120 and B.A. 275.

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 the instructor.

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. Two hours recitation and two hours laboratory a week. Pr.: Econ. 110 and Math. 100.

UNDERGRADUATE CREDIT (not available as major electives) AND GRADUATE CREDIT IN MINOR FIELD

010 510 Grain Marketing. (3) I. The general areas covered include price influences and relationships, market structure, buying and selling problems, domestic and export trade; grain trade organization and regulation. Three hours recitation a week, including field trips. Pr.: Econ. 110.

010 511. Livestock and Meat Marketing. (3) II. A study of the market structure and organization of the livestock-meat economy; with emphasis on factors affecting prices, changing competitive market arrangements, and marketing problems of farmers and ranchers, market agencies, and processing firms. Three hours recitation a week. Pr.: Econ. 110.

010 512. Ranch and Feedlot Management. (3) I. Organization and management of a ranch or feedlot; selection of a livestock system; economics of size of business; financial management of the business. Two hours recitation and two hours laboratory or field trips a week. Pr.: Econ. 110.

UNDERGRADUATE AND GRADUATE CREDIT

010 600. Bargaining and Cooperation in Agriculture. (3) I. A study of collective bargaining and cooperative activity in agriculture. Other marketing institutions such as marketing orders, marketing agreements, and agricultural marketing boards will be included. Emphasis is placed upon assessing the potential of these marketing techniques to strengthen the economic position of farmers in the economy. Three hours recitation a week. Pr.: Junior standing.

010 605. Price Analysis. (3) II. The analysis of selected agricultural prices; application of regression analysis to price analysis and special econometric considerations.

Three hours recitation a week. Pr.: Ag. Econ. 400 and 480.

010 610. Quantitative Methods in Agricultural Marketing Firms. (3) I. Application of mathematical programming and other operations research techniques to practical management problems in agriculture. Two hours recitation and two hours laboratory per week. Pr.: Ag. Econ. 431 or consent of instructor.

010 612. Economic Analysis of Farm Firms. (3) II. The application of methods such as correlation, regression and linear programming for solving farm business problems and how results are used in decision making. Three hours recitation a week. Pr.: Ag. Econ. 400 and Stat. 520, or consent of instructor.

010 625. Natural Resources Economics. (3) I. Supply and demand for natural resources; optimal development, use and conservation of natural resources within welfare economics; benefit-cost analyses; public and private ownership and control over natural resources; particular attention given to recreational uses of resources, forests, wildlife, and urban uses of natural resources; quality, esthetic, and other non-market factors associated with natural resources. Three hours of recitation a week. Pr.: Econ. 110 and Junior standing.

010 630. Rural Human Resource Development. (3) II. Study of the nature of community development, the problems facing rural communities, and alternative solutions. Emphasis is placed on identifying problems, studying background materials such as public decision making, property rights taxation, zoning, etc., and developing communities through industrialization recreation, agricultural businesses and the creation of new employment centers. Three hours of recitation and field work a week. Pr.: Junior standing.

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.: Consent of instructor.

GRADUATE CREDIT

010 801. Seminar in International Agricultural Development. (3) II. Reading, study, analysis and group discussion of (a) important problems of agricultural development in underdeveloped regions, (b) relevant development, theories and (c) approaches to agricultural development, 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 relation 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.

010 822. 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. Econ. 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.: 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 as they relate to marketing; tools of analysis for solving marketing problems. Pr.: Ag. Econ. 405 and B.A. 275 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. 410 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.

Agricultural Education

B.S. in Agriculture; requires 126 sem. hrs.

Agricultural Education is for those interested in becoming teachers of vocational agriculture in high schools, teachers of agriculture in area vocational schools, or entering other educational work in agriculture, 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

Fall Semester			Course	Sem. Hrs.
General Agriculture	035	101	Ag Orientation	1
English	229	100	English Composition I	3
Mathematics	245	100	College Algebra	3
Botany	215	210	General Botany	4
			Elective Agricultural Science ..	3
Physical Education	261	011	Physical Education	0

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Spring Semester				English Composition II	3
English	229	120		General Psychology	3
Psychology	273	110		General Chemistry	5
Chemistry	221	110		Plant Science	4
Horticulture	040	200		Physical Education	0
Physical Education	261	011			15
SOPHOMORE					
Fall Semester				General Zoology	4
Zoology	215	205		Ag. Mechanics Practices	2
Ag. Engg.	506	151		Educational Psychology I	3
Education	405	202		Economics I	3
Economics	225	110		Oral Communications I	2
Speech	281	105		General Elective	1
					15
Spring Semester				Intro. Bio. & Org. Chem.	5
Biochemistry	020	120		Soils	4
Agronomy	015	270		Elective Agricultural Science ..	3
				Farm Power	3
Ag. Engg.	506	251		General Elective	1
					16
JUNIOR					
Fall Semester				Prin. of Ag. Econ.	3
Ag. Ec.	010	201		Educational Psychology II	3
Education	405	302		Literature or Language	3
				Elective Agricultural Science ..	3
				Elective Social Science	3
					15
Spring Semester				Prin. of Secondary Ed.	3
Education	415	450		Agricultural Journalism	3
Journalism	289	350		Elective Agricultural Science ..	3
				Ag. Engg. Elective	4
				Literature or Language	3
					16
SENIOR					
Fall Semester				Vocational Education	3
Education	410	702		Methods of Teaching Ag.	2
Education	410	500		Tchg. Partic. Sec. Sch.	8
Education	415	477		Ag. Mechanic Methods	3
Ag. Engg.	506	459		Ag. Machinery Operation	2
Ag. Engg.	506	351			18
Spring Semester				Ag. Engg. Elective	2
				General Elective	3
				Elective Social Science	3
				Elective Agricultural Science ..	8
					16

Specialty Certification—Special certification is available for those who wish to prepare for positions in multi-teacher departments. The combination of 16 required and elective credit hours in Agricultural Sciences from one of the following areas is required for specialty certification:

- 1. Animal Sciences
- 2. Crops and Soils
- 3. Horticulture
- 4. Ag. Mechanics
- 5. Agri-Business (Cr. from Ag. Econ and B.A.)

Eight weeks during the first or second semester of the senior year are devoted to fulltime 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, fall semester courses are moved to spring semester. See "Admission to Teacher Education" & "Admission to Student Teaching" in College of Education section of catalog.

Agricultural Journalism

B.S. in Agriculture; requires 126 sem. hrs.

Graduates with a major in agricultural journalism will be prepared to fill the critical need for specialists able to gather information on new developments and interpret it for farm people to use. Graduates will be able to write for farm newspapers and magazines, prepare radio and television scripts, serve as Extension and Experiment Station editors, write information for the USDA and edit company and business magazines.

Students majoring in this area take the following courses:

English Composition I	3
English Composition II	3
Oral Communication	2
Ag Orientation	1
College Algebra	3
Economics I	3
Chemistry I or General Chemistry	5
Physical Education I	0
Physical Education II	0
Humanities and/or Social Sci. (see pg. 34)	12
Communications (see pg. 34)	2 or 3

Other general requirements depend upon the option selected (see page 33.) A faculty adviser assists students in the selection of non-major and elective courses.

Journalism Courses

Agricultural Journalism	3
Reporting II	3
Editing	3
Photo-Journalism I	3
Principles of Advertising	3
Magazine Article Writing	3
Public Relations	3
Radio & TV News	2
Ag Student Magazine	4
Journalism Electives	3

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 Science
5. Entomology
6. Grain Science and Industry
7. Horticulture and Forestry
8. Poultry Science
9. Agricultural Mechanization

Agricultural Mechanization

B.S. in Agriculture; requires 126 sem. hrs.

(See Agricultural Engineering, page 208 for listing of faculty)

General Requirements

English Composition I	3
English Composition II	3
Oral Communications	2
Ag Orientation	1
College Algebra	3
Economics I	3
Chemistry I or General Chemistry	5
Physical Education I	0
Physical Education II	0
Communications	2 or 3
Social Sciences and Humanities	12

Other beginning and basic courses depend on the option selected (Science Option not used; Biological Sciences Option required in Business and Industry Option; Business and Industry Option requires at least 33 hours total credits in the combined areas of Economics, Agricultural Economics, Business Administration, and Industrial Engineering with at least 12 hours in Agricultural Economics and at least 3 courses in Business Administration. Economics II may be substituted for Principles of Agricultural Economics; In addition to Biological Sciences courses listed under the Production and Services Options, include Economic Entomology and Plant Pathology as electives). Options listed on page 33.

Department Requirements

Major Courses

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

Total credits of 24 hours required in Agricultural Engineering series 505 courses.

Supporting Courses

Graphic Comm., Anal. & Des. I 560 212	2
General Physics I	4
General Physics II	4
Plane Trigonometry	3
Principles of Biology	5

Professional Agriculture Courses

Principles of Animal Science	3
Animal Science and Industry 005 103 or Poultry Science or Dairy Science	1
Plant Science	4
Soils	4
Principles of Agricultural Economics	3
A minimum of 12 hours in one of the following:	
1. Agricultural Economics and Journalism	
2. Agronomy, Entomology, Horticulture, and Plant Pathology	
3. Animal Science and Industry, Dairy and Poultry Science	

Agricultural Mechanization is administered through the Department of Agricultural Engineering. See page 209 for "Courses for Students in Agriculture." Those courses are directed toward engineering applications, planning, servicing and management rather than toward engineering design. Most are open to all students in Agriculture.

This major is intended to meet the demands of modern agriculture for personnel engaged either in direct agricultural production or in service to the agricultural industry who are equipped to apply increasingly sophisticated decision-making processes to the management, marketing, and servicing of machine, facility, and energy application systems.

Agronomy

B.S. in Agriculture; requires 126 sem. hrs.

H. S. JACOBS,* Head of Department

Professors Bidwell,* Bieberly,* Casady,* Ellis,* Heyne,* Hobbs,* Jacobs,* Jones,* Mader,* Olson,* Pittenger,* Sorenson,* and Woodruff; Associate Professors Atkinson, Barnett,* Edelblute, Harper, Hyde,* Liang,* Murphy,* Nilson, Overley, Paulsen,* Peterson, Powers,* Sloan, Skidmore,* Teare,* Vanderlip,* Wassom,* Whitney,* and Withee,* Assistant Professors Dicken, Eaton,* Goltz,* Humburg, Kanemasu,* Lundquist, Lyles,* Moore, Nickell,* Owensby,* Raney, Stiegler, Swallow, Thien, and Walter; Instructors Bonne, Burchett, Gronau, Gruver, and Newton; Emeritus: Professors Anderson,* Axelton, Clapp, Cleavinger, Lind, Throckmorton,* and Zahnley.*

Undergraduate Study

Agronomy is the science of crops and soils. It attracts students with interests ranging

from soil management to the physics and chemistry of soils and from crop production to the study of photosynthesis, crop physiology and genetics.

Students majoring in agronomy are required to complete the following basic courses:

		Hrs.
229	100 English Composition I	3
229	120 English Composition II	3
281	105 Oral Communications	2
035	101 Ag Orientation	1
245	100 College Algebra	3
225	110 Economics I	3
221	210 Chemistry I	5
	Physical Education I and II	0
	Humanities and / or Social	
	Sciences (see pg. 34)	12
	Communications (see pg. 34)	2 or 3

There are four options available in agronomy: production, science, business and industry, and services. Programs in the science option include crop science, soil science, and range management. Students may also select the soil and water conservation option of the curriculum in Natural Resource Management, see page 61. This option provides an opportunity for students to combine an interest in the natural and physical sciences with a concern for the environment and the application of ecological principles.

Considerable flexibility in programs is possible.

All students in agronomy take 015 200 Plant Science and 015 270 Soils. Other courses taken in agronomy depend upon student interest and the option selected. Minimum requirements for the various options are given on page 33.

Farms, laboratories and greenhouses are used by the Department of Agronomy for both research and instruction.

Graduate Study

Graduate study leading to Master of Science and Doctor of Philosophy degrees is offered in the fields of crop production, crop physiology, crop ecology, pasture improvement, plant breeding, weed science, plant genetics, soil chemistry, soil fertility, soil physics, soil management, erosion, irrigation and soil classification.

Prerequisite to work for advanced degrees is the completion of an undergraduate curriculum substantially equivalent to that required of undergraduate students majoring in agronomy. This includes not only courses in agronomy but also courses in physical and biological science.

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. Not open to Juniors and Seniors except with consent of instructor.

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 two 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.

015 261. Market Grading of Cereals. (2) I. Market grades of cereals and factors that influence them. Six hours lab. a week. Pr.: Gr. Sci. 100.

015 270. Soils. (4) I, II. Fundamental chemical, physical and biological properties of soils; their formation, fertility and management. Two hours lec., one hour rec. and two hours lab. a week. Pr.: Chem. 110 or 210 or credit in high school chemistry with grade of A or B.

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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

015 400. Development and Classification of Soils. (3) II. Geologic, climatic, and plant interactions in soil formation and distribution and methods of mapping and classifying soils in the field; field trips. Two hours rec. and three hours lab. a week. Pr.: Geol. 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 265 401)

015 410. Range Management I. (3) II. Presents fundamental ecological principles of production, conservation, and utilization of grasslands. Applies these fundamental principles to range management. Three hours rec. a week. Pr.: Agron. 200.

015 430. Tropical Agronomy. (3) II. A study of the soils and plant materials of tropical areas, their distribution and use. Systems of agriculture and problems of agricultural production in tropical regions with emphasis on developing countries. Pr.: Junior standing and consent of instructor.

015 440. Plant Improvement. (3) I. Methods of breeding agricultural crops and evaluation, distribution and maintenance of crop varieties. Three hours rec. a week. Pr.: Agron. 200 (Joint listing with the Dept. of Horticulture and Forestry. See 040 440.)

UNDERGRADUATE AND GRADUATE CREDIT

015 600. Crop Problems. Credit arranged. I, II, S. Studies may be chosen in the fields of: Genetics, Crop Improvement, Pasture Improvement, Ecology, Weed Control, Plant Physiology, Production.

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.

015 630. Soil Problems. Credit arranged. I, II, S. 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 applications and manufacturing. Three hours rec. a week. Pr.: Agron. 200, 270.

015 660. Soil Physics. (3) I. 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.

015 666. Agricultural Climatology. (3) I. Offered 1972-73 and alt. years. A study of the soil-plant-atmosphere continuum with a laboratory in instrumentation. Two hours rec. and 3 hours of lab. a week. Pr.: Agron. 401 or 700 or consent of instructor.

015 670. Soil Analysis Application. (3) I. Offered 1971-72 and alt. years. 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. 271.

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 State College. Pr.: Agron. 410, Biol. 530. Suitable field experience may be substituted for these prerequisites with consent of instructor.

015 685. Principles of Plant Breeding. (3) I. The application of basic genetic principles for the improvement of plants. Three hours rec. a week. Pr.: A.S.I. 400 or equivalent (Joint listing with the Dept. of Horticulture and Forestry. See 040 685.)

015 690. Plant Genetics. (3) I. Concepts and application of basic genetic principles in higher plants. Measurement of linkage, mapping, aneuploidy analyses, gene transfer, and estimation of genetic parameters for quantitative characters. Three hours rec. a week. Pr.: A.S.I. 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 inter-dependency of these factors. Pr.: Agron. 200, 270 or consent of instructor.

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

015 711. Identification of Range and Pasture Plants. (2) II. Offered 1971-72 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.: Biol. 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. Not offered in 1971-72. (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 1971-72 and alt. years. 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, Biol. 530.

015 750. Soil Erosion and Its Control. (3) I. Offered 1972-73 and alt. years. Mechanics of wind and water erosion, methods of predicting quantities of erosion, principles and practices for erosion control. Three hours rec, a week. Pr.: Agron. 270, Phys. 211, or consent of instructor.

015 751. Soil Erosion Laboratory. (1) Offered 1972-73 and alt. years. Three hours lab. a week. Pr.: Agron. 270, 750, or conc. enrollment.

GRADUATE CREDIT

015 800. Agronomic Plant Breeding. (3) II. Offered in 1971-72 and alt. years. 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 and 685.

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.

015 835. Topics in Plant Breeding. Credit arranged. I, II, S. Discussion and lectures on important papers and contributions in this field. Pr.: Consent of instructor. (Joint listing with Dept. of Horticulture and Forestry. See 040 835.)

015 840. Advanced Crop Ecology. (3) I. Offered 1972-73 and alt. years. Principles of growth and development of crops in relation to the environment. Three hours rec. a week. Pr.: Agron. 700, or equiv., and Biol. 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. (Joint listing with the Dept. of Horticulture and Forestry. See 040 850.)

015 860. Advanced Forage Crops. (3) I. Offered 1971-72 and alt. years. Important forage crops 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 1972-73 and alt. years. Application of physical chemistry to soils; cation and anion equilibria, cation activities, electrokinetics, sorption and other physiochemical reactions in soils. Two hours rec, and three hours lab. a week. Pr.: Agron. 640, 660 and Chem. 585.

015 900. Advanced Soil Physics. (3) I. Offered 1971-72 and alt. years. An advanced study of prominent theories concerning the physical behavior of soils. Three hours rec. a week. Pr.: Agron. 660, Math. 222, Phys. 211.

015 920. Soil Genesis. (2) II. Offered 1972-73 and alt. years. Theories of soil formation processes. Two hours rec. a week. Pr.: Agron. 400.

Animal Science & Industry

B.S. in Agriculture; requires 126 sem. hrs.

DON L. GOOD,* Head of Department

Professors Koch,* Moyer, Richardson,* E. Smith,* and Wheat;* Associate Professors Allen,* Brent,* Francis, Harbers,* Hines,* Kiracofe,* Kropf,* McKee,* Schalles,* W. Smith,* Tuma,* and Zoellner; Assistant Professors Able,* Ahlschwede,* Allee,* Ames,* Armbruster, Bolsen,* Dikeman,* Schafer and Westmeyer; Instructors Hoover and McCollough; Emeritus Professors Aicher, Aubel, Cox, Mackintosh, McAdams, McCormick and Weber.

Courses in this department give the student instruction in the selection, breeding, feeding, management, and marketing of all classes of meat animals.

The animal science and industry buildings, lots and pastures are devoted to the maintenance of herds and flocks of purebred cattle, sheep, hogs, and horses, and to ex-

perimental projects with meat animals. All animals maintained by the department are used for class work.

Students majoring in Animal Science and Industry take the Following Courses:

General Requirements for the B.S. Degree

English Composition I	3
English Composition II	3
Oral Communication	2
Ag Orientation	1
College Algebra	3
Economics I	3
Chemistry I or General Chemistry	5
Physical Education I	0
Physical Education II	0
Humanities and / or Social Sciences (see pg. 34)	12
Communications (see pg. 34)	2 or 3

Other general requirements depend upon the option selected (see page 33.) Faculty advisers assist students in the selection of non-major and elective courses.

Required Animal Science and Industry Courses

Principles of Animal Science	3
Animal Science and Industry	1
Principles of Feeding	3
Animal Nutrition	3
Principles of Livestock Selection	3
Elements of Meat Processing	3
Animal Breeding	3
Animal Science and Industry	1
Three of the following courses:	
Beef Science	3
Swine Science	3
Sheep Science	3
Horse Science	2
Meat Technology	3
One of the following courses:	
Environmental Physiology of Farm Animals	3
Gestation of Farm Animals	3

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, wool, meats, genetics, and animal breeding laboratories), where animals can be studied from the standpoint of maintenance, growth, reproduction, structure and body composition.

UNDERGRADUATE CREDIT

005 101. Basic Animal Science and Industries. (2) I, II. An introductory study of reproduction, nutrition, marketing procedures and management involved in the production of beef cattle, sheep, swine, and horses. Two hours rec. a week (A.S.I. 103 is a companion course.)

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

005 103. Animal Science and Industry. (1) I, II. A study of the breeding and market types and classes of livestock

including a comparison of the live animal and carcass evaluation. A companion course to A.S.I. 101 and 102 and Dy. and Pl. Sc. 102.

005 230. Principles of Feeding. (3) I, II. Review of the digestive systems, metabolic processes and basic nutritional processes; origin, chemical analysis and feeding value of common feeds; nutritive requirements for maintenance, growth and production; basic ration formulation and evaluation. Three hours rec. a week. Pr.: Five hours of chem. or consent of instructor.

005 240. Livestock Feeding. (3) I. A resume of digestion and nutrition of ruminants and monogastric species. Feed ingredients, feed control laws, feed sample analysis, feeding standards, energy systems, feed preparation, ration formulation and feeding. Open only to students in Veterinary Medicine. Three hours rec. a week. Pr.: Chem. 350, Physi. 635 or consent of instructor.

005 250. Elements of Meat Processing. (2) I, II. A survey and discussion of the red meat industry and the product quality, processing, merchandising and promotional trends and techniques. Two hours lec. a week. Pr.: A.S.I. 101 or 102 and 103 or consent of instructor.

005 260. Meat Processing. (1) I, II. Processing and marketing techniques for meat and meat products; to include slaughtering, pricing, cutting, cut identification, preservation, processing, meat cookery and color and product control. Three hours lab. a week. Pr.: A.S.I. 101 or 102 and 103; 250 or conc. assignment.

005 280. Meat Selection and Utilization, H.E. (2) I. For students in home economics. Selection of meats, cutting meats, carcass grading, prepared meats and meat products, frozen meats and meat preparation are demonstrated and discussed. Two 2-hr. lecture demonstrations per week.

005 305. Fundamentals of Food Processing. (3) II. The study of some basic ingredients used in food processing, principles of preserving and processing of foods, and food packaging. Pr.: A course in Chemistry.

005 340. Animal Science and Industry Practicums. (2) II. Manual phases of livestock management. Open only to majors in Animal Science and Industry and in Agricultural Education. Four hours lab. a week.

005 350. 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 or 102, A.S.I. 103.

005 360. Judging Farm Animals. (2) II. Advanced judging of beef cattle, sheep, swine and horses. Pr.: A.S.I. 205 or consent of instructor.

005 370. Form & 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. Pr.: A.S.I. 210.

005 380. Principles of Meat Evaluation. (2) I. Introduction to subjective and objective standards employed in evaluating beef, lamb and pork carcasses and also wholesale cuts. Application of these factors to carcass grade, and yield of edible portion; value and consumer acceptance. Two hrs. class per week. Pr.: A.S.I. 250, 260 or conc. enrollment (or consent of instructor) and sophomore standing.

005 385. Wool Grading and Classification. (1) I. A study of factors determining the commercial classes and grades of wool and the desired fleece qualities of the breeds of sheep; practice in judging, grading and scoring wool. Three hours lab. a week. Pr.: A.S.I. 101 or 102.

005 390. Advanced Wool Grading and Classification. (1) I. Advanced work in commercial and purebred fleeces, with particular emphasis on the grading used by commercial wool marketing agencies. Laboratory exercises to acquaint the student with the physical properties of wool as they may affect its grading classification. Three hours lab. a week. Pr.: A.S.I. 275 or consent of instructor.

005 395. Classification, Grading and Selection of Meats. (1) I. Advanced study in the evaluation and classification 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

005 400. Genetics. (3) I, II, S. Variation, Mendelian inheritance and related subjects. Three hours lec. a week. Pr.: Biol. 198 or 205 or 210.

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

005 412. Gestation of Farm Animals. (2) I, II. A detailed study of the gestation of farm animals including management and nutritional factors affecting the physiological events of gestation such as fertilization, ova transport, placenta attachment, growth and parturition of the fetus. The laboratory provides practical training in following the development of the bovine fetus. Pr.: Senior standing and consent of instructor.

005 415. Beef Science. (3) I, II, A comprehensive course covering all phases of the beef cattle industry. Practical application of nutrition, breeding, physiology of reproduction, carcasses, merchandising and related areas. Special emphasis on management systems of raising, growing and finishing beef cattle. Pr.: A.S.I. 230 or consent of instructor.

005 420. Horse Science. (2) I. A study of the light horse industry in the U.S. Types and breeds of horses, selection, nutrition, management, performance and health. Two hours rec. a week. Pr.: A.S.I. 230 or consent of instructor.

005 425. Sheep Science. (3) I. Survey of the sheep and wool industry. Application of scientific principles and research findings to lamb and wool production. Attention given to different production programs. Three hours rec. a week. Pr.: A.S.I. 230 or consent of instructor.

005 435. Swine Science. (3) I, II. Application of basic scientific principles to the economical production of pork. Recommendations are made in breeding, reproduction, nutrition, health, housing, marketing and general overall management of swine production units of varying sizes. Three hours rec. a week. Pr.: A.S.I. 230 or consent of instructor.

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.

UNDERGRADUATE AND GRADUATE CREDIT

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

005 605. Commercial Cattle Feedlot Management. (2 to 4) S, I. Principles of commercial cattle feedlot management including cattle management, animal health, feed yard maintenance, feed mill operation, office management, and animal evaluation. A maximum of two hours credit for each 4 weeks of supervised work-study at an approved commercial cattle feedlot. Pr.: A.S.I. 415.

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 and three hours in statistics.

005 615. Swine Production Unit Operation. (2-4) S, I. A maximum of two hours credit for each 4 weeks of supervised work-study at an approved commercial swine production unit. Pr.: A.S.I. 435.

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. assignment.

005 625. Beef Cow Herd Unit Operation. (2-4) S, I. Principles of management in a beef cow unit involving direct contact in physiology, reproduction, breeding programs, nutrition, ranch accounting and other management procedures. Two hours credit will be given for each four weeks of study with a maximum of four total credits. Pr.: A.S.I. 415 or consent of instructor.

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.

005 635. Environmental Physiology of Farm Animals. (3) II. A detailed study of the effects of the environment on animal physiology and performance efficiency. Two hours lecture and two hours lab per week. Pr.: Physiol. Sci. 740 431, or consent of instructor.

005 650. Animal Science and Industry Literature. (1) I, II. Introduction to use of biological and chemical references in the University libraries, preparation and reporting of abstracts and literature from scientific journals on research in area of student interest. One hour rec. each week. Graduate standing or consent of instructor.

055 660. 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) II. 1970-71 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.H. 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 san-

itation, food additives, meat color, packaging and quality control. Two hours lec. and three hours lab. a week. Pr.: A.H. 250 and 260 or consent of instructor, senior or graduate standing.

005 690. Meat-Packing Plant Operation. (2-6) 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 evolutionary progress leading to current organization and economic structure and future developments; reports on selected readings. Pr.: A.S.I. 101, 230, 250, senior or graduate standing.

005 715. The Wool Industry. (3) II. Supply and demand, production, marketing and manufacturing. Two hours rec. and three hours lab. a week. Pr.: A.S.I. 425.

GRADUATE CREDIT

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

005 830. Advanced Meat Science. (2) II. 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.H. 250 and 260 Biochem. 420 or consent of instructor.

005 835. Research Techniques in Animal Reproduction. (3) II. Study of experimental techniques used in animal reproduction. Current literature studies and laboratory experiments. Pr.: Background in anatomy and physiology or consent of instructor.

005 840. Research in Animal Science and Industry. Credit arranged. I, II, S. Pr.: Consult instructor.

005 850. Analytical Techniques in Animal Science and Industry. (3) I, II. Principles of analytical procedures used in research in Animal Science and Industries. One hour rec. and 6 hours lab. a week. Pr.: Consent of instructor.

005 890. Graduate Seminar in Animal Science and Industry. (1) I, II. Discussion of research and technical problems in the discipline. Attendance required of all departmental graduate students. Maximum of two hours may be applied toward an advanced degree.

Biochemistry

B.S. in Biochemistry; requires 120 sem. hrs.

HOWARD L. MITCHELL,* Head of Department

Professors Burkhard,* Clegg,* Mitchell,* Nordin,* Parrish* and Ruliffson;* Associate Professor Hedgcoth;* Assistant Professors Cunningham,* Klopfenstein,* and Mueller;* 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 offers many opportunities in teaching, research, industry, and public service. It also is excellent preparation for basic and applied science. Work in many of these fields depends on biochemical knowledge and methods.

Suggested Course Sequence of Required Courses

FRESHMAN*

Fall Semester

		Course	Sem. Hrs.
Chemistry	221 210	Chemistry I	3
Chemistry	221 211	Chemistry I Lab	2
Mathematics	245 220	Anal. Geometry & Calculus I	4
English	229 100	English Composition I	2
Speech	281 105	Oral Communication	2
Physical Education	261 011	Physical Education	0
Biochemistry	020 100	Biochemistry Orientation	1
			15

Spring Semester

Chemistry	221 230	Chemistry II	3
Chemistry	221 271	Chemical Analysis	4
Mathematics	245 221	Anal. Geometry & Calculus II	4
English	229 120	English Composition II	3
Physical Education	261 011	Physical Education	0
			14

SOPHOMORE

Fall Semester

Mathematics	245 222	Anal. Geometry & Calculus III	4
Chemistry	221 431	Organic Chemistry I	3
Chemistry	221 451	Organic Chemistry I Lab	2
Physics	265 310	Engineering Physics I	5
			14

Spring Semester

Chemistry	221 445	Chemical Separations	2
Chemistry	221 450	Organic Chemistry II	3
Chemistry	221 451	Organic Chemistry II Lab	2
Physics	265 311	Engineering Physics II	5
			12

JUNIOR

Fall Semester

Chemistry	221 585	Physical Chemistry I Lecture	3
Biochemistry	020 655	Biochemistry I	3
Biochemistry	020 656	Biochemistry I Lab	2
			8

Spring Semester

Chemistry	221 595	Physical Chemistry II Lecture	3
Chemistry	221 598	Physical Chemistry II Lab	2
Biochemistry	020 665	Biochemistry II	3
Biochemistry	020 666	Biochemistry II Lab	2
			10

SENIOR

Fall Semester

Modern Language**			3 or 5
Chemistry	221 666	Instrumental Analysis	4
Statistics	285 520	Statistical Methods I	3
			10

Spring Semester

Modern Language**			3 or 4
Subtotal			86
Restricted Electives:			
	Biology		16
	Social Science		6
	Humanities		6
Nonrestricted Electives:			6
Total hours			120
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 Chemistry I and II lectures during the summer between the junior and senior years if they wish to finish in four years.

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

The Department of Biochemistry offers work leading to the degrees Bachelor of Science and, as a participant in the Graduate Biochemistry Group, the Master of Science and Doctor of Philosophy with a major in biochemistry (See Graduate Biochemistry Group, page 271). The department also participates in interdepartmental programs in animal nutrition leading to the Doctor of Philosophy degree (see Animal Nutrition, page 271) and in Food Science leading to Master of Science and Doctor of Philosophy degrees (see Food Science, page 272).

The Department has many well-equipped laboratories, instruments, animal rooms, and auxiliary facilities for investigations in biochemistry.

Courses in Biochemistry

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.

020 110. Biochemistry and Society. (3) II. A cultural and environmental approach to biochemical compounds and circumstances affecting man. Topics to be discussed include compounds of biochemical interests, biochemical evolution, food additives, heavy metals, drugs, and certain control chemicals, e.g., pesticides. Intended for non-science majors. (Category C: Cr.-NCR only).

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. 190.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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. 350.

020 422. General Biochemistry Laboratory. (2) I, II, S. A one semester laboratory course with experiments relating to carbohydrates, lipids, proteins, nucleic acids and enzymes. Six hours lab. a week. Pr.: Quantitative chemical analysis, Chem. 351 and Biochem. 421 or conc. enrollment, or Biochem. 665 or conc. enrollment.

UNDERGRADUATE AND GRADUATE CREDIT

020 655. Biochemistry I. (3) I. An introduction to physical methods, kinetics and thermodynamics of biochemical reactions and bioenergetics, chemistry of proteins and amino acids, carbohydrate chemistry and metabolism and lipid chemistry. Biochem. 655 and 665 are for students interested in two semester comprehensive coverage of biochemistry. For one semester course, enroll in Biochem. 421. Pr.: *Quantitative chemical analysis, one year of organic chemistry, differential and integral calculus.

020 656. Biochemistry I Laboratory. (2) I. An intensive laboratory course to accompany Biochem. 655. Biochem. 656 and 666 are sequential courses for students interested in a two semester comprehensive coverage of experiments in biochemistry. For a one semester laboratory course, enroll in Biochem. 422. Six hours lab. a week. Pr.: *Biochem. 655 or conc. enrollment.

020 665. Biochemistry II. (3) II. A cont. of Biochem. 655; lipid metabolism, amino acid metabolism, nutrition, nucleic acid chemistry and metabolism, integration of biochemical pathways and metabolic control mechanisms. Pr.: *Biochem. 655.

020 666. Biochemistry II Laboratory. (2) II. A cont. of Biochem. 656. 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; methods for animal nutrition studies and evaluation of feeds. Pr.: *Biochem. 655 and 656.

020 680. Biochemistry of Toxic Materials. (2) I. Offered 1971-72 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 1971-72 and alt. years. Chemistry of plant and animal lipids, their occurrence, metabolism and industrial uses. Pr.: *Biochem. 665.

020 705. Vitamins. (2) II. Offered 1971-72 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 1970-71 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.

GRADUATE CREDIT

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

020 812. Proteins. (2) I. Offered 1971-72 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 1970-71 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 1970-71 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 1970-71 and alt. years. A laboratory course to accompany Biochem. 818. Pr.: *Biochem. 656 and 818 or conc. enrollment.

020 825. Advanced Animal Nutrition. (3) I. Offered 1970-71 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) I. Offered in 1971-72 and alternate years. Applications of thermodynamics to biological energy transformations, solution properties of macromolecules, titrations of proteins, multiple equilibria, physical methods for determination of the size and shape of macromolecules. Pr.: *Biochem. 665 and Physical Chemistry I and II or equivalent.

020 891. Conformational Analysis of Biopolymers. (2) II. Offered in 1971-72 and alternate years. Studies of the forces responsible for the maintenance of a conformation in solution, applications of physical and chemical techniques to the study of secondary and tertiary structures of biological macromolecules with emphasis on hydrogen-deuterium exchange and optical methods. Pr.: *Biochem. 665 and Physical Chemistry I and II or equivalent.

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.

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

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

Dairy and Poultry Science

C. L. NORTON,* Head of Department

Professors Bartley,* Claydon,* Craig,* Farmer,* Larson,* Norton,* Sanford,* and Ward;* Associate Professors Adams,* Bassette,* Bonewitz,* Call,* Cunningham,* Mickelsen,* Morrill;* Assistant Professor Roberts; Instructor Kahrs; Emeritus: Professor Martin.*

DAIRY PRODUCTION

B.S. in Agriculture; requires 126 sem. hrs.

Undergraduate Study

A wide application of science to the problems of milk production requires technically-trained men. Courses below provide excellent background for training in the dairy industry.

University-owned herds provide animals for classwork and for research projects.

Students majoring in Dairy Production are required to complete the following basic courses:

English Composition I	3
English Composition II	3
Oral Communication	2
Ag Orientation	1
Economics I	3
College Algebra	3
Chemistry I or General Chemistry	5
Physical Education I	0
Physical Education II	0
Humanities and / or Social Sciences (see pg. 34)	12
Communications (see pg. 34)	2 or 3

Other general requirements depend upon the option selected (see page 33.)

Required major courses include:

Major Courses	
Principles of Animal Science	3
Dairy Science	1
Fundamentals of Nutrition	3
Genetics	3
Dairy Cattle Nutrition	3
Dairy Cattle Management	3
Dairy Cattle Genetics	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.

POULTRY SCIENCE

B.S. in Agriculture; requires 126 sem. hrs.

Undergraduate Study

A Research Center capable of handling 13,800 birds, provides excellent facilities for the breeding, rearing and management of poultry for classroom and experimental work. In addition, modern laboratory and teaching facilities are available for poultry science training in Call Hall.

Students majoring in Poultry Science are required to complete the following basic courses:

English Composition I	3
English Composition II	3
Oral Communication	2
Ag Orientation	1
College Algebra	3
Economics I	3
Chemistry I or General Chemistry	5
Physical Education I	0
Physical Education II	0
Humanities and / or Social Sciences (see pg. 34)	12
Communications (see pg. 34)	2 or 3

Other general requirements depend upon the option selected (see page 33.)

Required major courses include:

Principles of Animal Science	3
Poultry Science	1
Nutrition of the Fowl	3
Quantitative Genetics and Poultry Improvement	3
Avian Metabolism	3
Poultry Products Technology	3
Poultry Management	3

Non-Major Courses

To be developed in consultation with adviser.

DAIRY FOODS SCIENCE & INDUSTRY

B.S. in Agriculture; requires 126 sem. hrs.

In Dairy Foods Science and Industry the student studies 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.

FRESHMAN

Fall Semester		Course	Sem. Hrs.
General Agriculture	035 101	Ag Orientation	1
Chemistry	221 110	General Chemistry	5
English	229 100	English Composition I	3
Dairy & Poul. Sci.	025 201	Principles of Animal Science	3
Dairy & Poul. Sci.	025 202	Dairy Science	1
Physical Education	261 011	Physical Education	0
			13

Spring Semester

Biochemistry	020 120	Intro. Org. & Biol. Chem.	5
Economics	225 100	Economics I	3
English	229 120	English Composition II	3
Mathematics	245 100	College Algebra	3
Physical Education	261 011	Physical Education	0
			14

SOPHOMORE

Fall Semester		Course	Sem. Hrs.
Biology	215 450	General Microbiology	4
		Biological Science	4
Mathematics	245 150	Plane Trigonometry	3
Speech	281 105	Oral Communications	2
		Elective	4
			17

Spring Semester

Dairy & Poul. Sci.	025 400	Market Milk & Dairy Inspection	4
Dairy & Poul. Sci.	025 350	Dairy Bacteriology	4
		Biological Science	4
		Social Science	3
Dairy & Poul. Sci.	025 220	Dairy Products Evaluation I	2
			17

JUNIOR

Fall Semester		Course	Sem. Hrs.
Dairy & Poul. Sci.	025 681	Dairy Foods Processing I	2
Dairy & Poul. Sci.	025 510	Dairy Technology	3
Ag. E.	010 455	Dairy Mechanics	3
		Descriptive Physics	4
		Humanities	3
			15

Spring Semester

Dairy & Poul. Sci.	025 683	Dairy Foods Processing III	2
		Humanities	3
		Options	5
		Communications Elective	3
		Elective	3
			16

SENIOR

Fall Semester

Dairy & Poult. Sci.	025	682	Dairy Foods Processing II	2
Dairy & Poult. Sci.	025	685	Dairy Foods Processing Lab A	1
Statistics	285	320	Elements of Statistics	3
			Option	7
			Food Processing Elective	3
				16

Spring Semester

Dairy & Poult. Sci.	025	684	Dairy Foods Processing IV	2
Dairy & Poult. Sci.	025	686	Dairy Food Processing Lab B	1
Ag. Econ.	010	245	Prin. of Ag. Marketing	3
Dairy & Poult. Sci.	025	500	Dairy Seminar	1
Dairy & Poult. Sci.	025	695	Dairy Plant Management	2
Dairy & Poult. Sci.	025	670	Quality Control of Dairy Products	3
			Option	5
				17

ADDITIONAL ELECTIVE COURSES

Science Option

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

Administration Option

Economics II	3
Fundamentals of Accounting	4
Business Law I	3
Managerial Accounting	3
Sales Management	3
Marketing	3
Personnel Administration	3
Business Finance	3
Business Policy	3
Management Concepts	3
Principles of Accounting	3
Taxation I	3

Food Processing Option

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

Graduate Study

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, which 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.

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.

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 and II. Elementary principles of comparative nutrition of farm animals. Three hours rec. a week. Pr.: Chem. 110 or 210.

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.

025 221. **Dairy Products Evaluation I.** (2) II. Fundamentals of organoleptic examination of dairy products according to official standards and commercial grades; introduction to sampling techniques, consumer testing and data processing. One hour lec. and three hours lab. a week.

025 305. **Fundamentals of Food Processing.** (3) II. The study of some basic ingredients used in food processing, principles of preserving and processing of foods, and food packaging. Pr.: A course in Chemistry.

025 311. **Introductory Food Chemistry.** (3) II. The basic composition, structure and properties of foods and the chemistry of changes occurring during processing, storage and utilization. Two hours lecture, two hours of lab. a week. Pr.: Biochem. 120 or equivalent.

025 350. **Dairy Bacteriology.** (4) II. Offered even academic years. Application of the principles of bacteriology to the production and processing of quality milk and dairy products. Consideration of the general characteristics of microorganisms in dairy products. Relationship of bacteria in milk to public health. Two hours lecture and two 2 hr. labs per week. Pr.: Biochem. 120 or equiv.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

025 401. **Fundamentals of Milk Processing.** (3) II. A study of modern procedures employed in procurement,

processing, distribution, quality control and inspection of a fluid market milk enterprise. Two hours rec., one 2-hour lab. Pr.: One course in microbiology or consent of instructor.

025 420. **Advanced Dairy Cattle Judging.** (1) I. Three hours lab. a week. Pr.: Dy. and Pl. Sc. 196.

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.

UNDERGRADUATE AND GRADUATE CREDIT

026 600. **Poultry Products Technology.** (3) II. Offered in even years. Emphasis on the technological problems that exist between producer and consumer in the production and distribution of poultry and eggs. Poultry processing, tenderness, shelf-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; Biochem. 200, Bact. 220, or consent of instructor.

025 601. **Milk Secretion.** (3) II. Offered in odd years. Anatomy and histology of mammary gland. Physiology of lactation, milk constituents and management practices that alter qualitative and quantitative aspects. Contemporary milking practices and mastitis control. 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 to properties and to physical and chemical stability of foods. Special attention will be given to dairy and poultry 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. Dairy farm layout planning and analysis, integration of agronomic, physiologic and economic aspects of dairying, field study trip. Three hours rec. a week. Pr.: Dy. and Pl. Sc. 102 and 103 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.

025 636. **Dairy Cattle Genetics.** (4) I. Introduction and application of quantitative genetic principles to the improvement of economically important traits in dairy cattle with emphasis upon selection, variation, heritability estimates, breeding systems and estimates of breeding values of sires and dams through pedigree analysis. Three hours rec. and three hours lab. a week. Pr.: One semester each of elementary genetics and statistics or consent of instructor.

026 640. **Poultry Management.** (3) II. Offered in odd years. A detailed study of all phases of farm and commercial flocks, including cost of production. Two hours rec. and three hours lab. a week. Pr.: Dy. and Pl. Sci. 102 and 104, senior or graduate standing, or consent of instructor.

026 646. **Quantitative Genetics and Poultry Improvement.** (3) II. Offered 1973 and odd years. Major concepts, experimental verification and applications of quantitative genetics to improvement by breeding. Special emphasis on evaluation of genetic gains, genotypic-environmental interactions, selection plateaus, heterosis, selection for combing ability and special techniques in relation to poultry breeding. Discussion, 3 lectures a week. Pr.: One semester each of genetics and statistics.

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.

026 655. **Behavior of Domestic Animals.** (3) I. Behavior associated with domestication. Effects of selective breeding, physical and social environments, and developmental stage on social organization, aggressive behavior, sexual behavior, productivity and training of domestic animals. Physiology of behavior and abnormal behavior considered briefly. Pr.: Biol. 198 or 205 and junior standing.

026 660. **Poultry Industry Training.** (3) S. Eight 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.

025 675. **Dairy Manufacturing Problems.** Credit arranged. I, II, S. Pr.: Junior standing in dairy manufacturing.

025 688. **Principles of Dairy Foods Processing.** (3) II. The application of chemical, microbiological and physical principles to the conversion of milk into concentrated and dry milk products, hard and soft cheeses, frozen desserts and butter. Pr.: A course in microbiology, Dy. and Pl. Sci. 311 or consent of instructor.

025 689. **Principles of Dairy Foods Processing Laboratory.** (1-3) II. Laboratories are integrated with the lecture offered in Principles of Dairy Foods Processing

025 688, and with outside reading material. One paper and from five to fifteen laboratory assignments required depending on credit hours enrolled. The paper is to be handled on a tutorial basis and developed from assigned reading. Pr.: Dy. and Pl. Sci. 688 or concurrent enrollment.

025 690. Practical Quality Control of Dairy and Food Products. (3) I. The role of the control laboratory in maintaining standards and quality of dairy and food products and ingredients. Tests and techniques for evaluating quality and sanitation and for compliance with regulatory requirements, one hour rec. and five hours lab a week. Pr.: One course in bacteriology, Dy. and Pl. Sci. 305.

025 694. Food Plant Management. (2) II. A study of business management practices involved in a food plant operation; organization, plant operations, personnel, production control, purchasing, cost control, sales, and legal aspects of a food operation. Not open to Business Option students—Food Science and Industry. Pr.: Jr. standing or consent of instructor.

025 710. Dairy Fermentations. (3) I. Offered even academic years. 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. Offered odd academic years. 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.

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 rumen 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 endocrine control and cyclic changes. Two hours rec. and three hours lab. a week. By appointment. 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 Anatomy. (See Anatomy 801.)

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

Entomology

B.S. degree in Agriculture; requires 126 sem. hrs.

HERBERT KNUTSON,* Head of Department

Professors Knutson,* Gates, Harvey,* Hopkins,* Horber,* Associate Professors Blocker,* Elzinga,* Mills,* Pitts,* and Thompson,* Assistant Professors Boling,* Brooks, DePew, Eshbaugh, Kadoum,* Partida,* and Wilde,* Emeritus: Professors Wilbur* and Smith.*

Undergraduate Study

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 courses suitable for any student, and (2) professional courses which provide training for research, teaching and administration in colleges, experiment stations, health services, and agencies of the state and federal governments, industry, foundations, and private practice.

Students majoring in other fields may have a special interest in entomology. Courses 200 or 211 and at least five additional credits are recommended.

General Requirements for the B.S. Degree

229 100	English Composition I	3
229 120	English Composition II	3
281 105	Oral Communication	2
035 101	Ag Orientation	1
245 100	Economics I	3
225 110	Economics II	3
221 210	Chemistry I	5
	Physical Education I	0
	Physical Education II	0
	Humanities and or Soc. Sci.	
	(see pg. 34)	12
	Communications	2 or 3

Entomology students choose the Business and Industry option or the Science Option.

Business and Industry Option Requirements

Major Courses		
030 200	General Entomology	3
030 660	External Insect Morphology	3
030 701	Insect Taxonomy	3
030 770	Advanced Applied Entomology I	3
030 780	Advanced Applied Entomology II	3
030 657	Toxicology and Properties of Insecticides	3
Non-Major Courses		
010 100	Principles of Agricultural Economics	3
015 270	Soils	4
005 102	Principles of Animal Science	3
005 103	Animal Science and Industry	1
245 150	Plane Trigonometry	3
015 200	Plant Science	4
215 198	Principles of Biology	4
215 201	Organismic Biology	4
221 230	Chemistry II	3
221 250	Chemistry II Laboratory	2

(Continued next page)

221 190	Elementary Organic Chemistry	3
OR		
221 350	General Organic Chemistry	3
A Second Agricultural Economics Course	3
005 400	Genetics	3
265 112	Descriptive Physics	4
285 320	Elements of Statistics	3
215 450	Microbiology	4

Science Option Requirements

Major Courses

030 200	General Entomology	3
030 660	External Insect Morphology	3
030 701	Insect Taxonomy	3

Non-Major Courses

215 198	Principles of Biology	4
215 201	Organismic Biology	4
221 230	Chemistry II	3
221 250	Chemistry II Laboratory	4
221 350	General Organic Chemistry and	3
221 251	General Organic Chemistry Laboratory	2
221 431	OR Organic Chemistry I and	3
221 432	Organic Chemistry I Laboratory	2
265 211	General Physics I	4
265 212	General Physics II	4
234 100	Physical Geology or	4
235 150	Physical Geography I	4
245 150	Plane Trigonometry	3
245 220	Analytic Geometry and Calculus I	4
285 320	Elements of Statistics	3
005 400	Genetics	3
215 450	Microbiology	4

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

Graduate Study

The M.S. and Ph.D. degrees are offered. For majors, professional courses in entomology and a broad, basic training in agriculture or the biological and physical sciences are needed to provide a satisfactory foundation for graduate work. Facilities for research include field insectaries, greenhouses, programmed environmental chambers, sound recording room, several temperature and humidity-controlled rooms for rearing insects, laboratories for use of radioisotopes, and a scanning electron microscope.

Major laboratories are provided for study of insect behavior, host plant resistance to insects; taxonomy; toxicology; physiology; biochemistry; for biology, ecology and control of insects attacking man, animals, and stored products; and isolated laboratories for insecticide testing and for chemical and bioassay determination of insecticide residues. Facilities for the investigation of the biology and control of insects attacking trees, shrubs and ornamental plants, fruits and vegetables, grasslands, and field crops also are provided.

Mutual cooperation with entomologists at the U.S. Grain Marketing Research Center further enhances graduate studies.

UNDERGRADUATE CREDIT

030 100. Milling Entomology. (4) II. Elementary structure, life histories, classification and control of insects with emphasis on insects infesting flour mills, granaries, elevators, warehouses, and bakeries. Three hours rec. and 3 hours lab. a week.

030 200. Economic Entomology. (3) I, II. Classification, life histories, habits, and control of important economic insects. For agriculture majors. Two hours rec. and 3 hours lab. a week.

030 211. General Entomology. (3) I, II. Basic study of insects and related arthropods, their classification, behavior, and relations to plants and animals, including man. Two hours rec. and 3 hours lab. a week.

UNDERGRADUATE AND GRADUATE CREDIT

030 610. Insects of Stored Products. (3) I. Taxonomy, ecology and behavior of stored-product 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 3 hours lab. a week. Pr.: Entom. 200 or 211.

030 630 Insect Ecology. (3) I. Offered 1972-73 and alt. years. Influence of biotic, physical and edaphic factors of environments on insects. Two hours lec. and 4 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 in entomological research. Pr.: Entom. 200 or 211 or equiv.

030 650. Insect Control by Host Plant Resistance. (2) I. Resistance of varieties of crop plants to insect attack and 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.

030 657. Toxicology and Properties of Insecticides. (3) I. Physical, chemical and biological properties of insecticides, symptoms and antidotes in mammals, formulations and residue analysis. Two hours lecture and 2 hours lab. a week. Pr.: 221 350 General Organic Chemistry, or consent of instructor.

030 660. External Insect Morphology. (3) I. External form, structure and anatomy; leading theories of form and structure from generalized to specialized conditions. One hour rec. and 6 hours lab. a week. Pr.: Entom. 200 or 211.

030 670. Internal Insect Morphology. (3) II. Offered 1972-73 and alt. years. Internal anatomy of representative insects; plan and structure of internal systems. One hour rec. and 6 hours lab. a week. Pr.: Entom. 660.

030 675. Insect Physiology. (3) I. Offered 1973-74 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 and 701, or equiv. in Zool. Entom. 850 may be taken concurrently.

030 701. Insect Taxonomy. (3) II. Families in all orders and some lower categories; principles of insect collecting and collection management; introduction of principles of phylogeny and classification for students not specializing in taxonomy. One hr. rec. and six hours lab. a week. Pr.: Entom 660. Collection at least equivalent to that submitted for Entom. 200 or 211, is required prior to enrollment.

030 711. Taxonomy of Immature Insects. (3) II. Offered 1973-74 and alt. years. Classification and bionomics of immature stages; practice in their identification. Six hours lab. a week. Pr.: Entom. 690 and 701.

030 750. Entomological and Zoological Literature. (2) On demand. Bibliographies, biological journals, and keys to the literature; preparation and publication of technical papers. Emphasis on best time saving aids and methods for library work needed for thesis preparation. Pr.: Entom. 200 or 211, and beginning biology courses.

030 770. Advanced Applied Entomology I. (3) I. Offered 1973-74 and alt. years. Insecticides, types and methods of application, biological control, its usefulness and limitations, cultural control. Two hours rec. and 3 hours lab. a week. Pr.: Entom. 200 or 211.

030 780. Advanced Applied Entomology II. (3) II. Offered 1973-74 and alt. years. Includes representative insects of field crops, grassland insects, vegetable insects, fruit, forest and shade tree insects, insects of stored products, insects attacking man and animals, cotton insects. Two hours rec. and 3 hours lab. a week. Pr.: Entom. 200 or 211; Entom. 770 desirable.

030 795. Entomology Seminar. (1) I, II, S. Pr.: Consult seminar committee. Required of all Ph.D. entomology graduate students once yearly.

030 799. Problems in Entomology. Credit arranged. I, II, S. For non-thesis studies. Work in various fields of entomology. Pr.: Consent of instructor.

GRADUATE CREDIT

030 800. Advanced Economic Entomology. (1 to 3) I, II, S. 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 1973-74 and alt. years. Metabolism and utilization of carbohydrates, lipids and nitrogen compounds; energy production, neuromuscular mechanisms, hormones and morphogenesis; 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; evolutionary and systematic considerations necessary prior to conduct of a taxonomic study. Pr.: Entom. 660, 701; consent of instructor; Entom. 690 should be taken concurrently.

030 855. Arachnology. (3) I. Offered 1973-74 and alt. years. Arachnids, with emphasis on spiders and mites: their classification, structure, and relationships to plants and animals, including man. One hour lec. and 6 hours lab. a week. Pr.: Entom. 200 or 211 and consent of instructor.

030 856. Action and Metabolism of Insecticides. (2) II. Offered 1972-73 and alt. years. Toxic action and metabolism of insecticidal chemicals in insects and vertebrate animals; insect resistance to insecticides; special topics. Two lec. a week. Pr.: Entomol. 657 and a course in biochemistry.

030 860. Insect Behavior. (3) II. Offered 1973-74 and alt. years. Major behavior patterns of insects and other arthropods. Two hours lec. and 4 hours lab. a week. Pr.: Entom. 630.

030 999. Research in Entomology. I, II, S. Credit arranged. Thesis or dissertation credit for students majoring in entomology. Pr.: Knowledge in special area and consent of instructor.

General Agriculture

CARROLL V. HESS, Dean, College of Agriculture
FRANK R. CARPENTER, Assistant Dean

UNDERGRADUATE CREDIT

035 101. Ag Orientation. (1) I. Orientation for freshmen in Agriculture to University and College of Agriculture objectives, organization and procedures; historical development of modern-day U.S. agriculture and projected trends with implications for future agricultural graduates; orientation to the student's departmental curriculum, faculty and programs; appreciation of the basic sciences in professional agriculture. Required of freshmen in Agriculture.

035 105. Introductory Food Science and Technology. (3) I. Introduce and survey relationships of food raw materials and their methods of handling, manufacturing, distribution and consumption.

035 110. Agricultural Student Magazine (1-2) I, II. Planning, interviewing, preparing stories, headlines, layouts, editing, etc., for Kansas State Agriculturist 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.

UNDERGRADUATE AND GRADUATE CREDIT

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.

GRADUATE CREDIT

035 888. Scientific Writing. (1) I, II. Instruction in reporting research results, as in a scientific journal article (thesis, dissertation). Course attempts to show how to organize and communicate scientific findings logically, clearly and precisely. Students who use results of their research should benefit most from the course. Pr.: at least one semester graduate school.

Grain Science and Industry

WILLIAM HOOVER,* Head of Department

Professors Deyoe,* Farrell,* Finney,* Hoover,* Johnson,* Pfost,* Schoeff, Tsen,* Ward,* and Wilcox; Associate Professors Hoseney,* Lineback,* Robinson,* and Sieb;* Assistant Professor Miller;* Instructors Balding and Sanchez.

Undergraduate Study

The Department of Grain Science and Industry offers three curriculums. They are listed below. The student selects one of three options, either Administration, Chemistry, or Operations.

BAKERY SCIENCE AND MANAGEMENT

B.S. in Bakery Science and Management; requires 132 sem. hrs.

FRESHMAN

Fall Semester

		Course	Sem. Hrs.
General Agriculture	035 101	Ag Orientation	1
Grain Science	045 100	Principles of Milling	3
Chemistry	221 210	Chemistry I	5
English	229 100	English Composition I	3
Mathematics	245 100	College Algebra	3
Physical Education	261 011	Physical Education	0

15

Spring Semester

Chemistry	221 230	Chemistry II	3
Economics	225 110	Economics I	3
English	229 120	English Composition II	3
Mathematics	245 150	Plane Trigonometry	3
Physical Education	261 011	Physical Education	0
Speech	281 105	Oral Communications I	2
Mech. E.	560 212	Graphical Communications I	2

16

SOPHOMORE

Fall Semester

Grain Science	045 220	Bakery Layout & Flow	2
Biology	215 198	Principles of Biology	4
		Option A, B, or C	10

16

Spring Semester

Biology	215 450	Microbiology	4
		Humanities Electives	6
		Option A, B, or C	6

16

JUNIOR

Fall Semester

Grain Science	045 630	Experimental Baking I	4
Bacteriology	215 645	Microbiology of Foods	4
		Option A, B, or C	9

17

Spring Semester

Grain Science	045 631	Experimental Baking II	4
Grain Science	045 650	Qualities of Wheat & Flour	3
		Option A, B, or C	10

17

SENIOR

Fall Semester

Grain Science	045 633	Bakery Technology	3
		Social Science Elective	3
		Option A, B, or C	11

17

Spring Semester

Grain Science	045 651	Food and Feed Plant Sanitation	4
		Option A, B, or C	13

17

Option A (Administration)

Chemistry	221 250	Chemistry II Lab.	2
Biochemistry	020 120	Intro. to Org. & Bio. Chem.	5
Grain Science	045 610	Flour & Feed Analysis	5
Economics	225 120	Economics II	3
Mathematics	245 350	Elem. Digital Comp. Tech.	2
Physics	265 211	General Physics I	4
Statistics	285 320	Elements of Statistics	3
Mathematics	245 340	Intro. to Analytic Processes	3
Bus. Ad.	305 275	Fundamentals of Accounting ..	4
Bus. Ad.	305 305	Managerial Accounting	3
Bus. Ad.	305 325	Business Law I	3
Economics	225 430	Money Bank	3
Bus. Ad.	305 542	Sales Management	3
Bus. Ad.	305 410	Business Finance	3
Bus. Ad.	305 440	Marketing	3
		Electives	10

Option B. (Chemistry)

Biochemistry	020 421	General Biochemistry	3
Biochemistry	020 422	General Biochemistry Lab	2
Grain Science	045 610	Flour & Feed Analysis	5
Grain Science	045 620	Adv. Wheat & Flour Testing	3
Chemistry	221 271	Chemical Analysis	4
Chemistry	221 431	Organic Chemistry I	3
Chemistry	221 432	Organic Chem. I Lab	2
Chemistry	221 450	Organic Chem. 2	3
Chemistry	221 451	Organic Chemistry II Lab	2
Chemistry	221 400	Desc. Physical Chemistry	3
Mathematics	245 220	Anal. Geometry & Calculus I ..	4
Mathematics	245 221	Anal. Geometry & Calculus II ..	4
Physics	265 310	Engineering Physics I	5
Physics	265 311	Engineering Physics II	5
		Electives	11

Option C (Operations)

Biochemistry	020 120	Intro. to Org. & Bio. Chem.	5
Chemistry	221 250	Chemistry II Lab	2
Mathematics	245 220	Anal. Geometry & Calculus I ..	4
Mathematics	245 221	Anal. Geometry & Calculus II ..	4
Mathematics	245 222	Anal. Geometry & Calculus III ..	4
Physics	265 310	Engineering Physics I	5
Physics	265 311	Engineering Physics II	5
Applied Mechanics	510 220	Strength of Materials	3
Applied Mechanics	510 305	Statics	3
Elect. E.	530 419	Electrical Circuits & Machines ..	4
Indust. E.	550 401	Industrial Management	3
Mech. E.	560 217	Graphical Communications II ..	3
Mech. E.	560 413	Thermodynamics	3
		Electives	11

FEED SCIENCE AND MANAGEMENT

B.S. Feed Science and Management; requires 132 sem. hrs.

FRESHMAN

Fall Semester

		Course	Semester Hours
General Agriculture	035 101	Ag Orientation	1
Grain Science	045 100	Principles of Milling	3
Chemistry	221 210	Chemistry I	5
English	229 100	English Composition I	3
Mathematics	245 100	College Algebra	3
Physical Education	261 011	Physical Education	0

15

Spring Semester

Chemistry	221 230	Chemistry II	3
English	229 120	English Composition II	3
Mathematics	245 150	Plane Trigonometry	3
Physical Education	261 011	Physical Education	0
Speech	281 105	Oral Communication I	2
Mech. Engineering	560 212	Graphical Communications I	2
		Option A, B, or C	3

16

SOPHOMORE

Fall Semester

Grain Science	045 210	Flow Sheets	2
Biology	215 198	Principles of Biology	4
Economics	225 110	Economics I	3
		Option A, B, or C	7

16

Spring Semester

Biology	215 201	Organismic Biology	4
Dairy Science	025 200	Fundamentals of Nutrition	3
		Humanities Elective	6
		Option A, B, or C	3

16

JUNIOR

Fall Semester

Grain Science	045 410	Feed Technology I	4
		Social Science Elective	3
		Option A, B, or C	10

17

Spring Semester

Grain Science	045 660	Qualities of Feed Ingred.	3
		Option A, B, or C	14

17

SENIOR

Fall Semester

Option A, B, or C

17

Spring Semester

Grain Science	045 651	Food & Feed Plant Sanitation ..	4
		Option A, B, or C	13

17

Option A (Administration)

Ag. Economics	010	510	Grain Marketing	3
Biochemistry	020	120	Intro. to Org. & Biol. Chemistry	5
Grain Science	045	610	Flour & Feed Analysis	5
Grain Science	045	680	Feed Technology II	4
Chemistry	221	250	Chemistry II Lab	2
Economics	225	120	Economics II	3
Economics	225	430	Money & Banking	3
Mathematics	245	350	Elem. Digital Computing Tech.	2
Physics	265	211	General Physics I	4
Physics	265	212	General Physics II	4
Statistics	285	320	Elements of Statistics	3
Mathematics	245	340	Intro. to Analytic Processes	3
Bus. Ad.	305	275	Fund. of Accounting	4
Bus. Ad.	305	305	Managerial Accounting	3
Bus. Ad.	305	325	Business Law I	3
Bus. Ad.	305	542	Sales Management	3
Bus. Ad.	305	410	Business Finance	3
			Electives	10

Option B (Chemistry)

Biochemistry	020	421	General Biochemistry	3
Biochemistry	020	422	General Biochemistry Lab	2
Grain Science	045	610	Flour & Feed Analysis	5
Chemistry	221	271	Chemical Analysis	4
Chemistry	221	400	Desc. Physical Chemistry	3
Chemistry	221	431	Organic Chemistry I	3
Chemistry	221	432	Organic Chemistry I Lab	2
Chemistry	221	450	Organic Chemistry II	3
Chemistry	221	451	Organic Chemistry II Lab	2
Mathematics	245	220	Anal. Geom. & Calc. I	4
Mathematics	245	221	Anal. Geom. & Calc. II	4
Mathematics	245	222	Anal. Geom. & Calc. III	4
Physics	265	310	Engineering Physics I	5
Physics	265	311	Engineering Physics II	5
Statistics	285	520	Statistical Methods I	3
			Electives	15

Option C (Operations)

Biochemistry	020	120	Intro. to Org. & Biol. Chemistry	5
Grain Science	045	210	Advanced Flow Sheets	2
Grain Science	045	680	Feed Technology II	4
Grain Science	045	720	Adv. Flour & Feed Tech.	3
Grain Science	045	730	Flour & Feed Mill Constr.	3
Chemistry	221	250	Chemistry II Lab	2
Mathematics	245	220	Anal. Geom. & Calc. I	4
Mathematics	245	221	Anal. Geom. & Calc. II	4
Mathematics	245	222	Anal. Geom. & Calc. III	4
Mathematics	245	240	Series & Diff. Equations	4
Physics	265	310	Engineering Physics I	5
Physics	265	311	Engineering Physics II	5
Applied Mechanics	510	220	Strength of Materials	3
Applied Mechanics	510	305	Statics	3
Electrical Engineering	530	419	Elec. Circuits & Machines	4
			Electives	12

JUNIOR

Fall Semester

Agronomy	015	261	Market Grading Cereals	2
			Social Science Elective	3
			Option A, B, or C	12
				17

Spring Semester

Grain Science	045	650	Qualities Wheat & Flour	3
			Option A, B, or C	14
				17

SENIOR

Fall Semester

Grain Science	045	630	Experimental Baking I	4
			Option A, B, or C	13
				17

Spring Semester

Grain Science	045	651	Food & Feed Plant Sanitation	4
			Option	13
				17

Option A (Administration)

Ag. Economics	010	510	Grain Marketing	3
Biochemistry	020	120	Intro. Org. & Biol. Chemistry	5
Grain Science	045	610	Flour & Feed Analysis	5
Chemistry	221	250	Chemistry II Lab	2
Economics	225	120	Economics II	3
Economics	225	430	Money & Banking	3
Mathematics	245	350	Elem. Digital Computing Tech.	2
Physics	265	211	General Physics I	4
Physics	265	212	General Physics II	4
Statistics	285	320	Elements of Statistics	3
Mathematics	245	340	Intro. Analytical Processes	3
Bus. Ad.	305	275	Fundamentals of Accounting	4
Bus. Ad.	305	305	Managerial Accounting	3
Bus. Ad.	305	325	Business Law I	3
Bus. Ad.	305	542	Sales Management	3
Bus. Ad.	305	410	Business Finance	3
			Electives	11

Option B (Chemistry)

Biochemistry	020	421	General Biochemistry	3
Biochemistry	020	422	General Biochemistry Lab	2
Grain Science	045	610	Flour & Feed Analysis	5
Grain Science	045	620	Adv. Wheat & Flour Test.	3
Chemistry	221	271	Chemical Analysis	4
Chemistry	221	400	Desc. Physical Chemistry	3
Chemistry	221	431	Organic Chemistry I	3
Chemistry	221	432	Organic Chemistry I Lab	2
Chemistry	221	450	Organic Chemistry II	3
Chemistry	221	451	Organic Chemistry II Lab	2
Mathematics	245	220	Anal. Geom. & Calc. I	4
Mathematics	245	221	Anal. Geom. & Calc. II	4
Physics	265	310	Engineering Physics I	5
Phsyics	265	311	Engineering Physics II	5
			Electives	16

Option C (Operations)

Biochemistry	020	120	Intro. Org. & Biol. Chem.	5
Grain Science	045	210	Adv. Flow Sheets	2
Grain Science	045	670	Milling Technology II	4
Grain Science	045	720	Adv. Flour & Feed Tech.	3
Grain Science	045	730	Flour & Feed Mill Constr.	3
Chemistry	221	250	Chemistry II Lab	2
Mathematics	245	220	Anal. Geom. & Calc. I	4
Mathematics	245	221	Anal. Geom. & Calc. II	4
Mathematics	245	222	Anal. Geom. & Calc. III	4
Physics	265	310	Engineering Physics I	5
Physics	265	311	Engineering Physics II	5
Applied Mechanics	510	220	Strength of Materials	3
Applied Mechanics	510	305	Statics	3
Electrical Engg.	530	419	Elec. Circuits & Machines	4
			Electives	13

MILLING SCIENCE AND MANAGEMENT

B.S. in Milling Science and Management; requires 132 sem. hrs.

FRESHMAN

Fall Semester

			Course	Semester Hours
General Agriculture	035	101	Ag Orientation	1
Grain Science	045	100	Principles of Milling	3
Chemistry	221	210	Chemistry I	5
English	229	100	English Composition I	3
Mathematics	245	100	College Algebra	3
Physical Education	261	011	Physical Education	0
				15

Spring Semester

Chemistry	221	230	Chemistry II	3
English	229	120	English Composition II	3
Mathematics	245	150	Plane Trigonometry	3
Physical Education	261	011	Physical Education	0
Speech	281	105	Oral Communication I	2
Mech. Engineering	580	212	Graphical Comm. I	2
			Option A, B, or C	3
				16

SOPHOMORE

Fall Semester

Grain Science	045	210	Flow Sheets	2
Biology	215	198	Principles of Biology	4
Economics	225	110	Economics I	3
			Option A, B, or C	7
				16

Spring Semester

Grain Science	045	400	Milling Technology I	4
Biology	215	450	Microbiology	4
			Humanities Elective	6
			Option A, B, or C	2
				16

Graduate Study

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 production of a wide variety of foods.

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 assembling of a flow sheet. Six hours lab. a week. Pr.: Gr. Sc. 100, M. E. 212.

045 225. Introductory Bakery Technology. (2) I. An introduction to baking technology. Instruction on modern baking processes and equipment by lecture, visual aids and field trips. One hour lec. and three hours lab. a week. Pr.: Math. 100.

045 305. Fundamentals of Food Processing. (3) II. The study of some basic ingredients used in food processing, principles of preserving and processing of foods, and food packaging. Pr.: A course in Chemistry.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

045 400. Milling Technology I. (4) II. Principles and practices of wheat flour milling with full scale equipment including grain storage, blending, cleaning, conditioning plant, and a modern pneumatic 200 hundred weight flour mill, with instrumentation and air conditioning, etc. Two hours lec. and six hours lab. a week. Pr.: Gr. Sc. 100 and 210, or consent of instructor.

045 410. Feed Technology I. (4) II. Introduction to the engineering aspects of formula feed manufacture; including, principles of conveying, grinding, mixing, pelleting, and 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.

045 420. Cereal and Feed Analysis. (3) II. Methods of analyzing and testing cereal grains, cereal and feed products. One hour lec. and six hours lab. a week. Pr.: Chem. 250 and Biochem. 120 or consent of instructor.

045 490. Feed Manufacturing Processes. (3) I. Study of the technical phases of formula feed manufacturing, equipment design and function, effect of processing and ingredients on nutritional acceptability of feeds and quality control. Two hours lec. and three hours lab. a week. Pr.: Math. 100, 150; A. S. I. 230 or consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT

045 600. Advanced Cereal Chemistry. (3) I. The chemistry of cereal components at the molecular level. The role and interactions of the various constituents,

their functionality in producing an end-product, and their influence on nutritional properties. Three hours lec. a week. Pr.: Biochem. 421 and Gr. Sc. 652 or consent of instructor.

045 605. Fundamentals of Processing Grains for Food. (3) I. Unit processes in the receiving and storing of grains: grinding, sifting, mixing, conveying, cooling, drying air qualities, air flow, compaction, extrusion, etc. This course is not open to undergraduate majors in the Department. Two hours of lec. and three hours of lab. per week. Pr.: A course in physics or consent of instructor.

045 625. Flour and Dough Testing. (3) I. Physical and chemical methods used in evaluating wheat flour and dough. One hour lec. and six hours lab. a week. Pr.: Gr. Sc. 652 or consent of instructor.

045 634. Bakery Technology. (3) II. Discussions and analysis of problems in the baking industry, including inventory control, quality control, distribution and selected unit operations. Three hours lec. a week. Pr.: Gr. Sc. 637.

045 635. Baking Science I. (2) I. Introduction to properties of ingredients used in baking, reactions of ingredients during processing into baked products. Two hours lec. a week. Pr.: Biochem. 120.

045 636. Baking Science I Laboratory. (2) I. Laboratory exercises in theory and production of yeast leavened baked products. Six hours lab. a week. Pr.: Gr. Sci. 635 or concurrent enrollment.

045 637. Baking Science II. (2) 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 batters and ingredients. Two hours lec. a week. Pr.: Gr. Sc. 635.

045 638. Baking Science II Laboratory. (1) II. A laboratory course to accompany Gr. Sc. 637. Three hours lab. a week. Pr.: Gr. Sc. 637 or concurrent enrollment.

045 640. Advanced Flow Sheets. (2) II. Designing flow diagrams for flour mills, corn mills, or feed mills. Six hours lab. a week. Pr.: Gr. Sc. 400 or 410 or consent of instructor.

045 651. Food and Feed Plant Sanitation. (4) II. Sanitation in relation to processing, handling and storage of human and animal foods. Emphasis on contaminants, control of causative agents, equipment and plant design, applicable laws and regulations. Three hours lec. and three hours lab. a week. Pr.: Minimum of eight hours of biological science; junior standing.

045 652. Cereal Science. (3) II. The characteristics of cereals, legumes and their products. Three hours lec. a week. Pr.: Biochem. 120 or equivalent.

045 661. Qualities of Feed and Food Ingredients. (3) II. Physical and nutritional properties of feed and food ingredients and the effects of origin, processing, storage and other factors upon them. Three hours lec. a week. Pr.: Biochem. 120.

045 670. Milling Technology II. (4) I. Advanced studies of the entire gradual reduction system of wheat flour milling and the many unit process systems that constitute the milling system. The theory and practices of wheat conditioning, drying and aeration, are elaborated upon. The processes for milling other grains such as corn, oats, sorghum, rice and rye are studied in theory and by practice on small scale laboratory milling units.

Two hours lec. and six hours lab. a week. Pr.: Gr. Sc. 400 or consent of instructor.

045 680. Feed Technology II. (4) I. Advanced study of engineering principles of feed plant production, materials handling, grinding, pelleting and other major processing operations. 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. Interrelationships of moisture, molds and insects in grain and products in storage; changes occurring in storage; proper drying, storage, control of insects, rodents, birds. Pr.: Gr. Sc. 650 or 660 or consent of instructor.

045 711. Principles of Food Analysis. (3) II. Principles of instrumentation and analysis, with emphasis on applications to quality control and research in the food industry. Pr.: Chem. 271 or Gr. Sc. 610, Biochem. 120 or equivalent or consent of instructor.

045 720. Advanced Flour and Feed Technology. (3) II. Study of fluid flow and heat transfer in relation to grain processing. Introduction to distillation and extraction processes involved in grain processing. Two hours lec. and three hours lab. a week. Pr.: Gr. Sc. 670 or 680.

045 730. Flour and Feed Mill Construction. (3) I. Mill engineering practices including sheet metal drafting, design of power transmission drives with belts, chains and gears and layout of new installations in existing plants. Design and layout of a grain or feed mill. Nine hours lab. a week. Pr.: Gr. Sc. 400 or 410 or consent of instructor.

045 790. Grain Science Problem. Credit arranged. I, II, S. Pr.: Consent of staff.

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 function; commercial methods of manufacture and industrial uses, with special emphasis on the role of enzymes in the food industries. Two hours lec. a week. Pr.: Biochem. 421, 422 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.

Horticulture and Forestry

R. W. CAMPBELL, Head of Department

Professors Campbell*, Gallaher, Greig*, Hall*, Keen*; Associate Professors Biswell, Grey, Morrison*, Odom*, and Strickler; Assistant Professors Abmeyer, Dainello, Deutsch, Funsch, Gaylor, Geyer*, Hadle, Marr*, Mattson*, McDaniel, Miles*, Moyer, Naughton, Nighswonger, Pair, Pinkerton, Rowland and Winzer; Instructors Atchison, Biles, Bratton, Geisler, Gould, Jones, Leuthold, Long, Loucks and Shreve; Emeritus: Professors Amstein, Filing and Pickett; Assistant Professor Willis.

Undergraduate Study

The Department of Horticulture and Forestry offers two four-year curriculums and two, two-year programs in Agriculture. Also, students may select the Management of Parks and Recreation Areas Option of the Curriculum in Natural Resource Management, see page 61. This option provides an opportunity for students to apply ecological principles to the field of recreational areas management.

HORTICULTURE (4-yr. curriculum)

B.S. degree in Agriculture; requires 126 sem. hrs.

Horticulture is a science, business, profession, art, industry, and way of life. There are positions and careers in horticulture in the city as well as on the farm. Students may elect programs of study in horticulture in one of four areas: science, business and industries, production, and services. Students, in consultation with faculty advisers, may select courses to meet individual needs.

Horticultural science is intended for students preparing for graduate study or for employment as horticulturists in the many fields associated with horticultural plants, products and services. Employment opportunities are provided by universities, industry and the federal government.

The horticultural business and industry is created for students seeking a career with the many businesses and industries related to agriculture. The demand for trained horticulturists in the sales and development of products and equipment is strong.

The horticultural production program is designed primarily for students wishing to have a broad knowledge of agriculture, especially the production and management of horticultural crops. Graduates of this option manage orchards, vegetable farms,

greenhouses, flower shops, nurseries, landscape services, processing firms, municipal and public grounds, parks, golf courses, athletic fields and other recreational areas.

The horticultural services option prepares students to work with people, both rural and urban. Demands are great for individuals trained in horticulture to work in youth, poverty, recreational and international agricultural programs.

General Requirements for the B.S. Degree

English Composition I	3
English Composition II	3
Oral Communication	2
Ag Orientation	1
College Algebra	3
Economics I	3
Chemistry I or General Chemistry	5
Physical Education I	0
Physical Education II	0
Humanities and / or Social Sci. (see pg. 34)	12
Communications (see pg. 34)	2 or 3

Other beginning and basic courses depend on the option selected, see page 33.

Horticulture Department Requirements

Major Courses	
Home Horticulture	2
Horticulture Seminar	0
Plant Science	4
Landscape Horticulture	3
Fruit Production	3
Floriculture	3
Vegetable Ecology	3
Non-Major Courses	
Dependent on option chosen.	

HORTICULTURAL THERAPY (4-yr. curriculum)

B.S. degree in Agriculture; requires 126 sem. hrs.

Horticultural Therapy undergraduate training is not available elsewhere in the United States. Hospitals, psychiatric institutions, rehabilitation centers, correctional institutions, geriatric homes and retirement communities have great need for people trained in this field. Students get a good background in horticulture with supporting courses in psychology, sociology and related areas. Clinical application of this knowledge is provided to students during their senior year at the Menninger Foundation in Topeka, Kansas.

FRESHMAN

Fall Semester

English	229	100
Speech	281	105
Mathematics	245	100
Psychology	273	110
General Agriculture	035	101
Physical Education	261	011

Course	Semester Hours
English Composition I	3
Oral Communication I	2
College Algebra	3
General Psychology	3
Ag Orientation	1
Physical Education	0
Humanities	3

15

Spring Semester

Spring Semester				
English	229	120	English Composition II	3
Economics	225	110	Economics I	3
Chemistry	221	210	Chemistry I	5
or				
Chemistry	221	110	General Chemistry	5
Sociology	277	214	Intro. to Sociology	3
Hort. & For.	040	150	Home Horticulture	2
Physical Education	261	011	Physical Education	0
Hort. & For.	040	160	Horticulture Seminar	0

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SOPHOMORE

Fall Semester

Biology	215	210	Botany I	4
			or	
Biology	215	121	Principles of Biology	5
Hort. & For.	040	130	Floral Arrangement I	3
Landscape Arch.	110	100	Landscape Design	3
			Humanities	3
			Electives	3

16 or 17

Spring Semester

Hort. & For.	040	200	Plant Science	4
Psychology	273	405	Abnormal Psychology	3
Hort. & For.	040	410	Landscape Hort.	3
Electives				3
Family & Child Develop.				3
Elective				3

16

JUNIOR

Fall Semester

Hort. & For.	040	420	Fruit Production	3
Hort. & For.	040	260	Plant Materials I	3
Agronomy	015	270	Soils	4
Plant Pathology	050	400	Plant Pathology	2
Sociology	277	450	Group Behavior & Primary Interaction	3

15

Spring Semester

Hort. & For.	040	690	Veg. Crop Ecol.	3
Hort. & For.	040	625	Floriculture	3
Art	209	100	Design I	2
Education	405	202	Education Psychology I	3
Hort. & For.	040	220	Plant Prop.	3
Electives				2 or 3

16 or 17

SENIOR

Either Semester

Entomology	030	200	Economic Entomology	3
Communications Elective				2
Psychology Elective				3
Electives				8 or 9

16 or 17

Either Semester

Hort. & For.	040	640	Horticultural Problems	6
Hort. & For.	040	661	Greenhouse Clinical Pract.	6
Hort. & For.	040	662	Garden & Landscape Therapy	3

15

PRE-FORESTRY (2-yr. program)

Hours earned in this program can be transferred to most other colleges offering a degree in forestry. The required program follows:

FRESHMAN

Chemistry I	5
English Composition I	3
Oral Communication I	2
College Algebra	3
Physical Education	0
Forestry Conservation	3
Horticulture & Forestry Seminar	0

16

Chemistry II	3
English Composition II	3
Plane Trigonometry	3
Economics I	3
Physical Education	0
Soils	4

16

SOPHOMORE

General Botany	4
Economics II	3
Physical Geology	4
Forestry Practices	3
Elements of Statistics	3
	17
Physics I	4
Dendrology	4
Electives	3
Social Science Electives	6
	17

RETAIL FLORICULTURE (2-yr. program)

This is a two-year technical program. 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 sessions. The second year, the student serves an apprenticeship at a selected retail florist business. Every effort is 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 Semester

Hort.	131	Floral Arrangement	3
Landscape Arch.	100	General Land Design	3
Biology	200	General Botany	4
Business Administration	201	Fund. Bus. for Prof. People	2
Psychology	110	General Psychology	3
			15

Spring Semester

Hort.	140	Adv. Floral Arrangement	3
Hort.	200	Plant Science	4
Hort.	150	Home Hort.	2
C & T	100	Design for Cont. Living	3
Speech	105	Oral Communication I	2
Art	100	Design I	2
			16

Summer School

Business Administration	275	Fund. of Accounting	4
English	100	English Composition I	3
			7

Graduate Study

Graduate study leading to the degrees Master of Science and Doctor of Philosophy is offered in the department. Research may be pursued in floriculture, fruit and nut crops, ornamental horticulture, turfgrass and vegetable crops. Areas of proficiency include plant breeding and genetics, horticultural crop physiology, plant environmental relationships, horticultural crop marketing and weed control. A B.S. degree from a recognized college or university whose undergraduate program is substantially equivalent to the program at KSU is prerequisite to admittance to graduate work in this department.

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.

UNDERGRADUATE CREDIT

040 100. **Plants, Man and Environment.** (2) I, II. A study of how plants and man interact and how this interaction influences their environmental quality. Recognition of the essential nature of plants and their role in modifying the environment in which we live will be the primary objective. Two hours rec. a week. No prerequisites.

040 130. **Floral Arrangement.** (3) I, II. Floral arrangement for the home and commercial flower shop. Basic fundamentals of floral design are emphasized. Two hours rec. and three hours lab. a week. For non-major students.

040 131. **Floral Arrangement.** (3) I. Floral arrangement for commercial flower shop. Basic fundamentals of floral design are emphasized. Two hours rec. and three hours lab. a week. For major students.

040 140. **Advanced Floral Arrangement.** (3) II. Stylized floral design for the commercial flower shop, including corsages, wedding designs, funeral pieces and party and banquet decorations. Two hours rec. and three hours lab. a week. Pr.: Hort. and For. 131.

040 150. **Home Horticulture.** (2) I, II. An introduction to horticulture and horticultural endeavors. Basic information on horticulture plants and their uses will be emphasized along with discussions of the various phases of horticulture activity. Two hours rec. a week. No prerequisites.

040 160. **Horticulture and Forestry Seminar.** (0) I, II. A discussion of current topics in horticulture, forestry and closely related fields by students, faculty and invited speakers. Required of all horticulture and forestry majors the first semester in attendance.

040 170. **Natural Resources and Man.** (3) I, II. An introductory course that assesses the environment to acquaint students with the kinds and extent of natural resources, their availability and utilization. The course is also listed in the Departments of Agricultural Economics and Agronomy.

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. Taught in cooperation with the Department of Agronomy. Pr.: Not open to Juniors and Seniors except by consent of instructor.

040 220. **Plant Propagation.** (3) II. Designed to develop proficiency in the various skills and techniques necessary for propagation of horticultural plants. Basic fundamentals of seed structure and vegetative makeup

of plants are emphasized. Two hours rec. and three hours lab. a week. Pr.: Biol. 210.

040 230. Greenhouse Construction and Management. (3) I. 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. Field trips and planting plans required. Two hours rec. and three hours lab. a week. Pr.: Biol. 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.: Biol. 210.

040 280. Forest Conservation. (3) I. An introduction to American forestry—what it is and what foresters do. Distribution of the forest resource includes 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

040 410. 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. Two hours rec. and three hours lab. a week. Pr.: Biol. 210 or Plant Science 200.

040 420. Fruit Production. (3) I. 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. and For. 200 or equiv.

040 430. 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 industries, and management of timber tracts. Two hours rec. and three hours lab. a week. Pr.: Hort. and For. 200 or consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT

040 610. Turf Management. (2) I. Methods and principles of establishing and maintaining special purpose turf. Pr.: Hort. and For. 200, Agron. 270 or consent of instructor.

040 620. Arboriculture. (3) II. Principles and practices of maintaining shade and ornamental trees under urban environments. Two hours rec. and three hours lab. a week. Pr.: Hort. and For. 200, Agron. 270 or consent of instructor.

040 625. Floriculture. (3) II. Principles and commercial practices for producing greenhouse crops. The relationship between a plant's physiological response and its greenhouse environment is stressed. Three hours rec. a week. Pr.: Hort. and For. 200.

040 640. Horticultural Problems. Credit arranged. I, II, S. Problems and reports in floriculture, olericulture, ornamental horticulture, and pomology. Pr.: Advanced undergraduates and consent of instructor.

040 641. Forestry Problems. Credit arranged. I, II, S. Work is offered in various fields of forestry. Pr.: Consent of instructor.

040 661. Greenhouse Clinical Practices. (3-6) I, II, S. Supervised training in the application of greenhouse practices and the use of plants and flowers in the treatment of institutional patients. Pr.: Consent of instructor.

040 662. Garden and Landscape Therapy. (3-6) I, II, S. Training in supervision of patients in flower and vegetable gardening as a therapy. The use of landscape to better the trainees' understanding of how institutional landscape maintenance can be used in therapy. Pr.: Consent of instructor.

040 670. Systematic Olericulture and Pomology. (3) I. 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. and For. 200.

040 675. Storage and Post-Harvest Physiology. (3) I. 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. Plant Protection. (3) II. 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.: Ent. 200 or Plant Path. 400.

040 690. Vegetable Crop Ecology. (3) II. Study of ecological principles involved in the production of vegetable crops, as influenced by environmental conditions. Two hours lec. and three hours lab. or field trips a week. Pr.: Ent. 200 or Plant Path. 400.

040 700. Vegetable Crop Physiology. (3) II. Study of applied physiological responses of selected vegetable crops on grade, quality, storage and marketing of these products. Three hours lec. a week. Field trip required. Pr.: Hort. and For. 200.

040 720. Horticultural Crop Breeding. (3) II. Problems and breeding practices related to fruit, ornamental, or vegetable plants. Pr.: One course in genetics and consent of instructor.

040 730. Fruit Science. (3) I. Detailed discussion of fruit plant hardiness, nutrition, light utilizations, growth regulators and rootstocks. Laboratory exercise emphasis on research topics. Two hours rec. and three hours lab. a week. Pr.: Hort. and For. 200 or equiv.

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.: Consent of instructor.

040 820. Advanced Vegetable Crops. (1-3) I. A specialized study related to the physiological develop-

ment and handling of selected vegetable crops. Pr.: Hort. and For. 690 or 700 and consent of instructor.

040 830. Advanced Pomology. (1-3) II. Morphological and physiological changes occurring in fruit plants. Pr.: Consent of instructor.

040 846. Plant Research Methods. (3) I. Review of history and forms of plant science literature. Discussion on selecting experimental procedures, interpreting data, and reporting results. Two hours. rec. and two hours lab. per week. Pr.: One Statistics course or consent of instructor.

Natural Resource Management

B.S. degree in Agriculture; requires 126 sem. hrs.

This curriculum is designed for the individual who wishes to interpret and apply ecological principles in the solution of environmental problems involving renewable natural resources. It contains courses in the social sciences and humanities which help make the student sensitive to his environmental surroundings, courses in the physical and biological sciences that help him understand and solve environmental problems, and courses in communications that make it easy to interpret, convey and employ solutions.

The three options, (A) Soil and Water Conservation, (B) Resource Administration, and (C) Park and Recreational Areas Management, are administered by faculty members who serve as advisers to students. Persons interested in the curriculum should contact the College of Agriculture Dean's office for additional information and selection of an adviser. Required courses for the curriculum and the three options are as follows.

FRESHMAN

Fall Semester	
Ag Orientation	1
Chemistry I	5
English Composition I	3
College Algebra	3
Principles of Political Science or State and Local Government	3
Physical Education	0
	<hr/> 15

Spring Semester	
English Composition II	3
Plane Trigonometry or Introduction to Analytic Processes	3
Oral Communication I	2
General Botany or Principles of Biology	4
Chemistry II Lecture	3
Physical Education	0
	<hr/> 15

SOPHOMORE

Fall Semester	
Economics I	3
Physical Geology	4
Plant Science	4
General Physics I ¹	4
	<hr/> 15

Spring Semester	
Soils	4
Principles of Agricultural Economics	3
Wildlife Conservation or General Zoology	3 or 4
Option and Electives	5 or 6
	<hr/> 16

JUNIOR

Fall Semester	
Forest Conservation or Range Management I	3
Introduction to Sociology	3
Mathematics or Statistics	3 or 4
Humanities or Social Science ²	3
Option and Electives	3 or 4
	<hr/> 16

Spring Semester	
Humanities or Social Science ²	3
Environmental Biology	4
Economic Entomology	3
Option and Electives	6
	<hr/> 16

SENIOR

Fall Semester	
Population and Human Ecology or Community Organization and Leadership	3
Geography of Extractive Industries	3
Option and Electives	10
	<hr/> 16

Spring Semester	
Microbiology	4
Option and Electives	12
	<hr/> 16

Total 125

Option A: Soil and Water Conservation³

Chemistry II Laboratory ⁴	2
General Organic Chemistry	5
Select courses from four of the following areas:	
Soil Management and Moisture Conservation, or Management of Irrigated Soils	2 or 3
Development and Classification of Soils	3
Soil Fertility or Chemical Properties of Soils	3
Crop Ecology, Turf Management, or Forestry Practices	3
Soil Physics or Conservation Survey and Planning	3
Electives	17-20
	<hr/> 36-38

Option B: Resource Administration⁵

Fundamentals of Accounting	4
Public Finance or Rural Human Resource Development	3
Production Economics	3
Agricultural Law and Economics	3
Natural Resource Economics	3
Introduction to Planning	3
Agricultural Market Structures	3
Electives	14-16
	<hr/> 36-38

Option C: Park and Recreational Areas Management⁶

General Organic Chemistry ⁴	5
Plant Pathology	2
Landscape Horticulture or Plant Protection	3
Turf Management	2
Arboriculture	3
Landscape Design	3
Community Recreation	3
Electives	15-17
	<hr/> 36-38

1. Descriptive Physics may be substituted for General Physics I in Options B and C.

2. To be selected from List of Approved Humanities and Social Science electives on page 34.

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

4. Students terminating with the B.S. degree may substitute Elementary Biochemistry for General Organic Chemistry.

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

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

Plant Pathology

B.S. in Agriculture; requires 126 sem. hrs.

JOHN F. SCHAFER,* Head of Department

Professors Hansing,* King, and Schafer;* Associate Professors Dickerson,* Edmunds,* Johnson,* Stuteville,* and Willis;* Assistant Professors Browder,* Niblett,* Sauer,* and Schwenk;* Instructor Eversmeyer; Emeritus: Professors Elmer* and Melchers.*

Plant pathology is the study of plant diseases, their economic effects, causes, nature, and control. Opportunities for graduates in plant pathology include research and development for many types of agencies, teaching, extension, sales, and commercial service. Industry, government, educational institutions, and private foundations employ plant pathologists on a world-wide basis.

Undergraduate Study

The undergraduate program in plant pathology is designed to provide a broad background in the biological, physical, and agricultural sciences. Many plant pathology majors continue in graduate study.

General Requirements for BS Degree

229 100	English Composition I	3
229 120	English Composition II	3
281 105	Oral Communication	2
289 350	Agricultural Journalism	3
035 101	Ag Orientation	1
245 100	College Algebra	3
225 110	Economics I	3
221 210	Chemistry I	5
261 011	Physical Education I	0
261 011	Physical Education II	0
	Electives in Social Sciences and / or Humanities	12

Departmental Requirements

Major Courses

215 210	General Botany	4
015 200	Plant Science	4
050 400	Plant Pathology	2
215 640	Introductory Mycology	4
050 600	General Plant Pathology	3
	Electives in the Botanical Sciences	9

Supporting courses

215 450	Microbiology	4
005 400	Genetics	3
221 230	Chemistry II	3
221 250	Chemistry II lab.	2
221 350	General Organic Chemistry	3
221 351	Gen. Organic Chem. lab.	2
015 270	Soils	4
245 150	Plane Trigonometry	3
285 320	Elements of Statistics	3
265 211	General Physics I	4

One of the following

265 135	Descriptive Meteorology	3
265 212	General Physics II	4

One of the following

020 410	General Plant Biochemistry	4
020 421	and 020 422 Gen. Biochem. lecture and lab.	5
020 655	and 020 656 Biochem. I lecture and lab.	5

One of the following

030 200	Economic Entomology	3
030 200	General Entomology	3

One or more of the following

245 220	Analytical Geometry and Calculus I	4
286 315	Fundamentals of Computer Programming	3

One or more of the following

005 102	Principles of Animal Sci.	3
005 101	Basic Animal Sci. & Ind.	2
010 100	Principles of Agri. Econ.	3
506 300	Engg. in Agric.	4
	Elective in Accounting or Bus. Admin.	3

Graduate Study

The graduate program in plant pathology leads to the Master of Science and Doctor of Philosophy degrees. Prerequisite to graduate study is possession of a bachelor's degree from an accredited college. Students often enter advanced work in plant pathology following a major in biology, botany, agronomy, horticulture, or similar area as well as from plant pathology. Specialized areas of study include epidemiology, disease physiology, nematology, virology, host-parasite relationships, ecology of disease development, biochemistry of pathogenicity, disease resistance, and chemical control. Research is conducted on diseases of grain crops, forage crops, fruits, vegetables, ornamentals, turf, and stored grain.

Departmental facilities include physiological laboratories, environmental chambers, greenhouses, and experimental field plots. Students have access to the electron microscope laboratory, Computing Center, herbarium, and science libraries. Graduate research assistantships or employment in departmental research projects may be available to outstanding students.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

050 400. Plant Pathology. (2) I, II. 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.

UNDERGRADUATE AND GRADUATE CREDIT

050 600. General Plant Pathology. (3) II. A study of the fundamental principles and techniques 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.: Biol. 640 or equiv., or consent of instructor.

050 605. Literature of Plant Pathology. (1) I. Study and analysis of recent important developments in plant pathology. One hour rec. a week. Pr.: Plant Pathology 600 or consent of instructor.

050 620. General Nematology. (3) I. The morphology, taxonomy, biology of, and techniques used in the study of plant parasitic and soil and freshwater free-living nematodes. Six hours of combined rec. and lab. a week. Pr.: Plant Pathology 400 or consent of instructor (consent implies some background in zoological science).

050 630. Principles of Plant Disease Control. (3) II. Offered in 1972-73 and alt. 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.: Plant Pathology 400 or consent of instructor.

050 640. Diseases of Horticultural Crops. (3) I. Offered in 1971-72 and alt. years. Identification, classification, epidemiology and control of diseases of vegetable, fruit, and ornamental plants. Two hours rec. and three hours lab. a week. Pr.: Plant Pathology 400, its equivalent, or consent of instructor.

050 650. Diseases of Field Crops. (3) II. Offered in 1973-74 and alt. years. Diseases of cereal, forage, and fiber crops; their causes, symptoms, life histories, host-parasite relationships, and control. Two hours rec. and three hours lab. a week. Pr.: Plant Pathology 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 plants and mammalian cell cultures as the host for virus propagation. Pr.: Twelve hours of biological sciences, including Biol. 450 or equiv. and Biochem. 421 or equiv. Consent of instructor. (Taught in cooperation with the Division of Biology).

050 751. Methods in Plant Pathology. (3) I. Offered 1972-73 and alt. years. The 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.: Plant Pathology 400 or equiv., or consent of instructor.

050 782. Plant Virology. (3) I. Offered 1972-73 and alt. years. A study of the virus diseases of plants with emphasis on the chemical, physical, and biological properties of the causal agents. Two hours rec. and three hours lab. a week. Pr.: Plant Pathology 600 or 751, Biochem. 421 or equiv., and consent of instructor.

050 790. Problems in Plant Pathology. Credit Variable, (1-3) I, II, S. Work is offered in general plant pathology, plant virology, plant nematology, disease physiology, and epidemiology. Pr.: Background of courses needed for problem undertaken.

GRADUATE CREDIT

050 800. Advanced Nematology. (3) II. Offered in 1973-74 and alt. years. Emphasis on taxonomy with discussions on the general biology, ecology and physiology of plant parasitic and associated nematodes. Six hours of combined rec. and lab. a week. Pr.: Plant Pathology 620 or equiv.

050 810. Physiology of Plant Disease. (3) II. Offered in 1973-74 and alt. years. A discussion of changes in the physiology and biochemistry of the host and the pathogen, and their interaction during infection and disease development. Examples from fungal, bacterial and viral diseases will be utilized. Resistant and susceptible interactions will be considered. Two hours rec. and 3 hours lab. per week. Pr.: Biology 600 and a course in Biochemistry, 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 variable. I, II, S. Work is offered in general plant pathology, plant virology, plant nematology, disease physiology and epidemiology. Pr.: Sufficient background to conduct the line of research undertaken.

The Kansas Agricultural Experiment Station

FLOYD W. SMITH, Director
KEITH HUSTON, Associate Director
LOWELL BRANDNER, Editor
GRACE MUILENBERG, Assistant 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 disseminate the results of agricultural research. Attention is devoted largely to the solution of problems related to agriculture, including farm homes.

Departments of the Agricultural Experiment Station are as follows: Agricultural Engineering, Agricultural Economics, Agronomy, Animal Science and Industry, Biochemistry, Biology, Business Administration, Chemical Engineering, Chemistry, Computer Science, Economics, Entomology, Dairy and Poultry Science, Grain Science and Industry, Geology, Home Economics, Horticulture and Forestry, International Agriculture, Nuclear Engineering, Physics, Plant Pathology, Political Science, Statistics, Sociology and An-

thropology and Veterinary Medicine, and the five branch stations—Colby, Fort Hays, Garden City, Southeast Kansas and Tribune.

Research of the various departments is conducted in eight divisions of the Kansas Agricultural Experiment Station. The eight divisions include Animal Sciences, Food Sciences, Home Economics, Pesticides, Plant Sciences, Social Sciences, Soil and Water Sciences, and Veterinary Medicine.

An annual budget of about \$8.8 million and many positions for graduate research assistants make the Kansas Agricultural Experiment Station a strong ally of the Graduate School. The Experiment Station has research projects in six colleges of the University. Interested graduate students are encouraged to seek graduate research assistantships to supplement their graduate study programs.

Research by scientists in the experiment station is organized into more than 500 projects that cover nearly all phases of agriculture in its broadest context. Among the projects are physiology and nutrition of plants and animals; diseases of plants and animals; chemical composition of soils, plants, and animal products; plant and animal breeding; crop rotations and fertilizers; acclimatization of new plants and trees; grasses and forage plants; feeds for livestock; production, processing, marketing, distribution, and use of agricultural products and machinery and equipment; farm management and other economic problems; sociological problems; area development; human nutrition and family living.

Farms, branch stations, well-equipped laboratories, and scientific equipment are available for use by Experiment Station researchers.

Results of research are published in scientific journals, station bulletins, circulars, pamphlets, leaflets, reports of progress, research papers, 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. Any person in the state may have his name placed on the permanent mailing list of the station to receive announcements of station publications.

Letters of inquiry and general

correspondence should be addressed to the Kansas Agricultural Experiment Station, Kansas State University, Manhattan 66502.

Branch Agricultural Experiment Stations

Fort Hays Branch Station

W. W. DUTSMAN, Superintendent

Professors Duitsman, Hackerott, Harvey, Launchbaugh and Livers; Associate Professors Brethour and Phillips; Assistant Professors Baxter, Stegmeier and Thompson.

Land occupied by this station is 3,700 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 primarily related 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, legumes, and grasses; soil management; weed control; and insects as related to crops and livestock.

Garden City Branch Station

A. B. ERHART, Superintendent

Professor Erhart; Associate Professor Arnett, Assistant Professors Condray, DePew, Herron, Kyle, Norwood, Penas and Witt; Instructor Ohmes.

A 99-year lease from the Finney County commissioners to the State Board of Regents beginning June 14, 1907, provided 320 acres for agricultural research. Additional adjoining tracts totaling 235 acres were purchased in 1937 and 1939. An 80-acre irrigated tract was made available by The Garden City Company in 1948.

Current investigations involve extensive irrigation research, livestock feeding, dairying, dryland soil management, crop improvement, weed control, horticultural and specialty crops, insect control, and soils and fertilizer relationships. One of the two state soils laboratories is located at the Garden City Branch Station.

Colby Branch Station

E. E. BANBURY, Superintendent

Associate Professor Banbury, Assistant Professors Arehart, Bordovsky, Hinrichs and Lawless.

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

R. E. GWIN, Jr., Superintendent and Assistant Professor

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

F. W. BOREN, Superintendent

Professor Boren; Assistant Professors Helmer and Perry; Instructor Beason.

Following World War II, a 242-acre tract of land, near Mound Valley used as an auxiliary landing field, was declared surplus property. Ownership was transferred to Kansas State University in 1948. In 1949 the Kansas legislature authorized the establishment of the Mound Valley Branch Experiment Station and appropriated funds for its development and operations.

The 1966 Kansas legislature transferred 485 acres of land formerly operated by the Parsons State Hospital and Training Center to Kansas State University and authorized consolidation of the Mound Valley, Parsons, and Columbus Experiment Field land into a single unit, the Southeast Kansas Branch Experiment Station, with headquarters at Mound Valley.

Soil studies in relation to yield and quality of crops, field crop investigations, dairy cattle production, beef cattle investigations and extensive forage research are being conducted at this station.

Experiment Fields and

Irrigation Development Farms

The Kansas Agricultural Experiment Station includes 11 experimental fields of from 20 to more than 500 acres each. Six are operated by the Department of Agronomy. They are on different soil types and under different climatic conditions. Field crops and soil investigations are specially pertinent to local conditions. Two fields are supervised jointly by the Departments of Agricultural Engineering and Agronomy and include irrigation studies. Fields (most leased) are: Cornbelt (Powhattan), North Central Kansas (Belleville and Mankato), Irrigation (Scandia), Southwest Kansas (Minneola), Sandyland Irrigation and Dryland (St. John), South Central Kansas (Hutchinson), Newton, East Central (Ottawa).

Three fields for horticultural and forest crops operated by the Department of Horticulture and Forestry are Northeast Kansas (Wathena), Sedgwick County (Wichita), and Southeast Kansas (Chetopa).

The Kansas Water Resources

Research Institute

HYDE S. JACOBS, Director

Cooperating 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. By Regents stipulation Kansas State University and the University of Kansas are partners in the Institute for maximum benefit 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 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.

Evapotranspiration Laboratory

Established by the 1968 Kansas legislature, this laboratory is concerned with conserving Kansas' limited water resources by reducing both evaporation from soil and plant surfaces and transpiration from plant leaves.

The Food and Feed Grain Institute

WILLIAM J. HOOVER, Director

LEONARD W. SCHRUBEN, Associate Director

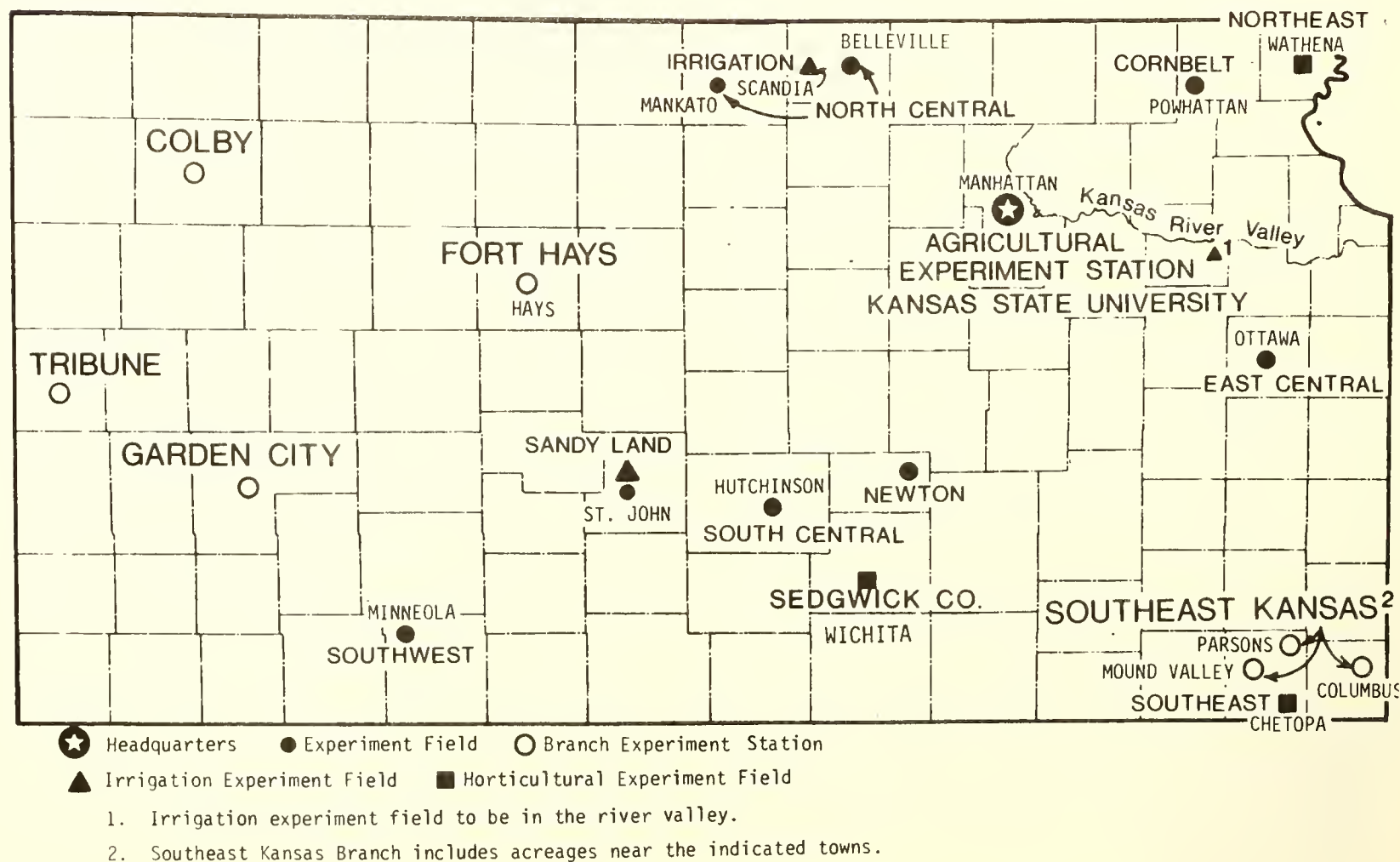
The Institute is based on the faculty in the Grain Science and Industry Department and

utilizes some faculty in other departments. Its goals are to develop methods of milling and processing grains; to evaluate and improve their quality and nutritional properties; to find new uses for them; and to improve the handling, transporting, storing, and domestic and international marketing of grains and foods.

The Statistical Laboratory

H. C. FRYER, Director

This Laboratory was established in 1946 to provide consulting and computational services to the faculty and students of Kansas State University, especially those associated with the Kansas Agricultural Experiment Station. It is under the administration of the Department of Statistics and Computer Science whose faculty are available by appointment for statistical and computational assistance on a twelve-months basis to assist in the designing of experiments.





THE COLLEGE OF ARCHITECTURE AND DESIGN

BERND FOERSTER, Dean
ROBERT P. EALY, Associate Dean
WILLIAM R. JAHNKE, Assistant Dean

The College of Architecture and Design provides professional study in architecture, architectural structures, interior architecture, landscape architecture, building construction and regional and community planning.

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. The planning curriculum is accredited by the American Institute of Planners in cooperation with the Association of Collegiate Schools of Planning.

The College of Architecture and Design consists of five administrative departments: Architecture, Construction Science, Interior Architecture, Landscape Architecture and Regional and Community Planning.

Bachelor's degrees are offered in each of the following areas:

- Architecture (curriculum on page 70)
- Architectural Structures (curriculum on page 70)
- Interior Architecture (curriculum on page 70)
- Landscape Architecture (curriculum on page 70)
- Building Construction (curriculum on page 71)

Dual Degree Programs

A student may earn two degrees by pursuing a dual degree program. There are several possibilities for a second major. Ordinarily such a program must begin during the student's junior year. In general, the second degree can be obtained with an ad-

ditional year of study (a minimum of 30 credit hours is required.)

Graduate Programs

The College of Architecture and Design offers work at the graduate level in architecture, architectural structures, interior architecture, 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 also are offered. Additional information on the graduate programs is included under Graduate School, page 263.

Summer School

Entering freshmen and transfer students will find that many courses may be taken during the summer session. Such courses are especially advantageous for those who wish to remove deficiencies. Detailed information on specific courses is contained in the Summer School Catalog, which may be obtained from the Director of Admissions, Kansas State University, Manhattan 66502.

Electives

Curricula in the College show two types of electives: those listed merely as electives may be chosen from any course offered in the University that is open to the student; those listed with a designation must be chosen from any course in the indicated field that is open to the student. Only four hours of electives may be taken in Basic Military Science.

Pre-Design Professions Program

The curricula in architecture, interior architecture and landscape architecture start in the beginning of the third year, and no students are admitted to them prior to successful completion of the pre-design professions curriculum. This two-year program provides common background and skills, and enables students to select their field on the basis of information obtained in the College.

Pre-Design Professions Curriculum

FIRST YEAR

First Semester			Second Semester		
104 207	Arch. Graphics I	2	104 208	Arch. Graphics II	2
	Art Elective	2		Art Elective	4
	Social Sci. Elective ...	3		Social Sci. Elective ...	3
229 100	English Comp. I	3	229 120	English Comp. II	3
	Humanities Elective ..	3		Mathematics Elective ..	3
281 105	Oral Comm. I	2			
261 011	Physical Education ...	0	261 011	Physical Education ...	0
		15			15

SECOND YEAR

Third Semester			Fourth Semester		
104 323	Envir. Design Studio I	4	104 324	Envir. Design Studio II	4
104 330	Intro. Des. Professions	2	104 331	Landscape Ecology ...	2
104 340	Basic Const. Tech. I ...	3	104 341	Basic Const. Tech. II ...	3
104 350	Hist. Designed Envir. .	3	104 351	Hist. Designed Envir. .	3
	Science Elective	3		Science Elective*	3
		15			15

Professional Curriculum in Architecture

Bachelor of Architecture

Fifth Semester			Sixth Semester			
105 501	Arch. Des. Studio I	5	105 502	Arch. Des. Studio II ...	5	
106 510	Structures I "A"	3	106 511	Structures II "A"	3	
105 433	Arch. Constr. I	3	105 434	Arch. Constr. II	3	
105 413	Environ. Systems in Arch.	3	106 520	Env. Technology I	3	
	Free Elective	3		Free Elective	3	
		17			17	
Seventh Semester			Eighth Semester			
105 503	Arch. Des. Studio III ..	5	Professional Concentration Studies**			15
106 521	Env. Technology II ...	3				
109 215	Intro. to Planning	3				
	Free Elective	6				
		17				
Ninth Semester			Tenth Semester			
	Prof. Conc. Studies** ..	9		Prof. Conc. Studies** ..	9	
105 656	Professional Sem. I ...	2	105 657	Professional Sem. II ..	2	
	Free Electives	6		Free Electives	6	
		17			17	

A minimum total of 160 credit hours is required for graduation.

*Students who consider electing the professional program in landscape architecture are advised to take botany as a science elective in the second year.

**Professional Concentration Studies: Fields of study, combining advanced design studios with present courses of the College and of the University are developed by the department faculty. Students may elect areas of concentration with the assistance of their adviser. Professional Concentration Studies consists of a minimum of 33 credit hours. Additional electives of concentration support courses may be taken in the 5th, 6th, or 7th semesters in anticipation of subsequent concentration studies.

Professional Curriculum in Interior Architecture

Bachelor of Interior Architecture

Fifth Semester			Sixth Semester		
107 501	Int. Arch. Des. Studio I	4	107 502	Int. Arch. Des. Studio II	4
105 501	Arch. Des. Studio I	5	550 425	Design Ergonomics	2
105 413	Env. Systems in Arch.	3	106 520	Env. Technology I	3
	Art Elective	2	107 309	Finishing	2
	Humanities Elective	3		Electives	6
		17			17
Seventh Semester			Eighth Semester		
107 503	Int. Arch. Des. Studio III	4	107 504	Int. Arch. Des. Studio IV	5
107 507	Design Workshop I	3	107 508	Design Workshop II	3
106 521	Env. Technology II	3		Electives	6
105 433	Arch. Constr. I	3		Soc. Sci. or Bus. Administration Elec.	3
	Soc. Sci. Elective	3			
		16			17
Ninth Semester			Tenth Semester		
107 601	Int. Arch. Des. Studio V	5	107 602	Int. Arch. Des. Studio VI	5
107 610	Design Workshop III	3	107 683	Contemporary Furn. Des.	4
107 653	Design Practice	2	107 720	Int. Arch. Seminar	3
	Bus. Adm. Electives	6		Electives	5
		16			17

A minimum total of 160 credit hours is required for graduation.

Curriculum in Landscape Architecture

Bachelor of Landscape Architecture

Fifth Semester		
110 431	L. A. Des. I	4
110 434	Planting Design I	3
110 436	Land. Const. I	3
525 212	Surveying	3
040 260	Pl. Mat. I	3
		<hr/> 16
Seventh Semester		
110 541	L. A. Design III	4
110 543	Planting Design III	3
110 547	Land. Const. III	3
040 410	Land. Hort.	3
110 501	L. A. Seminar	1
	Art Elective	2
		<hr/> 16
Ninth Semester		
110 651	L. A. Design V	5
110 656	Parks & Rec.	3
110 501	L. A. Seminar	1
	Bus. Adm. Elec.	3
	Science Elec.	3
	Free Elec.	2
		<hr/> 17
Sixth Semester		
110 432	L. A. Des. II	4
110 435	Planting Design II	3
110 433	Hist. & Theory L. D. ...	3
040 270	Pl. Mat. II	3
110 437	Land. Const. II	3
		<hr/> 16
Eighth Semester		
110 542	L. A. Design IV	4
110 544	Com. Site Planning ...	3
110 545	Pro. Internship	0
109 215	Intro. Planning	3
110 501	L. A. Seminar	1
	Free Electives	4
	Science Electives	3
		<hr/> 18
Tenth Semester		
110 652	L. A. Design VI	5
110 653	Pro. Practice	2
110 501	L. A. Seminar	1
	Bus. Adm. Elec.	3
	Free Electives	6
		<hr/> 17

A minimum total of 160 credit hours is required for graduation.

Curriculum in Architectural Structures

Bachelor of Architecture

First Semester			Second Semester		
104 207	Architectural Graph. I	2	104 208	Arch. Graph. II	2
229 100	English Comp. I	3	229 120	English Comp. II	3
281 105	Oral Comm. I	2	106 210	Intro. Cost Programming	2
245 220	Anal. Geo. & Calc. I	4	245 221	Anal. Geo. & Calc. II	4
221 210	Chemistry I	5	221 230	Chemistry II	3
261 011	Physical Education	0	261 611	Physical Education	0
		16			14

Third Semester				Fourth Semester			
104	323	Envir. Design Studio I	4	104	324	Envir. Design Studio II	4
104	330	Intro. Des. Professions	2	104	331	Landscape Ecology ...	2
104	340	Basic Const. Tech. I ...	3	104	341	Basic Const. Tech. II ...	3
265	310	Engineering Physics I	5	265	311	Engineering Physics II	5
245	222	Anal. Geo. & Calc. III	4			Limited Sci. Elec.*	3
			18				17

Fifth Semester				Sixth Semester			
105	510	Arch. Des. Studio I	5	510	415	Mechanics-Materials	3
510	305	Statics	3	510	418	Mechanics-Materials	
105	433	Arch. Constr. I	3			Lab	1
525	212	Elem. Surv. Engg.	3	105	434	Arch. Constr. II	3
		Humanities Elective*	3	510	412	Dynamics	3
			17	105	301	Appreciation of Arch. ...	3
						Social Sci. Elective*	3
							16

Seventh Semester				Eighth Semester			
525	431	Stat. Determinent Struct.	3	106	422	Theory of Structures II	4
106	421	Timber Structures	2	106	434	Thermal Systems	3
525	422	Soil Mechanics I	3	106	437	Acoustic Systems	2
510	471	Fluid Mechanics I	3	525	432	Stat. Indeter. Structures	3
106	436	Sanitation Systems ...	2			Social Sci. Electives*	3
		Humanities Elective*	3				15
			16				

Ninth Semester				Tenth Semester			
106	428	Theory of Structures III	4	106	680	Theory of Structures IV	3
106	435	Lighting Systems	3	530	403	Elect. Cir. & Controls	4
560	413	Thermodynamics I ...	3			Free Elective	8
525	428	Foundation Engg.	3				15
		Free Elective	3				
			16				

A minimum total of 160 credit hours is required for graduation.

Curriculum in Building Construction

B. S. in Building Construction

First Semester				Second Semester			
229	100	Engl. Comp. I	3	229	120	Engl. Comp. II	3
245	340	Intro. Anal. Proc.	3	525	212	El. Survey Engg.	3
104	207	Arch. Graph. I	2	104	208	Arch. Graph. II	2
281	105	Oral Comm. I	2	106	210	Intro. Const. Prog.	2
225	110	Econ. I	3	265	211	Gen. Phys. I	4
261	011	Phys. Ed.	0	261	011	Phys. Ed.	0
		Soc. Sci. Elective	3			Soc. Sci. Elective	3
			16				17

Third Semester				Fourth Semester			
104	340	Basic Const. Tech I ...	3	104	341	Basic Const. Tech II ..	3
265	212	Gen. Phys. II	4	510	205	Appl. Mech. A	3
106	205	Site Constr.	3	105	301	Apprec. Arch.	3
234	100	Phys. Geology	4	305	275	Fund. Acctg.	4
106	116	Constr. Seminar	0	106	116	Constr. Seminar	0
		Humanities Elective ..	3			Humanities Elective ..	3
			17				16

Fifth Semester				Sixth Semester			
105	433	Arch. Const. I	3	106	313	Constr. Drawings	3
510	220	Str. Matls. A.	3	106	420	Theory Str. I	3
510	224	Str. Matls. A Lab	1	106	421	Timber Str.	2
106	440	Constr. Prob. I	3	106	437	Acoustic Systems	2
305	425	Business Law I	3	285	320	El. Statistics	3
106	436	Sanitation Systems ...	3			Free Elective	3
106	116	Constr. Seminar	0	106	116	Constr. Seminar	0
			16				16

Seventh Semester				Eighth Semester			
106	422	Theory Str. II	4	106	428	Theory Str. III	4
106	441	Constr. Estim.	3	106	434	Thermal Systems	3
106	442	Constr. Management I	3	105	443	Constr. Management II	3
305	630	Industrial Rel.	3	550	401	Industrial Mgmt.	3
106	435	Lighting	3			Free Elective	3
106	116	Constr. Seminar	0	106	116	Constr. Seminar	0
			16				16

A minimum total of 130 credit hours is required for graduation.

Pre-Design Professions Program

Professors Fischer,* Foerster,* Krider;* Associate Professor Bissey;* Assistant Professors Bartlett, Butke, Lippenberger, Martin, Selfridge, Wendt.

For curriculum see page 70.

104 207 and 104 208. Architectural Graphics I and II. Introduction to mechanical and freehand architectural drawing; vocabulary of graphic communication; symbols, conventions, architectural lettering, perspective, shades, and shadows. Six hours lab. a week.

104 207 A.G. I. (2) I, II. Pr.: Plane Geometry.

104 208 A.G. II. (2) I, II, S. Pr.: 104 207.

104 323 and 104 324. Environmental Design Studio I and II. Visualization and representation of spatial concepts; approaches to physical design; exercises and experiments involving space organization, form, color, texture, materials, structure, and climate; interaction of functional, material, social, and aesthetic needs. Eleven hours studio and lecture per week.

104 323 E.D.S. I. (4) I. Pr.: 104 208.

104 324 E.D.S. II. (4) II, S. Pr.: 104 323.

104 330. Introduction to the Design Professions. (2) I. Principles of environmental design; identification of attitudes and aptitudes for the environmental design professions; indication of challenges. Two hours lecture per week. Pr.: 2nd year classification.

104 331. Landscape Ecology. (2) II. An understanding of the relationship of man to his natural environment, and the role of the physical planner in that relationship. Two hours lecture per week.

104 340 and 104 341. Basic Construction Technology I and II. Criteria for evaluation and selection of materials, the art of joining; introduction to communicating construction information; interrelation of material properties, fabrication — erection methods and design considerations. Introduction to systems of environmental control. Principles of mechanics and strength of materials; types of loads and methods of load transfer; conceptual approach to structures; interrelation of structural systems; economic considerations and design criteria. Three hours lecture per week.

104 340 B.C.T. I. (3) I. Pr.: 104 208.

104 341 B.C.T. II. (3) II. Pr.: 104 340.

104 350 and 104 351. History of the Designed Environment I and II. A study of the history of the man-made environment and its relationship to the societies that produced it; classic times to present. Three lectures per week.

104 350 H.D.E. I. (3) I. Pr.: None.

104 351 H.D.E. II. (3) II. Pr.: 104 350.

*Limited Social Science and Humanities Electives.

*Limited Science Electives.

Architecture

F. GENE ERNST,* Head of Department

Professors Chadwick,* Fischer,* Heintzelman,* Krider,* and Miles,* Associate Professors Chang,* Christensen,* Ernst,* Hall,* Sanner,* and Slack; Assistant Professors Butke, Cool, Lippenberger, Martin, Reid,* Selfridge, Shepard and Wendt; Adjunct Professor Shaver; Emeritus Professors Helm,* Weigel.*

For Curriculum, see page 70.

The Bachelor of Architecture professional program consists of a five-year, three-phase course of study:

1. A 2-year pre-design professions program.
2. A 1½-year core studies program.
3. A 1½-year professional concentration studies program.

In addition to the general education and design fundamentals of the first two years, the professional program consists of a balance of architectural analysis and programming, design, construction technology, environmental control systems and specialization. A cumulative experience is developed through a series of design studios dealing with academic and real problems and involvement with people. The design experience provides the framework for application of the student's expanding knowledge of building materials, construction systems, concern for the land and its resources, and man's response to the built environment.

Courses In Architecture

UNDERGRADUATE CREDIT

105 301. **Appreciation of Architecture.** (3) I, II, S. 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 architecture and interior architecture curricula.

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.

105 413. **Environmental Systems in Architecture.** (3) I. Discussion of the influences of environmental technology upon design concepts. This course is not for graduate credit. Three hours rec. a week. Pr.: Approval of instructor.

105 433 and 105 434. **Architectural Construction I and II.** (3) Assemblage and components of construction systems; materials; building economics; specifications.

Written and graphic construction communication. These courses are not for graduate credit. Nine hours lab per week. Pr.: 104 340 and 104 341.

105 433 **Arch. Constr. I.** (3) I, II. Pr. 104 340.

105 434 **Arch. Constr. II.** (3) II, S. Pr. 105 433.

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. May be taken for a total of six (6) credits. Six hours lab. a week. Pr.: Sophomore classification and 6 credits in Art 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.

105 501, 105 502, and 105 503. **Architectural Design Studio I, II, III.** Relation of structures to their environment; client and community restraints; development of building programs; synthesis of functional, technical and aesthetic considerations in the design of structures for human use. These courses are not for graduate credit. Fifteen hours studio per week.

105 501 **A.D.S. I.** (5) I. Pr.: Admission to the Professional Program and 104 324.

105 502 **A.D.S. II.** (5) II, S. Pr.: 104 501.

105 503 **A.D.S. III.** (5) I, II, S. Pr.: 105 502.

105 504. **Architectural Internship.** (15) I, II. A professional concentration study area; 30 weeks off campus work-study in the office of an architect, environmental designer, or allied organization; field experience and office production. This course is not for graduate credit. Pr.: 105 434, 105 503, and approval of the Department Head.

105 542. **Architectural Design IV.** (5) I, II. Continuation of Arch. 503. Increased complexity of function and space definition systems. Relating Environmental Technology to total design. Fifteen hours studio per week. Pr.: Arch. 105 503.

105 651. **Architectural Design V.** (5) I, II. Integration of the physiological, psychological, and sociological parameters in the design of Man's environmental needs. Analysis, programming, and design of urban problems and/or large scale site planning problems, increased complexity of function and space definition systems. Relating environmental technology to total design. Fifteen hours studio per week. Pr.: Arch. 542.

105 652. **Architectural Design VI.** (5) I, II. Terminal Project: Analysis, programming, and development of a selected project approved by the faculty. Complete integration of function, space definition systems, and environmental technology. Fifteen hours studio per week. Pr.: Arch. 651 and Senior classification.

105 601. **Topics in History of the Designed Environment.** (3) I, II. For the concentrated study of a particular period or subject in the history of the man made environment. Seminars, readings, discussions, and projects. May be taken by majors in the College of Architecture & Design for a total of 12 hour-credit. Three rec. per week. Pr.: 104 351 or approval of instructor.

105 655. **Foreign Seminar.** Credit arranged. I, II, S. Group observation of design examples (ancient or

modern) of a selected region, conducted in Situ, to study significant aspects of environment, culture and technology as relating to Design solutions.

105 656 and 105 657. Professional Seminar I and II. Studies of professional environmental design practice, ethics, and production; contract documents, client relations, compensation, and field observation. Two hours lecture per week.

105 656 P.S. I. (2) I, II. Pr.: 4th year standing.

105 657 P.S. II. (2) I, II. Pr.: 105 656.

105 660. Environmental Aesthetics. (3) II. Problems involving aesthetics in areas related to student's major field. Three hours per week. Pr.: Senior standing in Architecture, Landscape Architecture, Interior Architecture, Architectural Structure, Urban Design.

105 690. Environmental Seminar. Credit arranged. I, II. Environmental systems related to human perception, reactions and behavior. Pr.: Senior standing in Architecture, Landscape Architecture, Interior Architecture, Architectural Structures, Urban Design.

105 765. Problems in Architecture. Credit arranged. I, II, S. A study of specific architectural problems under the direction of a member of the department staff. Pr.: Approval of instructor.

GRADUATE CREDIT

105 810. Research in Architecture. Credit arranged. I, II, S. Study in architecture and related fields leading to thesis or non-thesis project. Pr.: approval of instructor.

105 815. Theory of Design. (3) I. Analysis of theories and philosophies in the design professions including those in related societal and technological fields. Pr.: Degree in Architecture, Landscape Architecture, Interior Architecture, Architectural Structures, Urban Design.

105 830. Advanced Architectural Design. Credit arranged. I, II, S. Studies related to a comprehensive program in architecture. Pr.: Arch. 652.

Construction Science

I. EUGENE THORSON, Head of Department

Professor Thorson;* Associate Professors Jahnke;* Bissey,* and Blackman; Instructors Burton, Bell and Simcox.

The Building Construction curriculum is designed to prepare graduates for responsible positions in the construction industry. The curriculum leads to the degree Bachelor of Science in Building Construction.

The Architectural Structures option is offered for the student who is particularly interested in the engineering aspects of building design. After thorough instruction in mathematics and science, the student applies these principles to structural, mechanical and electrical problems in building design. The undergraduate curriculum leads to the degree of Bachelor of Architecture-Architectural Structures Option.

The department also provides course work in the technical and management areas of the architecture and interior architecture programs.

Courses in Construction Science

UNDERGRADUATE CREDIT

106 116. Construction Seminar. (0) I, II. Presentation of professional problems and practices by students, faculty, contractors, architects, and various organizations associated with the building industry. One hour lecture per month.

106 210. Introduction to Construction Programming. (2) II. Application of digital computer techniques to the solution of elementary problems in the field of Construction Science and Architecture. Pr.: Math. 150. 4 hours per week.

106 250. Site Construction. (3) I. Study of site construction procedures, beginning with soil investigation, review of site plans, layout for construction, excavation calculations for earth moving, calculations using the computer for areas and volumes of earth work. Pr.: Con. Sci. 210, C.E. 212 concurrent with Geol. 100. 3 hours per week.

106 313. Construction Drawings. (3) II. Production of a set of construction drawings. Emphasis on Construction procedures. Introduction to shop drawings. For Building Construction Majors. Pr.: Arch. 433, C. E. 212, or C. E. 212 concurrently. Nine hours lab. per week.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

106 410. 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.

106 420. Theory of Structures I. (3) I, II. Bar stresses in trusses; solid and framed arches; mathematical and graphical solution of stresses and deflections in beams under static and moving loads. Six hours a week. Pr.: Ap. M. 220.

106 421. 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.: Con. Sci. 420 or C. E. 330.

106 422. Theory of Structures II. (4) I, II. Analysis and design of metal structures; emphasis on buildings. Six hours a week. Pr.: Con. Sci. 420 and 421.

106 428. 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. Six hours a week. Pr.: Con. Sci. 420 and 422.

106 434. Thermal Systems. (3) I, II. Man's physiological needs, principles of heat transfer, principles of building thermal balance, comfort systems and space use relationships, involving heating, ventilating and cooling as integral parts of architectural design. Three hours a week. Pr.: Phys. 211 or 311.

106 435. Lighting Systems. (3) I, II. Vision, human psychophysical and psychological response, color,

natural and artificial lighting design and light sources, lighting techniques and spatial relationships, as integral parts of architectural design. Three hours a week. Pr.: Phys. 212 or 312.

106 436. Sanitation Systems. (3) I, II. Stream and water pollution, sewage disposal systems, building piping systems, space relationships, equipment requirements as related to architectural design, structural systems, construction materials and techniques. Three hours a week. Pr.: Gen. Phys. 211, or Engg. Phys. 311.

106 437. Acoustic Systems. (2) I, II. Hearing and the ear, sound generation, acoustical correction, noise reduction, sound transmission all as integral parts of architectural design. Two hours a week. Pr.: Gen. Phys. 211, or Engg. Phys. 311.

106 440. Construction Problems I. (3) I. Practical problems encountered in the erection of buildings and use of construction equipment. Pr.: Const. Science 250 and 313.

106 441. Construction Estimating. (3) I. Principles, theories and methods of building estimating. Nine hours lab. a week. Pr.: Con. Sci. 313 and 440.

106 442. Construction Management I. (3) I. Construction Safety; Project Planning, Scheduling and Cost Accounting Techniques. Computer applications to pert and critical path scheduling and cost records. Pr.: Arch. 653 and concurrent with Const. Science 441.

106 443. Construction Management II. (3) II. Construction planning and scheduling techniques. Computer applications to Pert and Critical Path. Three hours lecture per week. Pr.: Con. Sci. 441 and 442.

106 444. Problems in Construction Science. Credit arranged. I, II, S. A study of specific design problems under the direct supervision of a member of the Construction Science faculty. Pr.: Approval of the instructor.

106 520 and 106 521. Environmental Technology I and II. Thermal lighting, acoustics, sanitation, vertical transportation systems in buildings; delivery characteristics, criteria for selection, preliminary design, economics; field observation, demonstration, and application of systems in building design. Three hours recitation per week.

106 520 E.T. I. (3) II. Pr.: 105 413.

106 521 E.T. II. (3) I. Pr.: 106 520.

106 510 and 106 511. Structures I "A" and II "A". Theory and applied structural analysis, design and planning; structural building systems of wood, steel and concrete; integrated with Architectural Design Studios I and II. These courses are not for graduate credit. Six hours lecture and recitation per week. To be taken concurrently with 105 501 and 105 502.

106 510. S.I. "A". (3) I. Pr.: 104 341.

106 511. S.II. "A". (3) II, S. Pr.: 106 510.

UNDERGRADUATE AND GRADUATE CREDIT

106 680. Theory of Structures IV. (3) II. Cont. of Theory I, II, and III, with special emphasis being placed on the complete problem of the structure as a whole. Three hours a week. Pr.: Con. Sci. 428.

GRADUATE CREDIT

106 885. 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.: Con. Sci. 680 or consent of instructor.

Interior Architecture

JACK C. DURGAN,* Head of Department

Professors Durgan,* Foerster;* Associate Professor McGraw; Instructor Murphy.

The curriculum in interior architecture is structured for students who plan a professional career in space planning in the areas of commercial, institutional, and industrial interior design. After an introduction to basic interior space planning, students do studio exercises that include programming and designing of spaces related to these particular areas. Special emphasis is placed on spatial organization, space component construction and design, the integration of environmental systems, and the preparation of contract documents.

Students are encouraged to secure practical experience during the summer vacation, as well as devoting their senior year to actual projects.

Graduates may be employed by professional architectural offices, space planning and interior design firms, and corporate organizations.

Graduate Work

The degree Master of Architecture in Interior Architecture 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.

Courses in Interior Architecture

UNDERGRADUATE CREDIT

107 309. Finishing. (2) II. Methods of finishing various materials in interiors. Six hours lab. a week. Pr.: 104 324.

107 501, 502, 503, 504, 601, and 602. Interior Architectural Design Studio I through VI. Analysis, synthesis, and design execution of various types of interior spaces, integrating such space design determinants as human factors, environmental-technological systems, activity structure, and symbiotic relationships. These courses are not for graduate credit.

107 501. Interior Architectural Design Studio I. (4) I, II, S. Pr.: Admission to Professional program and 104 324.

107 502. Interior Architectural Design Studio II. (4) II, S. Pr.: 107 501.

107 503. Interior Architectural Design Studio III. (4) I, S. Pr.: 107 502.

107 504. Interior Architectural Design Studio IV. (5) II, S. Pr.: 107 503.

107 601. Interior Architectural Design Studio V. (5) I, S. Pr.: 107 504.

107 602. Interior Architectural Design Studio VI. (5) II, S. Pr.: 107 601.

107 507, 508, 610. Design Workshop I through III. Instruction in the sequence of courses consists of the design, development of shop drawings, construction, and finishing of interior space components. Design Workshop I and II are not for graduate credit.

107 507. Design Workshop I. (3) I, S. Pr.: Admission to a professional program and consent of instructor.

107 508. Design Workshop II. (3) II, S. Pr.: 107 507.

UNDERGRADUATE AND GRADUATE CREDIT

107 610. Design Workshop III. (3) I, S. Pr.: 107 508 or graduate standing.

107 653. Contract Design Practice. (3) I. The preparation of specifications, contract documents, purchasing, and professional responsibilities. Pr.: 107 651 or graduate standing.

107 683. Contemporary Furniture Design. (4) II, S. Experimentation in the design of spatial component systems, utilizing advanced techniques in construction methods and materials. Pr.: 107 550 or graduate standing.

GRADUATE CREDIT

107 720. Interior Architecture Seminar. (3) II, S. Readings and discussions of contemporary thought and movements within the field of Interior Architecture with special emphasis on the societal factors which produce and affect change. Pr.: 107 601 or graduate standing.

107 765. Problems in Interior Architecture. Credit arranged. I, II, S. Study of specific Interior Architectural problems under direct supervision of a member of the departmental staff. Pr.: Approval of instructor.

107 820. Advanced Interior Architectural Design. (4) I, II, S. Advanced study of interior space planning and interior component design. Pr.: Professional Design Degree.

Landscape Architecture

ROBERT P. EALY,* Head of Department

Professors Ealy,* Parks;* Associate Professor Oblinger; Assistant Professors Bartlett, Day,* Page; Instructor Hogue; Professor Emeritus Quinlan.

The curriculum is designed to prepare students for the field of professional landscape architecture. 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 110 431 and above.

Courses in Landscape Architecture

UNDERGRADUATE CREDIT

110 100. General Landscape Design. (3) I, II, S. An introductory course in the fundamental principles of landscape design, and an appreciation of man's natural environment for non-majors. Three hours rec. a week.

110 204. Landscape Architectural Delineation Techniques. (2) II. A study of delineation media and techniques that are related to the practice of landscape architecture in professional offices. Four hours lab. a week. Pr.: 104 208, 323, and 324.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

110 431, 432; 110 541, 542; 110 651, 652. Landscape Architectural Design I through VI. Design of the outdoor environment for human needs and activities; ecological considerations; project program, site selection, analysis, concept, design, communication specification, construction, planting and maintenance.

110 431. L.A.D. I. (4) I. Twelve hours design studio per week. Pr.: Admission to the Professional Program and 104 331, 104 324.

110 432. L.A.D. II. (4). 12 hours design studio per week. Pr.: 110 431.

110 541. L.A.D. III. (4) 12 hours design studio per week. Pr.: 110 432 and 100 436.

110 542. L.A.D. IV. (4). 12 hours design studio per week. Pr.: 110 541 and 110 437.

110 651. L.A.D. V. (5). 15 hours design studio per week. Pr.: 110 542 and 110 547.

110 652. L.A.D. VI. (5). 15 hours design studio per week. Pr.: 110 651 and 110 543.

110 433. History and Theory of Landscape Design. (3) I. The influences of social, political, economic and climatic factors on historic landscape styles; theory of landscape design. Three hours rec. a week. Pr.: Second year classification in L. A.

110 434. Planting Design I. (3). Use of plants as design elements in landscape architectural developments; preparation of sketches and plans. Eight hours lab. a week. Pr.: 104 324.

110 435. Planting Design II. (3) II. Cont. of L. A. 434. Eight hours lab. a week. Pre.: L. A. 434.

110 436. Landscape Construction I. (3) I. Problems in the basic aspects of land construction to include topography, site grading, earthwork estimating and vehicular requirements. Eight hours lab. a week. Pr.: 104 331, 340, 341. Conc. with 525 212.

110 437. Landscape Construction II. (3) II. Cont. of L. A. 436. To include site layout, road alignment, construction detailing and cost estimating. Eight hours lab. a week. Pr.: L. A. 436.

110 440. Problems in Landscape Design. Credit arranged. I, II, S. Assigned problems and reports in the area of landscape architecture. Pr.: Junior classification.

110 501. Landscape Architecture Seminar. (1) I, II. Required of all fourth and fifth-year landscape architecture majors. Discussion of current trends in landscape architecture and related fields by students, faculty and invited speakers.

110 543. **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. 435.

110 544. **Community Site Planning.** (3) II. Growth and development of cities and towns; land subdivision. Eight hours lab. a week. Pr.: Planning 215 or consent of instructor.

110 545. **Professional Internship.** (0) II, S. Confirmed employment in a professional physical planning office. for a minimum of 10 weeks; subject to approval of L. A. Department Staff. Pr.: L. A. 432 and 437.

110 547. **Landscape Construction III.** (3) I. Cont. of L. A. 437 to include utilities routing, area lighting, irrigation systems and construction specification writing. Eight hours lab. a week. Pr.: L. A. 437.

110 653. **Professional Practice.** (2) II. Ethics, office practice and procedure, contracts and specifications. A professional resume is required. Two hours rec. a week. Fifth-year classification.

110 655. **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.: 104 331, C. E. 212 or consent of instructor.

110 656. **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. 542 and 547.

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.

GRADUATE CREDIT

110 870. **Problems in Advance Landscape Architecture.** (1-3) I, II, S. Special studies and designs in advanced landscape architecture. Pr.: L. A. 652.

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. 547.

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.

Regional and Community Planning

VERNON P. DEINES,* Head of Department

Professors Deines,* Foerster;* Associate Professors Edmonds,* McGraw,* and Weisenburger;* Assistant Professors Reid,* Selfridge and Willis; Instructor Keithley; Adjunct Lecturers Halligan, Lakin and Scott.

Study leading to the two-year professional graduate degree Master of Regional and Community Planning, requiring a minimum of 48 graduate credit hours, is offered on an inter-departmental basis in cooperation with

the Departments of Architecture, Civil Engineering, Economics,* Geography, Landscape Architecture, Political Science and Sociology and the Colleges of Agriculture, Business Administration, Education and Home Economics.

Applicants with undergraduate degrees in administration, agriculture, architecture, commerce, economics, ecology, 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 for graduate study in planning. Applicants with other academic backgrounds may be accepted upon approval of the interdepartmental committee and subject to such conditions as it may impose.

Undergraduate students may elect to take planning courses either in preparation for graduate study or in fulfillment of undergraduate minors, options and electives.

The following list indicates suggested undergraduate study in Planning:

- Introduction to Planning
- Planning and Development Codes
- City Planning I
- Regional Planning I
- Housing and Renewal
- Institutional Plan. and Development
- Introduction to Economics and Urban and Regional Economics
- Urban Geography
- Introduction to Sociology and Urban Sociology
- Introduction to Political Science and Urban Politics
- A course in Statistics
- A course in Data Processing

The following list indicates a suggested undergraduate option in Urban Design and Planning for students in the design professions:

- Introduction to Planning
- Planning and Development Codes
- City Planning I
- Urban Design I
- Housing and Renewal
- Urban Visual Analysis
- Introduction to Economics and Urban Sociology
- Introduction to Economics and Urban and Regional Economics
- Urban Geography
- Introduction to Sociology and Urban Sociology
- Urban Transportation Analysis I
- Site Planning and Analysis
- Environmental Aesthetics
- Introduction to Political Science and Urban Politics
- A course in Statistics
- A course in Data Processing

Graduate students may also work towards the traditional one-year Master of Arts or Master of Science degree in their disciplines or profession with a minor in planning. Select a minor from the following courses:

Planning Principles
Housing and Renewal
Institutional Planning and Development
Planning Theory
City Planning I
Regional Planning I
Seminar in Planning
Advanced Planning Theory

Courses in Regional and Community Planning

UNDERGRADUATE CREDIT

109 215. **Introduction to Planning.** (3) I, II. 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

109 415. **Planning and Development Codes.** (3) I, II. Introduction to federal, state and local legislation and interpretation of codes related to planning, design and construction. Pr.: Plan. 215 or equivalent and junior standing.

UNDERGRADUATE AND GRADUATE CREDIT

109 605. **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.: Senior standing and approval of instructor.

109 615. **Planning Principles.** (3) I, 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 and approval of instructor.

109 625. **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.: Senior standing and approval of instructor.

109 635. **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.: Plan. 615 or 625.

109 645. **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.: Plan. 215, 615 or 625.

109 655. **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.: Plan. 615 or 625.

109 710. **Urban Visual Analysis.** (3) 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.: Plan. 645 or equiv.

109 720. **Institutional Planning and Development.** (3) II. Examination of institutional functions, administrative structures, resources and policies in the planning and development of physical facilities. Pr.: Plan. 615 or equivalent and nine other credit hours in planning and/or administration courses.

109 750. **Housing and Renewal.** (3) II. Review and evaluation of federal, state and local policies and programs of urban renewal and housing. Pr.: Plan. 615 or 625.

109 770. **Planning Administration and Implementation.** (3) I, II. Considerations for the planning director in the administration of the planning function and the implementation of the planning process. Pr.: Completion of one semester of graduate study in planning.

109 790. **Research Methods in Planning.** (3) I, II. Considerations in the selection, collection, analysis and interpretation of data. Introduction to modeling, information systems, planning studies, forecast techniques, and computer programs. Pr.: Plan. 615 or equivalent and one course each in graphics, statistics, and computer programming.

GRADUATE CREDIT

109 805. **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.

109 810. **Practicum in Planning and Development.** Credit arranged. I, II, S. Supervised experience in professional planning and development, including internships, field research, public service and professional workshops. Pr.: Plan. 615 and 635 or concurrent enrollment.

109 815. **Seminar in Planning.** (3) I, II, S. Discussion of contemporary issues in planning within the framework of professional education as a basis for planning practice. Pr.: Completion of one semester of graduate study in planning or urban design.

109 825. **Advanced Planning Theory.** (3) II. Review of Empirical and normative theories of regional and community planning; analysis of principles, hypotheses, concepts and law of planning and synthesis of a theory of planning. Pr.: Plan. 770 and completion of two semesters of graduate study in planning.

109 835. **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.: Plan. 635 or equiv.

109 845. **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.: Plan. 645 or equiv.

109 855. 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 and planning are reviewed and applied to the elements of the contemporary region. Pr.: Plan. 655 or equiv.

109 880. Topics in Planning. Credit arranged I, II, S. The study of selected concepts and trends in regional and community planning and development. Pr.: Plan. 615 or graduate standing.

109 890. 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 and Regional Planning Services

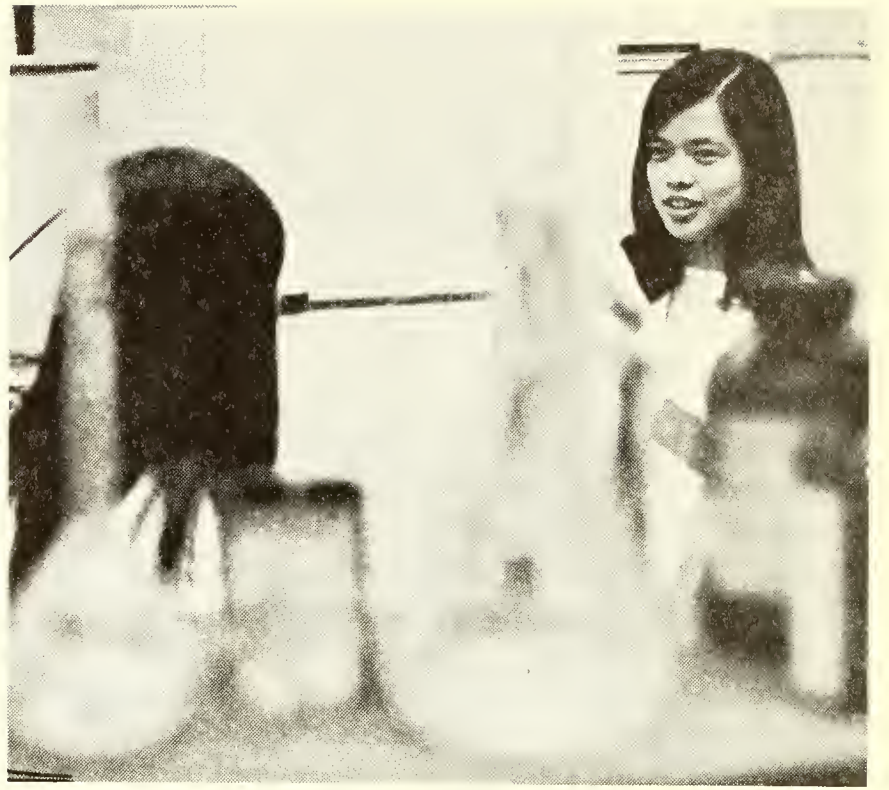
VERONON P. DEINES, Director

LELAND R. EDMONDS, Associate Director

The Center for Community and Regional Planning Services, a joint function of the Interdepartmental Program in Regional and Community Planning of the Graduate School and the Department of Regional and Com-

munity Planning of the College of Architecture and Design, has as its goal increased public awareness of community and regional planning and development. The Center for Community and Regional Planning Services at Kansas State University has a three-fold 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 graduate program in community and regional planning.

The public understanding of comprehensive planning is accomplished through cooperative action with other state and university extension programs. The supply of basic information about new techniques and programs in planning is achieved through a planning information service with inquiries handled on an individual basis. 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 with support by state and federal agencies and by cooperative action with other state and university research efforts.



THE COLLEGE OF ARTS AND SCIENCES

WILLIAM L. STAMEY, Dean
 PAIGE E. MULHOLLAN, Associate Dean
 ORVAL EBBERTS, Assistant Dean
 MARJORIE ADAMS, Assistant Dean
 MARJORIE CLELAND, Assistant to the Dean

The College of Arts and Sciences through its 23 departments and one division 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 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, 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 of obtaining 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. (199, Arts and Sciences, two semester hours). It offers summer reading of selected important books in natural sciences, social sciences, and humanities with an examination in early fall. Prerequisite: 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 offered is given in the following table. The specific requirements for a degree in the various curriculums are indicated on subsequent pages.

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

Anthropology
Art
Biology
Chemistry
Computer Science
Economics
English
General (Area Major)
Geography
Geology
History
Journalism and Mass Communications
Mathematics
Modern Language
Music
Philosophy
Political Science
Psychology
Sociology
Speech
Statistics
Pre-Professional
Physical Therapy
Pre-Medicine
Pre-Dentistry
Pre-Law
Pre-Social Work

B. F. A. Art

B. of Music Music

B. S. in Music Education Music

B. S.¹

Anthropology
Biology
Chemistry
Computer Science
Economics
General (Area Major)
Geography
Geology
History
Journalism and Mass Communications
Mathematics
Physics
Political Science
Psychology
Sociology
Speech
Statistics
Pre-Professional
Physical Therapy
Medical Technology
Pre-Elementary Education²
Pre-Secondary Education²
Pre-Dentistry
Pre-Law
Pre-Medicine
Pre-Nursing³
Pre-Pharmacy⁴
Pre-Social Work
Pre-Veterinary⁵

B. S. in Physical Education Physical Education

Bachelor of Arts Degree ***

120 hours required for graduation

I. General Requirements

A. English Composition I and II

B. Oral Communication I (or Oral Communication II, Argumentation and Debate, or Language and Communication as recommended by Department of Speech).

One course

C. Modern Languages

Two years in 1 language (or equivalent competence)

D. Mathematics

One Course

**E. Humanities (from Departments of Art, English, History, Modern Languages, Music, Philosophy, and Speech).

Three courses, including one course above the introductory level (400 level or above)

**F. Social Science (from Departments of Economics, Geography (excluding Geography 150 and 151), History, Political Science, Psychology, Sociology and Anthropology, Journalism and Mass Communications).

Three courses, including one course above the introductory level (400 level or above)

G. Natural Science from Division of Biology and Departments of Chemistry, Computer Science, Geography (courses 150 and 151 only), Geology, Mathematics, Physics, or Statistics.

Four courses, including one laboratory course 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).

Two courses****

II. Major Requirements: Remaining hours in major and additional tool and related courses and electives.

Pre-professional programs are administered by the appropriate department or, where not applicable, by the Office of the Dean of Arts and Sciences.

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 188).

2. Requirements for a degree to be completed in the College of Education (See page 186).

3. Requirements for a degree to be completed in a professional school of nursing.

4. Requirements for a degree to be completed in a professional school of pharmacy.

5. Students who complete pre-veterinary medicine requirements in the College of Arts and Sciences will be eligible for the Bachelor of Science degree from the College of Arts and Sciences upon completion of the second professional year in the College of Veterinary Medicine. (Pre-Veterinary medicine requirements may also be completed in the College of Agriculture. See 35).

* Credit for Intermediate Algebra may not be applied toward a degree.

**No more than three courses in history to fulfill E and F.

***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.

****Required of freshmen.

Bachelor of Science Degree *

120 hours required for graduation

I. General Requirements

A. English Composition I and II

B. Oral Communication I (or Oral Communication II, Argumentation and Debate, or Language and Communication as recommended by Department of Speech).

One Course

C. Humanities and Social Sciences (from Departments of Art, Economics, English, Geography (excluding Geography 150 and 151), History, Modern Languages, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology, Speech, Journalism and Mass Communications.

Seven courses, taken from at least two departments, including 1 course in Philosophy and 2 advanced level courses (400 level or above or second year of a foreign language).

D. Natural Science from Division of Biology and Departments of Chemistry, Computer Science, Geography (courses 150 and 151 only), Geology, Mathematics, Physics, or Statistics.

Four 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).

Two courses

II. Major Requirements: Remaining hours in major and additional tool and related courses and electives.

Pre-professional programs are administered by the appropriate department or, where not applicable, by the Office of the Dean of Arts and Sciences.

Bachelor of Fine Arts

The Bachelor of Fine Arts Degree is the more professionally oriented undergraduate degree in art. It is designed primarily for those planning to become professional artists or artist-teachers. Greater emphasis is

placed on actual practice in the creative art disciplines. The degree is considered the appropriate preparation for the Master of Fine Arts degree which is recognized as the terminal degree in studio arts. The BFA in Art is a 4-year 120-hour program with majors possible in Painting, Sculpture, Ceramics, and Printmaking. The degree requirements are as follows:

I. General Education (45 hours)

A. Communications, English Composition, 2 courses; and Oral Composition I, 1 course.

B. Social Science (6 hours)

C. Humanities (9 hours)

D. Philosophy, Aesthetics, or Mathematics (3 hours)

E. Natural Sciences (8 hours)

F. General Electives (11 hours)

II. Art Courses (75 hours)

A. Core (36 hours)

B. Major (20 hours)

C. Art Electives and Related Courses (19 hours)

Bachelor of Music Degree

128 hours required for graduation

Majors offered in this curriculum are: Applied Instruments, Voice, or Theory, and Composition. An applied minor is also required.

I. General Requirements

1. English Composition I and II

2. Oral Communication I or Ia

3. Physical Education (or marching band) 2 semesters.

4. Physics for Musicians.

5. General Education, General Psychology.

6. Non-music courses, 5 semester hours.

7. Modern Language, 8 to 20 semester hours.

II. Remaining hours in major, additional tool and related courses, and free electives. For major requirements, see catalog statement for Department of Music, page 136.

*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.

Bachelor of Science in Music Education Degree

The Bachelor of Science in Music Education is intended for those who plan to teach vocal or instrumental music on the elementary and secondary levels of the public schools. It also prepares one for graduate work in the field of Music Education.

Requirements

I. General Education

1. English Composition I and II
2. Oral Communication I or Ia
3. Literature or Language — 6 hours
4. Social Science — 12 hours (including General Psychology)
5. Natural Science — 12 hours (including Physics for Musicians and at least one Biological Science)
6. Humanities electives as needed for degree and certification

II. Professional Education

1. Educational Psychology I and II, 6 hours
2. Music Education Professional Semester (includes student teaching, and other required courses from the College of Education.)

III. Physical Education, 2 semesters (may be satisfied by Marching Band)

IV. Remaining hours in major, additional tool and related courses and electives:

Music 201, 202, 304, 305, 503, 506, 507, 516, 517 (Theory of Music); Music 421, 422, 551, 552 (Music History and Literature); Music 233, 234 (Applied Music); Music 412, 413, 512 (Music Education); Vocal Music majors include Music 513 (Music Education); Instrumental majors include two of the following (depending on specific major), Music 530, 531, 532 (Applied Music) and Music 514 (Music Education). Vocal Majors are required to have eight hours of Applied Keyboard as a minor. Instrumental majors complete four additional hours of Applied Music, of which two hours of Music 203 (Voice Class) is required, as well as a minimum of two hours from Music 206-209 (Piano Class). Both vocal and instrumental majors are required to pass Music 403 (Piano Proficiency) before admission to

student teaching. Participation in at least one major musical organization is required during each semester until graduation. A maximum of eight semester hours for this participation is allowed toward degree requirement. Music 050 (recital attendance) is required each semester of the program.

Bachelor of Science in Physical Education Degree

The Bachelor of Science degree in Physical Education is designed to prepare students for teaching careers in physical education, health education, and athletic coaching. In addition, students may earn a non-teaching general physical education degree or a physical education degree with a recreation emphasis.

Requirements

I. General Education

1. English Composition I and II
2. Oral Communication I
3. Social Science — 12 hours (including General Psychology)
4. Literature or language — 6 hours
5. Natural Science — 4 courses
6. Electives

II. Professional Education

1. Educational Psychology I and II, six hours
2. Physical Education Professional Semester
 - Teaching Participation — 8 hours (must be done in area of specialization.)
 - Principles of Education — 3 hours
 - Educational Sociology — 3 hours
 - Methods (415-476, 415-469, or 415-481) 3 hours

III. Physical Education, two semesters

IV. Remaining hours in major, additional tool and related courses, and electives.

For major requirements see catalog statement for Department of Physical Education, p. 144.

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. or B.S. degree (p. 82) and one of the following four major requirements:

A. Life Sciences: Public Health Biology, General Entomology; Principles of Biology, Organismic Biology, at least three additional courses from the fields of biology, microbiology, entomology or psychology, two of which must be above the introductory level. 30 hours.

B. 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.

C. Physical Science: Chemistry I and II, Physical Geology, Plane Trigonometry, and General Physics I 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.

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.

Pre-Professional Programs

A. Pre-Veterinary Curriculum: Sixty-four 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 the following courses should be used: College Algebra and Plane Trigonometry, Chemistry I and II, General Organic Chemistry and Laboratory, Chemical Analysis, General Physics I and II, Principles of Biology, Genetics of Heredity and Evolution. Animal science course requirements may be satisfied by completing Principles of Animal Science as well as Animal Science and Industry, Dairy Science, and Poultry Science laboratories. 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. 35).

Suggested Schedule of Pre-Veterinary Medicine Requirements

Fall Semester	
English Composition I	3
College Algebra	3
Chemistry I	5
Social Science elective or Principles of Animal Science	3
Oral Communications I	2
Basic Physical Education	0
	<hr/> 16

Spring Semester	
English Composition II	3
Chemistry II	3
Principles of Biology	3
Plane Trigonometry	3
Social Science elective or Principles of Animal Science	3
Basic Physical Education	0
	<hr/> 17

Fall Semester	
Chemical Analysis	4
Heredity and Evolution or Genetics	2
General Physics I	3
Social Science elective or Principles of Animal Science	4
Animal Husbandry	3
Dairy or Poultry Science	1
	<hr/> 16

Spring Semester	
General Physics II	4
Humanities electives	6
Dairy or Poultry Science	1
General Organic Chemistry	5
	<hr/> 16

64 semester hours required for admission to College of Veterinary Medicine.

B. Pre-Medicine Curriculum: Fulfill General Requirements for the A.B. (p. 82) or B.S. degree (p. 83) 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, Principles of Biology, 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 at the end of the junior year or after graduation should fulfill General Requirements for the A. B. degree (p. 82) or the B.S. degree (p. 83) 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, College Algebra, Plane Trigonometry, General Physics I and II, Principles of Biology and Organismic Biology, Microbiology, Genetics or Heredity and Evolution, Human Physiology. (One year's work (30 hours) will be granted toward the degree for completion of the first year at dental school for students who enter dental school at the end of their junior year).

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 Curriculum: In addition to the general requirements of the College of Arts and Sciences, the following courses must be taken: College Algebra (3 hrs.), Trigonometry (3 hrs.), Chemistry I (5 hrs.), Chemistry II Lecture (3 hrs.), General Organic Chemistry (5 hrs.), General Biochemistry (5 hrs.), Chemical Analysis (4 hrs.), Descriptive Physics (4 hrs.), Principles of Biology (5 hrs.), Microbiology (4 hrs.), Human Physiology (4 hrs.), Genetics (3 hrs.), Bacteriology of Human Diseases (5 hrs.), Immunology (5 hrs.), Human Parasitology (4 hrs.), and Introduction to Medical Technology (1 hr.). Thirty hours of credit is granted for fulfilling an approved Medical Technology internship. Upon completion, this program provides both a bachelor's degree and eligibility for professional certification.

F. Physical Therapy Curriculum: In addition to the general requirements of the College of Arts and Sciences, students should take the following: Chemistry I (5 hrs.), Chemistry II Lecture (3 hrs.), Descriptive Physics (4 hrs.), Human Physiology (4 hrs.),

Human Anatomy (5 hrs.), Public Health Bacteriology (3 hrs.), Introduction to Physical Therapy (1 hr.), General Psychology (3 hrs.); plus two of the following four courses: Abnormal Psychology (3 hrs.), Psychology of Childhood and Adolescence (3 hrs.), Social Psychology (3 hrs.), and Psychology of Exceptional Children (3 hrs.). This curriculum includes an off-campus period of instruction at an approved medical institution for which the student earns 30 hours of credit toward the bachelor's degree and which qualifies the student for professional certification.

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. 83), 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 and three courses from the Division of Biology.

H. Pre-Secondary Education: Students preparing to teach in the junior and senior high schools are usually enrolled in a Pre-Secondary Education Curriculum in the College of Arts and Sciences for the freshman and sophomore years. Students fulfill requirements for the B. S. Degree in the College of Education (p. 187). Prior to acceptance in the College of Education, students are advised by College of Education advisers in the Dean's Office of the College of Arts and Sciences and by advisers in their major fields. When students are accepted into the College of Education they are reassigned to advisers in the College of Education and retain their advisers in the majors who assist in the selection of courses in their majors and teaching fields.

Students should make application to the Teacher Education Program during the sophomore year. Fifty-three semester hours are required for application to enter the College of Education and admission to the Teacher Education Program. (p. 184).

I. Pre-Elementary Education: Students desiring to teach in elementary schools are enrolled in the College of Arts and Sciences for the freshman and sophomore years in the Pre-Elementary Education Curriculum. Pre-Elementary Education students fulfill requirements for the B. S. in Elementary

Education Degree in the College of Education (p. 186). Prior to acceptance into the College of Education, Pre-Elementary Education students are advised by the College of Education advisers in the Dean's Office of the College of Arts and Sciences. When students are accepted into the College of Education they are reassigned to advisers in the College of Education.

Students should make application to the Teacher Education Program during the sophomore year. Fifty-three semester hours are required for application to enter the College of Education and admission to the Teacher Education Program (p. 184).

J. Pre-Nursing Program: Students can enter the pre-nursing curriculum and take the necessary courses and electives for transferring to a school of nursing. The number of credits earned and the courses taken will vary depending on the school of nursing the student desires to attend. For students entering a baccalaureate degree program in nursing, generally two years of course work (60 credits) as prescribed by the university granting the degree, are required. For students transferring to a diploma program, 28-30 credits usually are required. The pre-nursing adviser will assist students in selecting appropriate courses, advising them regarding the different kinds of nursing education.

K. Pre-Social Work Curriculum. Students interested in preparing for the field of Social Work may enroll for the Pre-Social Work option in the Department of Sociology. The requirements are similar to those for a major in sociology with a selection of courses recommended for pre-professional training in Social Work.

Interdisciplinary Programs

South Asia Language And Area Studies

The South Asia Center is an interdisciplinary language and area center focusing the course offerings of several departments on this important world area with whose development Kansas State University programs have been concerned for more than a decade. It receives support through the NDEA program of the Depart-

ment of Health, Education and Welfare of the Federal Government. South Asia, as a linguistic and cultural area, includes Afghanistan, Pakistan, India, Nepal, Ceylon, Bhutan, Sikkim and the Maldives Republic. Of their principal languages, the Center currently offers three years of Urdu and one year of Hindi at the intermediate level, and one year of Tamil. While the Center does not offer a major, it affords the undergraduate an opportunity to give his major study an international emphasis through concentration on South Asia. The Center's "core offering," "Introduction to the Civilizations of South Asia," may be offered for credit in the Departments of Anthropology, Art, Economics, History, Geography, Political Science and Sociology.

Undergraduates majoring in these departments, with a South Asia concentration, are eligible for any of various group study tours in South Asia as, for example, those conducted by the Great Lakes College Association, Carleton College, etc. Graduate students whose thesis subject is in the area of South Asian studies may elect to apply for any of several federal and private grants enabling research and study in South Asia. Several of the offerings in the South Asia Language and Area Curriculum are available to graduate students.

As part of its support to the Center's program, the federal government may, as appropriations permit, grant fellowships to graduate students to pursue the study of a South Asian language.

The South Asia Center presents an annual series of colloquia at which faculty members and scholars of Kansas State University and from other campuses present current papers on aspects of South Asia studies. See p. 164 for course list of South Asia Center.

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 in the program is on general linguistics, but selective arrangement of the program or studies enables the individual student to obtain equally appropriate training in the teaching of English to speakers of other languages (TESOL), teaching of standard English as a second dialect (SESD), teaching of foreign languages, and teaching of English to native speakers.

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.

Summer Independent Reading Program

The College of Arts and Sciences offers each summer an opportunity for students to read independently six books during their summer holidays for two hours of academic credit. Each year two books are chosen in the humanities, two in the social sciences and two in the physical and biological sciences; the books chosen are all intelligible to the non-specialist, are usually current paperbacks, and are frequently controversial.

In the fall, having completed the books, students meet in three small two-hour seminars to discuss the books. Each seminar is moderated by a carefully selected faculty member. Following this, a written

examination is given for each pair of books and the course then appears on the student's transcript of courses for the fall term. The course may be taken on a "credit—no-credit" basis.

Students wishing to take the course should enroll in Arts and Sciences 200-199 during the spring pre-enrollment period preceding the summer they wish to do the reading. If the decision to take the course is made at a later time a student should see an adviser in the Dean's office.

DEPARTMENTS & COURSE OFFERINGS

Aerospace Studies

JOSEPH P. HEBERT, JR., Head of Department

Professor Hebert; Associate Professors Dillman and Krieger; Assistant Professor Sasaki; Instructors Schwab, Harris, Lee and Tubbs.

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 either:

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.

Any student, graduate or undergraduate, who is a U.S. citizen may become a cadet. The duration of the program varies between two and four years, depending upon an applicant's previous experience and the availability of different options.

A student electing the four-year program normally will start the General Military Course (GMC) during his or her freshman or sophomore year. This program consists of one credit hour each semester, will count toward all bachelor's degrees given at KSU, and in no way obligates the student to a military commitment. Students in the GMC are issued uniforms and all texts and other equipment needed for their AFROTC courses.

Male cadets may request a 1-D selective service deferment as members of this program.

Included in the course is the opportunity for each cadet to travel via military aircraft to various Air Force installations. KSU cadets have viewed space launches in Florida, seen the Air Force museum in Ohio, been instructed on navigator training in California, and witnessed pilot training in Texas. These are but a few of the trips regularly scheduled to provide a personal look at the Air Force and the many challenges it presents.

The Professional Officers Course (POC) consists of four courses of three credit hours each, over a period of four semesters. All cadets in the POC become members of the Air Force Reserve and receive \$100 a month and all necessary AFROTC texts and equipment. Outstanding cadets including freshmen and sophomores may apply for an Air Force ROTC college scholarship and if selected will have their tuition, fees, and book allowance for all courses taken at Kansas State University paid for by the USAF, and will receive the \$100 monthly.

High school students considering application for the four-year Air Force College Scholarship Program must be highly motivated toward becoming Air Force flying officers. To qualify a student should be an above-average scholar, physically capable, possess leadership potential, and make application in October of his senior year. Financial benefits are the same as mentioned in the preceding paragraph.

POC cadets practice their leadership and management skills in a Cadet Group. 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, prior to entering the POC. During training they are paid approximately \$230, and receive travel pay to and from their training base.

The two-year program consists of the POC phase only and may be taken during a student's final four semesters, undergraduate or graduate, at the university. Prerequisites for selection include Air Force aptitude testing, Air Force physical, and completion of six weeks summer Field Training. Applicants must contact the Department of Aerospace Studies during the spring semester prior to fall semester entry. A limited number of scholarships are available for two-year

students who are still undergraduates.

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 may lead to a private pilot's license. A one-semester one credit hour course provides ground instruction in flight theory and practice needed by student pilots. Cadets who have a private pilot's license are not eligible to receive free flight instruction.

General Military Courses

UNDERGRADUATE CREDIT

205 113. Aerospace Studies 1A. (1). I. A study of the mission and organization of the United States Air Force; U. S. general purpose and aerospace support forces. One hour of class plus one hour of leadership training a week.

205 114. Aerospace studies 1B. (1) II. U. S. strategic offensive and defensive forces; their mission, function; effect and employment of nuclear weapons. One hour of class plus one hour of leadership training a week.

205 200. Aerospace Studies 2A. (1) I. Defense policies; theories of general war; nature and context of limited war; role of the military in the United States' national policies. One hour of class plus one hour of leadership training a week.

205 201. Aerospace Studies 2B. (1) II. Defense organization and decision-making; organization and function of the Department of Defense; policies and strategies of the Soviet Union and China; and the role of alliances in U. S. defense policies; the elements and process of defense decision-making. One hour of class plus one hour of leadership training a week.

Professional Officers Courses

UNDERGRADUATE CREDIT

205 300. Aerospace Studies 3A. (3) I. 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 plus one hour of leadership training a week.

205 301. Aerospace Studies 3B. (3) II. Development of airpower, aerospace power today which includes USAF concepts, doctrine, and employment. Three hours of class plus one hour of leadership training a week.

205 380. Weather and Navigation. (1) I. Introduction to weather and navigation. Equivalent to that required for a private pilot's license. Required of AFROTC cadets enrolled in the Flight Instruction Program.

205 381. Briefing for Air Force Commissioned Service. (1) I, 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 4A. (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 plus one hour of leadership training a week.

205 391. **The Professional Officer 4B.** (3) II. Continuation of AS 390. Three hours of class plus one hour of leadership training a week.

205 399. **Problem in Aerospace Studies.** (3) Credit arranged. I, II. Work offered in any of the AFROTC 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

DAN HOWARD,* Head of Department

Professors Garzio,* Howard* and Larmer;* Associate Professors Deibler,* Tomasch,* and Vogt;* Assistant Professors Culley, O'Shea,* and Rex Replogle;* Instructors J. Abraham, Clore, Davis, Nushawg, Ogg, Renata Replogle, Swiler, Winegardner and Woodward; Emeritus: Professor Barfoot; Associate Professors Harris and Hill; Assistant Professor Geiger.

UNDERGRADUATE STUDY

Bachelor of Art

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, and (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. Bachelor of Art Degree requires a minimum of 45 semester hours in art.

Bachelor of Fine Arts

The Bachelor of Fine Arts Degree is the more professionally oriented undergraduate degree in art. It is designed primarily for those planning to become professional artists or artist-teachers. Greater emphasis is placed on actual practice in the creative art disciplines. The degree is considered the appropriate preparation for the Master of Fine Arts degree which is recognized as the terminal degree in studio arts. The B.F.A. in

Art is a four-year 120-hour program with majors possible in Painting, Sculpture, Ceramics, and Printmaking. The degree requirements are as follows:

- I. General Education (45 hours)
 - (1) Communications, English Composition, 2 courses; and Oral Composition I, 1 course.
 - (2) Social Science (6 hours)
 - (3) Humanities (9 hours)
 - (4) Philosophy, Aesthetics, or Mathematics (3 hours)
 - (5) Natural Sciences (8 hours)
 - (6) General Electives (11 hours)
- II. Art Courses (75 hours)
 - (1) Core (39 hours)
 - (2) Major (20 hours)
 - (3) Art Electives and Related Courses (16 hours)

Art Education

Students may satisfy requirements to teach art in public schools by either of two programs: (1) B.A. and teacher certification or (2) B.S. in Education with art concentration. Under the first option students qualify for teacher certification by completion of specified courses in the College of Education. The department offers courses at introductory level, which may be taken by any student. Courses suggested to meet humanities requirements include Art History, basic courses in Drawing and Design. Art students may enroll in *Introduction to the Civilizations of South Asia*, as a humanities requirement credit.

Studios, laboratories, equipment for creative work are provided and adequate to the needs of the art areas. Student work may be retained at the discretion of the faculty for an indefinite period of time for instructional and exhibition purposes.

GRADUATE STUDY

Work leading to the Master of Arts is offered in the Department of Art in the fields of Drawing, Painting, Sculpture, Ceramics, Crafts, and Prints.

Candidates for graduate work should have completed an undergraduate curriculum with a broad background in art. Students lacking preparation in certain areas, may be asked to do additional work. 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. 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.

Courses in Art

UNDERGRADUATE CREDIT

209 095. Art Assembly. (0) I, II. Required for all art education majors each semester. By appt. not to exceed one meeting per month.

209 096. Art Education Seminar. (0) I, II. Required each semester for all students majoring in art who plan to participate in the teaching block, an introduction to the attitudes of professional growth in art that will create a relationship between their fine arts training and their teaching experience.

209 100. Design I. (2) I, II, S. Introduction to and laboratory practice in the principles and elements of design. Four 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. Four 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. Four 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. Four hours lab. Pr.: Art 100, 190.

209 210. Drawing II. (2) I, II, S. Cont. of Drawing I, with strong emphasis on creative expression. Four 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. Four 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. Four hours lab. Pr.: Art 210.

209 230. Sculpture I. (2) I, II, S. An introduction to the problems of sculptural form; fundamental techniques and theory in clay modeling, molding, casting and direct plaster. Four 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. Four 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. Four 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. Four 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 and wheel throwing; decoration of ceramic forms using slips, stains, glazes, etc. Student participation in Raku firing procedures; stacking and firing of electric kilns. Four hours lab. Pr.: Art 100 or consent of instructor.

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. Four 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. Four hours lab. 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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.

209 415. Art for Exceptional Children. (3) I, II. A study of the knowledge and methods of utilizing art concepts and art activities by the elementary teacher to develop and enhance the learning experiences of exceptional children, including the disadvantaged, physically handicapped, mentally retarded and emotionally disturbed. Six hours lab. Pr.: Elementary Education or Art Major and Psychology 110. Same as Educ. 315.

209 420. History of Indian Art. (3) I, II. History of Indian art from c.3000 B. C. to the twelfth century B. C.

209 425. Pictorial Presentation. (1) II. An investigation of suitable materials and methods of matting, glazing, and framing of specific works of art. Matting to include selection of materials, color, texture, proportion, and methods of construction. Framing to include the selection of appropriate moulding styles, color, and finishes, wiring, lighting and installation problems. Two hours lab. Pr.: Art or Art Education Major. Junior standing or equivalent.

209 446. Painting II. (3) I, II, S. Continuation of Painting I. Emphasis on development of personal attitudes in formal structural relationships of line, color, and shape. Six hours lab. Pr.: Art 246.

209 492. **Italian Renaissance Art History.** (3) I, II. Italian art of the 15th and 16th centuries, with a brief discussion of the 14th century origins of Renaissance art. Pr.: Art 195, 196.

209 493. **Nineteenth Century Art History.** (3) I, II. Painting, sculpture, and architecture of the late 18th and 19th centuries, with emphasis on the art of France. Pr.: Art 196.

209 495. **Northern Renaissance Art History.** (3) I, II. A study of the art of Northern Europe in the 14th, 15th and 16th centuries, including the International Style, and painting of Flanders, Germany, and France. Pr.: Art 195, 196.

209 496. **Twentieth Century Art History I.** (3) I. Origins and development of twentieth century art from 1890 to 1914. Pr.: Art 195, 196.

209 497. **Twentieth Century Art History II.** (3) II. Origins and development of twentieth century art from 1914 to the present. Pr.: Art 195, 196, 496.

209 498. **Southern Baroque Art History.** (3) The development of the Baroque period in Italy, Spain and France, from its beginnings in the seventeenth century to Tiepolo and the Rococo style of the eighteenth century. Pr.: Art 195, 196.

209 499. **Northern Baroque Art History.** (3) The development of the Baroque in Holland and Flanders. Pr.: Art 195, 196.

209 565. **Ceramics II.** (3) I, II. Advanced work on potter's wheel combined with hand-built forms. Consideration of simple kiln design, firing techniques and procedures using various fuel burning kilns. Six hours lab. May be taken for three consecutive semesters. Pr.: Art 265.

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. Four hours lab. 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. Six hours lab. May be taken for four semesters. Pr.: Art 205, 290, or consent of instructor.

209 610. **Figure Drawing II.** (3) I, II, S. Continuation of Figure Drawing I, with emphasis on individual expression. Six hours lab. May be taken for four semesters. Pr.: Art 224.

209 612. **Figure Painting.** (3) I, II. Painting from the human figure with oil and plastic media. Six hours lab. May be taken for two semesters. Pr.: Art 246, 610.

209 622. **Water Color II.** (2) I, II, S. Cont. of Water Color I. Emphasis on individual expression within limitations of medium. Four hours lab. May be taken for two semesters. Pr.: Art 222.

209 630. **Sculpture II.** (3) I, II, S. Emphasis on personal development through exploratory experiences in the various media. Introduction to metallic casting (bronze, iron, aluminum) and welding (gas and electric). Six hours lab. May be taken for six semesters. Pr.: Art 230.

209 635. **Printmaking II.** (3) I, II, S. Advanced work in blockprints, serigraphy, or lithography. Six hours lab. May be taken for four semesters. Pr.: Art 235.

209 636. **Etching and Drypoint.** (3) I, II. Individual expression in intaglio techniques or printmaking; includes etching, engraving, aquatint, and drypoint. Six hours lab. May be taken for four semesters. Pr.: Art 235.

209 647. **Painting III.** (3-5) I, II, S. Continuation of Painting II. Emphasis on individual directions in painting to attain further professionalism. Primarily for undergraduate painting majors. May be taken for four semesters. Pr.: Art 446 and consent of instructor.

209 665. **Ceramics III.** (2) I, II. Clay and glaze analysis and calculations. Study of raw materials and their characteristics as used in clay and glaze formulations. One hour lecture and two hours lab. Pr.: Art 265.

209 669. **History of Ceramics.** (1) II. History and development of ceramics; study of the use of pottery and other aspects of ceramics from earliest known records to present day. Use of slides and other visual materials. Pr.: Art 100 or 265.

209 670. **Ceramics IV.** (2) I, II. Individual exploration and further development of ceramic design and glaze technology; advanced kiln design and construction. Four hours lab. May be taken for three consecutive semesters. Pr.: Art 565, 665.

209 680. **Drawing III.** (3) I, II. Continuation 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. **Techniques 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, consent of instructor; 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.

GRADUATE CREDIT

209 830. **Graduate Sculpture Studies.** Credit arranged. I, II, S. Advanced creative work involving appropriate sculptural media and related techniques. Emphasis placed on content of work. May be taken for a total of 18 credit hours. Pr.: Consent of instructor.

209 845. **Graduate Painting Studies.** Credit arranged. I, II, S. Advanced study with emphasis on original investigation leading to professional competence in painting. May be taken for a total of 18 credit hours. Pr.: consent of instructor.

209 855. **Graduate Printmaking Studies.** Credit arranged. I, II. Advanced creative work in any of the printmaking areas. Emphasis on original investigation into technical aspects as well as content in prints media. May be taken for a total of 20 credit hours. Pr.: Consent of instructor.

209 865. **Graduate Ceramics Studies.** Credit arranged. I, II. Further study of glaze experimentation; resolutions of advanced form and decoration problems established by instructor. May be taken for a total of 18 credit hours. Pr.: Art 670 or consent of instructor.

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

MR. ERNIE BARRETT, Head of Department

Athletic Director Barrett; Assistant Professors Dodds, Knorr, and Nelson; Instructors Brasher, Morgan and Wardell; Coaches Gibson and Hartman; Assistant Coaches Branch, Falks, Favrow, Floyd, Frazier, Garrett, Gottlieb, Heath, Jackson, McDowell, Montgomery, Powell, Robertson, Romaine; Assistant Athletic Director Tidd, Head; Administrative Assistants Myers 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, 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.

Division of Biology

L. E. ROTH, Director

T. M. BARKLEY, Associate Director

J. S. WEIS, Assistant Director

Professors Bode,* Consigli,* Fina,* Gier,* Hansen,* Harris,* Pady,* Pittenger,* Robel,* Roth,* and Tiemeier;* Associate Professors Anderson,* Barkley,* Buck,* Goss,* Hulbert,* Khalil,* Kramer,* Marzolf,* Smith,* Wilson,* and Zimmerman;* Assistant Professors Center,* A. Conrad,* G. Conrad,* Doezeema,* Ferguson,* Fretwell,* Iandolo,* Klaassen,* Lockhart,* Marchin,* Rodkey,* Slesenski,* Spooner,* Urban,* Weis,* and Williams;* Instructors M. Davis, Hook, Spiker, Tatschl; Emeritus: Professors Ameel,* Frazier,* Gainey,* Goodrich,* Guhl,* and Wimmer;* Associate Professors McCracken,* and Newcomb.*

The Division of Biology was formed in 1967 by an amalgamation of the former departments of Bacteriology, Botany, and Zoology in order to strengthen the cooperation between biologists and to reflect the modern trends of biology. The internal organization of

the Division consists of four sections: (a) Molecular Biology and Genetics, (b) Microbiology and Immunology, (c) Physiology and Developmental Biology, and (d) Environmental Biology. Biologists are thus grouped according to their approaches and methodologies regardless of whether their subject organisms are animals, plants, or microbes.

In 1969 the Division received a grant for \$800,000 from the National Science Foundation for the expansion of the academic program. In 1970 a new building was completed and occupied by the Division of Biology.

UNDERGRADUATE STUDY

The course offerings and curriculum have been extensively revised since the Division was created. Undergraduate majors are offered in Biology, Microbiology, and Fisheries and Wildlife Biology, plus two professional and pre-professional areas. The course offerings and degree requirements allow considerable latitude in choosing areas of emphasis and electives. Each student majoring in the areas of the Division of Biology is assigned an adviser to assist him in planning his academic program. Un-assistant director of the division, and enquiries regarding undergraduate programs may be directed to him.

Biology Degree. This program replaces the former degrees in botany and zoology. In consultation with his adviser, the student may arrange his program to receive either a B.A. or B.S. degree, the essential distinction being that the B.A. degree requires course work in a foreign language while the B.S. degree does not.

In addition to the general requirements of the College of Arts and Sciences, these courses are required for a bachelors degree in biology: Principles of Biology (4 hrs.), Organismic Biology (4 hrs.), Environmental Biology (4 hrs.), Microbiology (4 hrs.), Cell Biology (4 hrs.), Developmental Biology (4 hrs.), Molecular Genetics (3 hrs.), and Evolution (3 hrs.). The following courses given by other departments also are required: College Algebra (3 hrs.), Trigonometry (3 hrs.), General Physics I & II

(8 hrs.) or Engineering Physics I & II (10 hrs.), Chemistry I & II (10 hrs.), and Organic Chemistry (5 hrs.).

Students contemplating graduate school are urged to take course work in Calculus, Statistics, Biochemistry, and a modern foreign language.

Microbiology Degree: This program was formerly called Bacteriology and the degree requirements have been altered to correspond with the changes in course offerings. The actual degree may be either a B.A. or a B.S., depending upon which electives are chosen by the student and his adviser. The major in microbiology consists of the general requirements of the College of Arts and Sciences, plus the following courses in the Division of Biology: Principles of Biology (4 hrs.), Organismic Biology (4 hrs.), Microbiology (4 hrs.), Molecular Genetics (3 hrs.), plus 20 hours of microbiology courses to be chosen in consultation with the student's adviser. The following courses given by other departments are also required: College Algebra (3 hrs.), Trigonometry (3 hrs.), Chemistry I (5 hrs.), Chemistry II Lecture (3 hrs.), Chemical Analysis (4 hrs.), General Organic Chemistry (5 hrs.), General Biochemistry (5 hrs.), and General Physics I & II (8 hrs.). Students contemplating graduate school should also consider taking additional course work in mathematics and a modern foreign language.

Fisheries and Wildlife Biology Degree. This curriculum replaces the former Wildlife Conservation program, and it includes the following three options: Fisheries Biology, Wildlife Biology, and Conservation. Students in each of the three options must fulfill the general requirements of the College of Arts and Sciences, plus the following courses: College Algebra (3 hrs.), Elements of Statistics (3 hrs.), Chemistry I & II (10 hrs.) and General Organic Chemistry (5 hrs.) or General Chemistry (5 hrs.), Elementary Organic Chemistry (5 hrs.) and Elementary Biochemistry (5 hrs.) for a total of 15 hrs. of Chemistry, Physical Geology (4 hrs.) and General Entomology (4 hrs.). These courses from the Division of Biology are also required of students in each option: Principles of Biology (4 hrs.), Organismic Biology (4 hrs.), Environmental Biology (4 hrs.) and Wildlife Conservation (3 hrs.).

Major requirements for the Fisheries Biology option include: Biometrics (3 hrs.), Physics I & II (8 hrs.), Lower Plants (3 hrs.), Lower Vertebrates (4 hrs.), Fisheries Management (4 hrs.), Limnology (2 hrs.), Limnology Methods (1 hr.), Zoophysiology (4 hrs.), Molecular Genetics (3 hrs.), plus two of the following four courses: Cell Biology (4 hrs.), Developmental Biology (4 hrs.), Microbiology (4 hrs.) and Evolution (3 hrs.).

Major requirements for the Wildlife Biology option include: Biometrics (3 hrs.), Physics I & II (8 hrs.), Higher Plants (4 hrs.), Higher Vertebrates (4 hrs.), Wildlife Management Techniques (3 hrs.), Zoophysiology (4 hrs.), Molecular Genetics (3 hrs.), plus two of the following four courses: Cell Biology (4 hrs.), Developmental Biology (4 hrs.), Microbiology (4 hrs.) and Evolution (3 hrs.).

Major requirements for the Fisheries and Wildlife Conservation option include: Descriptive Physics (4 hrs.), Natural Resources Economics (3 hrs.), Zoophysiology (4 hrs.), plus two of the following five courses: Cell Biology (4 hrs.), Developmental Biology (4 hrs.), Microbiology (4 hrs.), Molecular Genetics (3 hrs.), and Evolution (3 hrs.). Nine to twelve additional elective hours in biology also are required.

GRADUATE STUDY

The Division offers both the M. S. and Ph.D. in numerous areas of biology. Degrees are specifically offered in Biology and Microbiology, and through interdepartmental programs in Animal Breeding, Biochemistry, Genetics, Parasitology, and Physiology. Graduate programs in the Division generally relate to one of the four sections—Molecular Biology and Genetics, Microbiology and Immunology, Physiology and Developmental Biology, and Environmental Biology. Graduate studies also are offered in the following areas: animal behavior, bacteriology, biophysics, cell biology, developmental biology, ecology, embryology, endocrinology, limnology, mycology, ornithology, parasitology, physiology, plant anatomy, plant taxonomy, virology, and wildlife biology. 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 Selection Committee, Division of Biology.

Until 1972, Bio. 205, General Zoology was offered each semester. Although Biology 198 is listed as a prerequisite for numerous courses, completion of Biology 205 is satisfactory.

Courses in the Division of Biology

UNDERGRADUATE CREDIT

215 198. Principles of Biology. (4) I, II, S. An introductory course concerned with the behavior of molecules, cells, organisms and populations in an ecosystem-bound and evolving world. Audiotutorial format, equivalent to two hours of lec., one hour of rec., and three hours of laboratory per week.

215 200. Public Health Bacteriology. (3) I, 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. Directed toward non-biology majors. Three hours lec. per week.

215 201. Organismic Biology. (4) I, II, S. The animal phyla and plant divisions, illustrating their taxonomy and functional adaptations that affect their survival. Two hours lec. and two three hour labs per week. Pr.: Bio. 198 or equiv.

215 202. Practicum in Nursing. (2). Interim semester only. Designed for students considering professional nursing as a career. Introduction to development of nursing care skills. Lecture, laboratory and clinical experience.

215 210. General Botany. (4) I, II. Two hours rec. and six hours lab. per week.

215 215. Human Anatomy. (5) I. General anatomy studies by means of dissectible models, skeletons, and charts. Three hours rec. and six hours lab. per week. Pr.: Bio. 198.

215 222. Field Ornithology. (1) II, odd years. Identification of bird species in the field and the illustration of attributes of avian behavior and ecology. One 3-hr. lab per week. Pr.: Sophomore standing.

215 230. Introduction to Physical Therapy. (1) II. Designed for Physical Therapy students. An introduction to terminology and techniques used in the profession. Pr.: sophomore standing in the Physical Therapy curriculum.

215 235. Introduction to Medical Technology. (1) II. Designed for Medical Technology students. An introduction to the terminology and procedures used in the profession. Pr.: sophomore standing in Medical Technology curriculum.

215 240. Human Anatomy and Physiology. (5) S. For students in Home Economics and Nursing. Three hours rec. and six hours lab. per week. Pr.: Bio. 198.

215 303. Ecosystems and Man. (3) II. Designed for non-biologists. Principles of ecology and their application to such problems as pollution, human population growth, and land use planning, and to show the interdependence of all fields of human endeavor in affecting environment. Two hours lecture and one hour discussion per week. Pr.: Sophomore standing.

215 325. Integrated-Independent Studies in Biology. (1-6). Offered on demand. A course designed for utilization by single students or groups of students under the guidance of a faculty member that could allow for innovative approaches to biological investigation.

215 345. Zoological Microtechnic. (2) I, II, S. Methods in preparation of slides and whole mounts; principles of photomicrography. Six hours lab. per week. Pr.: Bio. 198.

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. (1-3) I, II. Selected topics. Open to non-majors in the Honors Program.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

215 405. Comparative Anatomy of Vertebrates. (4) II. Two hours rec. and six hours lab. per week. Pr.: Bio. 198.

215 410. Embryology. (4) I, II, S. Developmental anatomy and physiology of reproduction of birds and mammals. Three hours rec. and three hours lab. per week. Pr.: Bio. 198.

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 lectures and two two-hour labs per week). Pr.: Bio. 198.

215 425. Human Physiology. (4) I, II, S. Functions of various organ systems of the body. Directed toward non-biology majors. Three hours rec. and two hours lab. per week. Pr. 198.

215 430. Wildlife Conservation. (3) II. Methods and techniques in the management and propagation of wildlife. Pr.: Bio. 198 and sophomore standing.

215 441. Human Parasitology Recitation. (3) II. Three hours lec. per week. Pr.: Bio. 198.

215 442. Human Parasitology Laboratory. (1) II. Two hours lab. per week. Pr.: To be taken concurrently with Bio. 441.

215 450. Microbiology. (4) I, II. Introduction to microorganisms; their morphology, physiology, classification, and importance. Two hours lec. and four hours lab. per week. Pr.: one course in biology and a course in organic chemistry.

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. per week. Pr.: Bio. 450 or equiv.

215 512. Principles of Zoophysiology. (4) II. Selected topics in physiology of cells, organ systems, and organisms. Three hours rec. and three hours lab. per week. Pr.: Bio. 198, two semesters of Chemistry or equiv.

215 515. Developmental Biology. (4) II. A study of development and differentiation in plants and animals.

Three hours lec. and one three-hour lab. per week. Pr.: Bio. 535.

215 520. Microbiology of Foods. (4) I. Microbial phenomena involved in the bacteriology and sanitation of foods. Two hours rec. and four hours lab. per week. Pr.: Bio. 450 or equiv.

215 530. Environmental Biology. (3) II. Structure and function of ecosystems. Abiotic and biotic interrelationships; energetics; population dynamics; community structure and regulation; biogeography; and succession. Three hours lec. Pr.: one course in biology and junior standing.

215 531. Environmental Biology Laboratory. (1) II. Practical experience in gathering and interpreting data for answering questions related to ecology. Designed for majors in the Division of Biology. Pr.: Concurrent enrollment in Bio. 530.

215 535. Cell Biology. (3) I. Chemistry, structure and function of cellular components and relationships to energy, transport, movement and growth. Three hours lec. per week. Pr.: 8 hours biology and Chemistry 351 or equiv.

215 536. Cell Biology Laboratory. (1) I. One three hour lab per week. Pr.: Concurrent enrollment in Biology 535, status as undergraduate major in the Division of Biology.

215 540. Lower Vertebrates. (4) II. Classification, morphology, physiology, distribution and natural history of the fishes and amphibians. Three hours lec. and three hours lab. per week. Pr.: Bio. 201.

215 541. Higher Vertebrates. (4) I. Classification, morphology, physiology, distribution, and natural history of the reptiles, birds, and mammals. Three hours lec. and three hours lab. per week. Pr.: Bio. 201.

215 550. Lower Plants. (3) II. Morphology, adaptive mechanisms, and evolutionary relationships of the cellular and vascular cryptograms. Two hours lec. and one three-hour lab. per week. Pr.: Bio. 201 or 210.

215 551. Higher Plants. (4) I. Morphology, taxonomy, and biogeography of the vascular plants. Two hours lec. and two three-hour labs. per week. Pr.: Bio. 201 or 210.

UNDERGRADUATE AND GRADUATE CREDIT

215 600. Plant Physiology. (4) I. Three hours rec. and three hours lab. per week. Pr.: Bio. 201 or 210 and a course in organic chemistry.

215 602. Comparative Embryology. (3) II in odd years. Vertebrate embryology and histogenesis, emphasizing the mechanics of development. One hour lec. and six hours lab. a week. Pr.: Bio. 410.

215 610. Bacteriology of Human Diseases. (5) I. Three hours rec. and six hours lab. per week. Pr.: Bio. 450 or equiv.

215 621. Endocrinology. (3) I, S. Survey of the glands of internal secretion and of their physiological and biochemical role in animals. Pr.: Bio. 198 plus a course in organic chemistry or biochemistry.

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. per week. Pr.: Bio. 198 and junior standing.

215 630. Invertebrate Zoology. (4) I. Two hours rec. and six hours lab. per week. Pr.: Bio. 210 and junior standing.

215 634. Soil Microbiology. (3) I in odd years. Microbial population of the soil and its role in soil fertility. Pr.: Bio. 450 or equiv.; Chemistry 351 or equiv.

215 640. Introductory Mycology. (4) I. Comparative morphology, classification, and life cycles of the fungi. Two hours rec. and six hours lab. per week. Pr.: Bio. 201 or 210.

215 642. Protozoology. (3) II. Taxonomy, morphology, and biology of the free-living and parasitic protozoa. Two hours rec. and three hours lab. per week. Pr.: Bio. 201.

215 646. Human Heredity and Evolution. (2) I. A study of human genetics and a survey of the principles of evolution of animals including man. Pr.: Bio. 201.

215 650. Molecular Genetics. (3) I. Structure, function and transmission of genetic material with special emphasis of studies at the molecular level. Pr.: Organic chemistry or concurrent enrollment, 10 hours of biology.

215 655. Microbial Metabolism. (3) II. An advanced treatment of metabolic activities of microorganisms. Pr.: Bio. 450.

215 656. Microbial Metabolism Lab. (2) II. Selected laboratory exercises demonstrating the fundamental principles and practices of physiology. One hour rec. and six hours lab a week. Pr.: Bio. 655 or conc. enrollment.

215 660. Evolution. (3) II. A study of the theory of evolution including its historical and social implications. Three hours lec. per week. Pr.: Senior standing in biology or related area.

215 670. Immunology. (4) II. Chemical, genetic and biological properties of the immune response, acquired immunity and antibody production. Pr.: two courses in biology and a course in biochemistry or equivalent.

215 671. Immunology Lab. (1) II. Laboratory exercises in conjunction with 215 670 Immunology. Pr.: 670 Immunology or concurrent enrollment.

215 685. Wildlife Management Techniques. (3) I. Ecology and management techniques. Two hours of rec. and three hours lab. per week. Pr.: Bio. 430 and 531.

215 693. Limnology. (2) I. Studies of inland lakes and streams. Emphasis is placed on water as a physical and chemical environment as it affects the nature of biological interactions and productivity. Two hours lec. Pr.: two laboratory courses in natural sciences.

215 694. Limnological Methods. (1) I. Problems in field observation and measurement of limnological phenomena. One three-hour lab. per week. Pr.: Stat. 285 320, Biology 215 530, and concurrent enrollment in 215 693.

215 696. Fisheries Management. (4) I. Methods of fishery biology; population dynamics, aging and growth rates, productivity, physio-chemical conditions of freshwater, survey methods, methods of aquatic environment improvement, and fish-pond management. Three hours rec. and three hours lab. per week. Pr.: Bio. 540.

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. per week. Pr.: Bio. 640.

215 725. Use of Models in Biology. (3) I. Rationale behind the use of models, formal logic and statistical methods of data analysis in biological research. Review of commonly used biological models, exercises in formal hypothesis development and model building. Three hours

lec. per week. Pr.: Math. 221 or 340 and Stat. 320 (or concurrently).

215 730. General Virology. (3) II. Theoretical and experimental basis of virology, with 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 Bio. 450 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. per week. Pr.: Bio. 201 or 210.

215 750. Molecular and Cellular Biology. (3) I. A study of the molecular biology of the cell. Regulation, organization and synthesis of cellular constituents in both prokaryotic and eukaryotic cells will be studied in a comparative manner. Pr.: Biochemistry 421 or equiv.

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. per week. Pr.: Bio. 500, Biochem. 420.

215 790. Bacteriology Seminar. (1) I, II. Pr.: 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.

GRADUATE CREDIT

215 800. Mineral Nutrition of Plants. (2) I. Current interpretation of the absorption and transport of mineral nutrients. Pr.: Bio. 600.

215 801. Advanced Topics in Microbiology. Credit arranged. I, II, S.

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. per week. Pr.: Bio. 625 and consent of instructor.

215 803. Introduction to Research in Biology I. (3) I. Participation with faculty in their research laboratories. The semester will consist of involvement in laboratories in Environmental Biology, Microbiology, Molecular and Cell Biology, AND Physiology and Developmental Biology. A student will divide his time in each of these laboratories equally. Pr.: Graduate standing in the Division of Biology.

215 804. Introduction to Research in Biology II. (3) II. Participation with faculty in their research laboratories. The semester will consist of involvement in laboratories in Environmental Biology, Microbiology, Molecular and Cell Biology, OR Physiology and Developmental Biology. At least two areas must be represented. Pr.: Biology 803.

215 815. Advanced Endocrinology. (2) I in even years. Pr.: Bio. 621.

215 819. 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.: Bio. 600.

215 820. Plant Physiological Technique. (2) II. Six hours lab. per week. Pr.: Bio. 600 and a course in biochemistry.

215 824. Paleobotany. (3) II. Fossil plants and their use in elucidating ancient biospheres. Two hours rec. and two hours lab. per week. Pr.: Bio. 201 or 210 and Geol. 430.

215 830. Advanced Virology. (4) I. Application of current biochemical, biophysical, and biological techniques to the study of viruses, including bacterial viruses (bacteriophage), animal viruses and plant viruses. Pr.: Bio. 730 and consent of instructor.

215 833. 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.: Bio. 600.

215 840. Immunochemistry. (3) I odd years. Lectures and readings covering the chemical and physical properties of antibodies. Pr.: Bio. 670 or equiv. and consent of instructor.

215 845. Animal Behavior. (3) II in odd years. The study of the mechanisms, ontogeny, and evolution of social and non-social behavior from an adaptive viewpoint. Discussion, lecture, laboratory and field exercises. Pr.: At least one year of biology.

215 855. The Genetic Analysis of Eukaryotic Organisms. (3) II. A course designed not only to stress the use of genetic techniques and methodology in the analysis of cellular and organismic processes in eukaryotic systems, but also to reinforce and expand basic concepts of transmission and molecular genetics. Pr.: Knowledge of genetics and consent of instructor.

215 858. Regulation of Gene Expression. (3) I. An analysis of the mechanisms controlling the expression of genetic information in biological systems of varying complexity. Emphasizes the biochemical, genetic and physical basis of regulation and development. Pr.: Biochemistry 421 or equiv.; a basic knowledge of molecular biology and consent of instructor.

215 860. Microbial Genetic Techniques. (4) II. Experiments in multiplication, recombination, and mutation in bacteria and bacteriophage. Pr.: Bio. 760, Biochem. 420 or equiv.

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. per week. Pr.: Bio. 530 and 600.

215 868. Cellular and Developmental Biology. (3) II. Chemistry, structure and function of cellular systems in growth, development and reproduction. Pr.: General Biochemistry (020-421) or equiv.

215 870. Advanced Systematic Botany. (4) II in odd years. Classification, nomenclature, and taxonomic theory of vascular plants. Two hours rec. and six hours lab. per week. Pr.: Bio. 551.

215 875. **Genetics of Microorganisms.** (3) II. Structure and function of genes as revealed by microorganisms; the role of genes in the control of cellular activities. Pr.: Knowledge of genetics and consent of instructor.

215 880. **Population Ecology.** (3) II. Growth and regulation of populations, cycles, competition theory, seasonal effects, predator-prey and community relationships, biogeography and social regulation. In depth consideration of current theoretical developments, and recent field population studies. Pr.: Bio. 530, a course in Calculus and a course in Statistics.

215 960. **Current Literature in Microbial Genetics.** (1) I. May be repeated to a maximum of three hours credit. Seminar 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. 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.

Chemistry

ADRIAN H. DAANE, Head of Department

Professors Daane,* Lambert,* McDonald,* Meloan,* Moser,* Schrenk,* and Setser;* Associate Professors Copeland,* Hammaker,* Hawley,* Johnson,* Lanning,* Purcell,* and van Swaay;* Assistant Professors Danen,* DesMarteau,* Kay,* Hoffman,* Lenhert,* and Paukstelis;* Emeritus: Professors Andrews,* Lash,* and Silker;* Assistant Professor Harriss, Instructor Crawford.

The Department of Chemistry occupies recently remodeled Willard Hall and a new building, the H. H. King Chemical Laboratory. The faculty of the department consists of 21 Ph.D. chemists representing a broad range of specialization in the chemistry field. The department offers programs leading to the B.S., B.A., M.S. and Ph.D. degrees and in addition, instruction is provided in introductory and advanced chemistry to undergraduate and graduate students in numerous other curriculums. Instruction and research in chemistry are conducted in laboratories well-equipped with modern facilities and instruments.

UNDERGRADUATE STUDY

Chemistry graduates from KSU are sought by chemical industries and graduate schools and by high schools as chemistry teachers. Also, a significant number of graduates use their course of study as an effective preparation for further study in a life science such as medicine. The chemistry curriculum for the B.S. degree is listed below; it has been approved by the American Chemical Society for professional training of chemists.

High school students who plan to major in chemistry should have good preparation in mathematics, chemistry, physics and English composition. Trigonometry and two years of algebra should be taken; more math is good.

Junior college students should take general chemistry, qualitative and quantitative analysis, one year of organic chemistry, analytic geometry, calculus, physics, and English composition.

Many chemistry students at Kansas State are engaged in independent study and research. Some begin their freshman year, and some begin later, working on their own research projects in a research laboratory under the supervision of a faculty member of their choice. A significant number publish the results of their work in scientific journals.

An undergraduate program resulting in degrees in both Chemistry and Chemical Engineering is available. The degree requirements of both curricula must be met and a minimum of 150 credit hours completed. Graduates of such a program are especially well suited for work in chemical industry or for graduate study in either field.

GRADUATE STUDY

Programs leading to the M.S. and Ph.D. degrees are offered. Research and graduate level courses are conducted in the areas of analytical, inorganic, organic, and physical chemistry and adequately prepare students for a career in research or college and university teaching.

In order to be admitted to the graduate program leading to the M.S. or Ph.D. degrees, a student must have completed undergraduate courses in chemistry, mathematics, and physics equivalent to those in the undergraduate chemistry curriculum (see below). 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.

The Department of Chemistry requires all graduate students majoring in chemistry to teach as part of their training for an advanced degree.

Information and a brochure describing fields of research, supporting facilities, financial support, and other aspects of graduate study may be obtained on request from the Chairman, Graduate Assistantship Committee, Department of Chemistry, Kansas State University, Manhattan, Kansas 66502.

CHEMISTRY CURRICULUM FOR THE B.S. DEGREE¹

120 credit hours required for graduation

1. **Chemistry:** 42 hours (departmental course numbers are in parentheses)
 Freshman: Chem. I (210), 5 hr.; Chem. II (230), 3 hr.; Chem. Analysis (271), 4 hr.
 Sophomore: Org. I (431), 3 hr.; Org. I Lab (432), 2 hr.; Org. II (450), 3 hr.; Org. II Lab (451), 2 hr.; Chem. Separations (445), 2 hr.
 Junior: Phys. Chem. (585), 3 hr.; Phys. Chem. II (595), 3 hr.; Phys. Chem. II Lab (598), 2 hr.
 Senior: Inorg. Chem. (597), 3 hr.; Instrumental Anal. (666), 4 hr.; Undergrad. Research (599), 3 hr. (may be taken prior to the senior year).
2. **Mathematics:** 12 hours
 Freshman: Anal. Geom. Calc. I (220), 4 hrs.; Anal. Geom. Calc. II (221), 4 hr.
 Sophomore: Anal. Geom. Calc. III (222), 4 hr.
3. **Physics:** 10 hours
 Sophomore: Engg. Phys. I (310), 5 hr.; Engg. Phys. II (311), 5 hr.
4. **English:** 6 hours
 Freshman: Engl. Comp. I (100), 3 hr.; Engl. Comp. II (120), 3 hr.
5. **Speech:** 1 course
6. **Physical Education:** 2 courses
7. **Social Sciences and Humanities:** seven courses from the Departments of Art, Economics, English, History, Modern Languages, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology, Speech, Journalism or Geography. Courses must include:
 - a. German: German I and II or Tech. German I and II.
 - b. Philosophy: one course

- c. 2 advanced level courses (400 level or above or the second year of a foreign language.)

8. **Electives:** Sufficient additional hours (25-30) to complete a total of 120.

Modification for preparation for High School Chemistry Teaching²

Students who desire to become high school Chemistry teachers may prepare themselves for this vocation while completing the requirements for the B.S. degree in chemistry. Items 5, 7, and 8 above are modified as follows:

5. **Speech:** Oral Communications (281-105 or 281-106).
7. **Social Sciences, Humanities, Biological Science and Professional Education:**
 - a. Philosophy: 1 course
 - b. German: German I and II or Tech. German I and II
 - c. Biological Science: Biol. 198 and 210.
 - d. Social Science: 12 hours. Must include Gen. Psych. (110), 3 hr.; additional 9 hours selected from economics, geography, political sciences, history, sociology, anthropology. Two courses must be at the 400 level or above
 - e. Education: Ed. Psych. I (202), 3 hr. (should be taken the first semester of the junior year); Ed. Psych II (302), 3 hr.; Instructional Media (316); Professional Semester (second semester of senior year), 17 hours of work in Education, including practice teaching.
8. **Electives:** Sufficient additional hours to complete a total of 126.

Courses in Introductory and General Chemistry

UNDERGRADUATE CREDIT

221 095. **Chemistry Seminar.** (0) I, II.

221 110. **General Chemistry.** (5) I, II. Principles, 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 I³.** (5) I, II, S. First course of a two-semester program 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. 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.

2. A related program of preparation for high school chemistry teaching leading to a B.S. Degree in Secondary Education is conducted by the College of Education.

3. 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.

1. Most chemistry majors choose to work for the B.S. degree, but a slightly modified program leading to the B.A. degree is also available.

221 230. Chemistry II. (3) I, II, S. Completion of the two-semester Chem. I, II program in introductory 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

221 499. Problems in Undergraduate Chemistry. Cr. arranged. I, II, S. Problems may include classroom and/or lab work. Pr.: Consent of instructor.

221 599. Undergraduate Research. (1,2,3) I, II, S. Analytical, Inorganic, Organic or Physical Chemistry.

UNDERGRADUATE AND GRADUATE CREDIT

221 601. Practicum in Teaching Chemistry. (1) I, II. Principles and methods of instruction in laboratories and recitation classes in chemistry, including one semester of supervised experience as an instructor in a chemical laboratory. This is a required course of all teaching assistants in the Department of Chemistry. May be taken only once for credit. Pr.: Senior standing in Chemistry.

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.⁴

221 799. Problems in Chemistry. Credit arranged. I, II, S. Problems may include classroom or laboratory work. Not for thesis research. Pr.: Consent of instructor.

GRADUATE CREDIT

221 999. Research in Chemistry. Credit arranged. I, II, S. Research in analytical chemistry, inorganic chemistry, organic chemistry, and physical chemistry.

Courses in Analytical Chemistry

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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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.

221 445. Chemical Separations. (2) II. Principles of modern separation techniques. One hour lec. and three hours lab. a week. Pr.: Chem. 271 or equiv.

UNDERGRADUATE AND GRADUATE CREDIT

221 618. Air and Water Analysis. (2) II. Current methods in use for the monitoring of air and water pollution; literature survey of new analytical methods and their development. Two hours lec. a week. Pr.: Chem.⁴ or consent of the instructor.

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.

GRADUATE CREDIT

221 801. Graduate Seminar in Analytical Chemistry. (0-1) I, II.

221 842. Advanced Analytical Chemistry I. (3) I in odd years. Elemental and functional group analyses, nonaqueous solvent systems, gas analysis, kinetics, and thermal methods of analysis. Pr.: Chem.⁴

221 843. Advanced Analytical II. (1-4) II. Theory of solution equilibria and physical and chemical methods of separation. Pr.: Chem.⁴

221 844. Advanced Analytical Chemistry III. (3) I in even years. Theory and application of electrochemical methods; chronoamperometry, linear potential sweep chronoamperometry, chronopotentiometry, cyclic voltammetry, controlled-potential and constant-current coulometry, electrochemical thin layer techniques, rotating disk, and electrochemical instrumentation. Three lectures a week. Pr.: Chem.⁴

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.⁴

221 846. Principles and Techniques of Analytical Chemistry I. (1-5) II of odd years. A lecture and laboratory course on emission spectroscopy, flame photometry, atomic absorption, and x-ray methods. Pr.: Chem.⁴

221 847. Principles and Techniques of Analytical Chemistry II. (1-4) II. of even years. A lecture and laboratory course on ultraviolet and visible absorption, infrared and Raman methods, fluorescence, phosphorescence, polarimetry, and refractometry. Pr.: Chem.⁴

Courses in Inorganic Chemistry

UNDERGRADUATE AND GRADUATE CREDIT

221 597. Inorganic Chemistry. (3) I and alt. S. A survey course in modern inorganic chemistry. Three hours lec. a week. Pr.: Chem. 450, 595.

4. All chemistry courses numbered 600 or above require the following as minimum prerequisites: Organic Chem. II (Chem. 450), Organic Chem. II Lab. (Chem. 451), Physical Chem. II (Chem. 595), and Physical Chem. II Lab. (Chem. 598).

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221 610. Chemical Applications of Group Theory. (1) I. Applications of group theory to molecular structure, bonding and spectra. One hour lec. a week. Pr.: Chem.⁴

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.⁴

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. 597, 610.

GRADUATE CREDIT

221 802. Graduate Seminar in Inorganic Chemistry. (0-1) I, II, S.

221 826. Chemistry of Non-Metals. (3) II in even years. Theory and properties of the non-metallic elements, with emphasis on their individual and group characteristics. Three hours lec. a week. Pr.: Chem.⁴

221 829. Physical Methods in Inorganic Chemistry. (3) II. 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. 597, 610.

221 831. Theoretical Inorganic Chemistry. (3) II in odd years. Theory of crystal fields and paramagnetic resonance. Three hours lec. a week. Pr.: Chem. 597, 610, 754, 895 or conc. enrollment.

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.: Consent of instructor.

Courses in Organic Chemistry

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 important to biological science areas including pre-veterinary, premedical, 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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 chemistry. Conc. enrollment in Chem. 451 is recommended. Three hours lec. a week. Pr.: Chem. 431 and 432.

221 451. Organic Chemistry II Laboratory. (2) I, II. Six hours lab. a week. Pr.: Chem. 450 or conc. enrollment.

UNDERGRADUATE AND GRADUATE CREDIT

221 752. Systematic Organic Chemistry. (3) II. Advanced study of organic compounds and fundamental types of reactions. Three hours lec. a week. Pr.: Chem.⁴

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.⁴

GRADUATE CREDIT

221 803. Graduate Seminar in Organic Chemistry. (0-1) I, II.

221 805. Current Organic Literature. (0-1) I, II, S. Topics of current interest in organic chemistry will be presented and critically discussed by graduate students and faculty. Max. 2 hr. credit in M. S. program, 4 hr. in Ph. D. program. Pr.: Enrollment as graduate student in organic chemistry.

221 865. Theoretical Organic Chemistry I. (3) II. Bond structure, stereo-chemistry, relation of constitution to physical properties, solvents, and other general topics of a theoretical nature. Three hours lec. a week. Pr.: Chem.⁴

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.⁴

4. All chemistry courses numbered 600 or above require the following as minimum prerequisites: Organic Chem. II (Chem. 450), Organic Chem. II Lab. (Chem. 451), Physical Chem. II (Chem. 595), and Physical Chem. II Lab. (Chem. 598).

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Courses in Physical Chemistry

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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. Chemistry and physics of radioactive substances and applications to fields of biological and physical science. Two hours lec. and three hours lab. a week. Pr.: Consent of instructor.

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.

221 598. **Physical Chemistry II Laboratory.** (2) II. Six hours lab. a week. Pr.: Chem. 595 or conc. enrollment.

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.⁴

221 625. **Colloid Chemistry.** (3) I. Three hours lec. a week. Pr.: Chem.⁴

221 701. **Chemical Thermodynamics.** (3) II. The laws, principles, and methods of thermodynamics and their applications to chemical systems, both pure and solutions. Introductory statistical-molecular approach also included. Three hours lec. a week. Pr.: Chem.⁴

221 702. **Chemical Kinetics.** (3) II. Survey of experimental and-or theoretical aspects of dynamics of chemical reactions. The topics presented will depend upon the instructor. Three hours lec. a week. Pr.: Chem.⁴

221 754. **Molecular Structure.** (3) I. Introduction to quantum mechanics and atomic and molecular spectroscopy. Three hours lec. a week. Pr.: Chem.⁴

GRADUATE CREDIT

221 804. **Graduate Seminar in Physical Chemistry.** (0-1) I, II. Presentation of topics from literature in physical chemistry.

221 850. **Chemical Statistical Thermodynamics.** (3) I. Application of classical and quantum statistical mechanics to chemical phenomena. Three hours lec. a week. Pr.: Chem. 701, 754.

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.⁴

221 895. **Theoretical Chemistry I.** (3) II. Principles of diatomic and polyatomic molecular spectroscopy and chemical bonding. Three hours lec. a week. Pr.: Chem. 754 or consent of instructor.

221 896. **Theoretical Chemistry II.** (3) I. Development of the basic principles of quantum mechanics and application to problems of energy states of atoms and molecules. Three hours lec. a week. Pr.: Chem. 754 or consent of instructor.

Computer Science

HAROLD SACKMAN, Head of Department

Professor Sackman,* Associate Professors Ahmed,* Conrow,* Gallagher* and Weinberg;* Assistant Professors Brewer, Calhoun,* Fisher,* Miller, Sincovec,* and Unger.

UNDERGRADUATE STUDY

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 thousands of 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 seeking an undergraduate degree in computer science must fulfill the general requirements of the College of Arts and Sciences and, for the Bachelor of Science or Bachelor of Arts degree, complete Math 220 and 221 and either 224 or 551; also complete Computer Science 315, 400, 425, 440, 505, 525, and 600, plus 22 additional hours chosen from the departmental list of technical electives.

GRADUATE STUDY

The Department of Computer Science offers graduate studies leading to the Master of Science and Doctor of Philosophy degrees.

Many graduate majors in computer science initially are deficient in formal computer science studies as compared to a person who

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received the baccalaureate degree in computer science. If so they may need to take one or more courses for undergraduate credit. They also will take two academic years to complete the requirements for the Master of Science degree unless full use is made of Intersessions and Summer Sessions.

The Doctor of Philosophy degree in computer science is offered jointly by the University of Kansas and Kansas State University so students will have the benefits to be derived from both faculties. The fields of highest concentration in computer science are divided between the two universities in the following manner:

Identified with Kansas State University

Machine Languages — Language processors, conversational languages, extensible languages

Computer Design and Architecture — Computer logic, switching theory
Programming Systems

Biological and Ecological Systems
Simulation

Data Organization and Manipulation — File management and data processing, information storage and retrieval, text processing.

Areas of Current and Essential Interest to Both Campuses

Numerical Analysis
Artificial Intelligence

Identified with the University of Kansas

Formal Language Theory — Theory of grammars, formal languages, formal semantics

Natural Languages and Symbol Systems — Computational linguistics, pattern generation in the humanities and fine arts, sound synthesis and analysis

Automata and Mathematical Logic — Theory of automata, computability, recursive function theory

Machine Systems

Information Systems Theory and Design — Analysis of information networks, information acquisition, social implications of information systems.

A student wishing to seek the Doctor of Philosophy degree in computer science

should choose his university with the above in mind at least by the time the requirements of the Master of Science Degree are met.

Courses in Computer Science

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.

286 397. **Seminar in Computer Science.** (1-3), I, II, S.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

286 400. **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 notation of lists, tables, data sets (files) and records. Pr.: Comp. Sci. 315.

286 410. **Cobol.** (3) Elements of data processing in cobol language. Applications. Pr.: Comp. Sci. 315.

286 425. **Computer Organization and Programming I.** (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.

286 440. **Introduction to Programming Languages.** (3) I, II. Structure of algorithmic languages. Conversational languages. List processing and string manipulation languages. Concepts and facilities of programming languages. Pr.: Comp. Sci. 400.

286 505. **Mathematical Machines and Computability.** (4) I. Elements of matrix algebra pertinent to digital computations. Computer methods of solving linear equations and inverting matrixes. Error analysis, problem conditioning and post-optimizations. Rectangular and singular systems. A generalized inverse for matrixes. Algorithmic methods of solving eigenvalue problems, progressive algorithms. Applications. Three hours lecture, one hour laboratory on a digital computer. Pr.: Math. 222, Comp. Sci. 400.

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 laboratory differential equations. Three hours lectures and one hour laboratory on a digital computer. Pr.: Comp. Sci. 505.

286 525. **Computer Organization and Programming II.** (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.

286 535. **Non-numeric Programming.** (3) I, II, S. The use of computers in areas not involving numeric calculations. Surveys of applications into areas such as music, learning theory, games and discrete pattern recognition. Heuristic programs. Pr.: Comp. Sci. 400.

286 597. **Seminar in Computer Science.** (1-3), I, II, S.

UNDERGRADUATE AND GRADUATE CREDIT

286 600. **Discrete Structures** (3) II. Study of linear lists, strings, arrays, orthogonal lists, and graphs. Representation of such structures within the computers. Pr.: Comp. Sci. 525, Math. 220.

286 610. **List and String Processing Languages** (3) II, S alternate years. The languages LISP and SNOBOL will be studied, and problems will be developed illustrating the use of each. Pr.: Comp. Sci. 400, 600.

286 615. **Theory of Computability.** (3) II, S. Propositional calculus, axiomatics. Turing machines; unsolvable problems; quantification theory; satisfiability and validity, models, first-order theories; foundational considerations. Pr.: E.E. 355 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. 400, 600.

286 635. **Artificial Intelligence.** (3) II. Application of heuristics to problem solving. Perceptrons, pattern recognition, learning, self-evolving programs. Pr.: Comp. Sci. 535.

286 640. **Programming Languages** (3) II. The study of the structure and facilities of major algorithmic procedure-oriented languages and their implementation, operation and use. Pr.: Comp. Sci. 440, 600.

286 670. **Information Organization and Retrieval** (3) I. Models for representing structured information techniques for organizing and searching files. Structure of semiformal languages. Analysis of information by statistical, syntactic and logical methods. Applications to automatic information retrieval systems, question answering systems, and man-machine interaction. Pr.: Comp. Sci. 425.

286 701. **Automata Theory I** (3) I Alternate 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 or consent of instructor.

286 710. **Compiler Design I** (3) Alternate years. Formulation of syntax-directed and table-driven techniques used in compiler design. Various alternative techniques. Environment of a compiler, conversational compilers. Pr.: Comp. Sci. 620, 640.

286 711. **Compiler Design II.** (3) II, S. Conversational compilers. Syntax-directed compilers. Extensible compilers. Compiler writing systems. Pr.: Comp. Sci. 710.

286 712. **Seminar in Computer Science** (1) I, II, S.

286 720. **Business Data Processing** (4) II, S. Manual, semi-automatic, automatic systems of data processing. Accounting concepts, data processing implications.

Organization of sequential and direct-access files. Checking and control techniques. Student groups will study business applications and recommend data-processing systems. Three hours lecture, two hours lab each week. Pr.: Comp. Sci. 410, 600.

286 798. **Topics in Computer Science.** Credit Arranged. I, II, S.

GRADUATE CREDIT

286 800. **Computational Semantics.** (3) I, S. Theoretical prerequisites and computational techniques for mechanical interpretation of language sentences. Semantics of formal computer languages, including query languages for information retrieval. Structural representation of meaning. Pr.: Comp. Sci. 615.

286 810. **Computer Simulation** (3) A variety of examples will be studied to illustrate the power and flexibility of automata theoretic representation, statistical techniques, and information theory in simulation studies. Pr.: Comp. Sci. 600 or 620.

286 811. **Computer Simulation Experiments** (3) A computer simulation will be programmed for the digital computer and used to predict data and test hypotheses. Pr.: Comp. Sci. 810 or consent of instructor.

286 815. **Special Topics in Computer Science** (2-4) I, II, S. Study in selected areas of artificial intelligence, computational linguistics, linear and nonlinear programming, theorem proving by computer, models of intelligent processes, and the like. Pr.: Consent of instructor.

286 865. **Computer Simulation of Eco-systems.** (3) II, S Alternate Years. A selection of various eco-systems will be used to show how a computer can be used to formally define an eco-system. Then computer-simulated eco-systems will be used to discover ways to optimize the benefits to be derived from actual eco-systems. Pr.: Comp. Sci. 810 or consent of instructor.

286 998. **Research in Computer Science and Mass Communication.** (credit arranged) I, II, S.

Economics*

PAUL L. KELLEY,* Head of Department
EDGAR S. BAGLEY*, Assistant Head, Teaching and Graduate Studies

NORMAN V. WHITEHAIR, Assistant Head, State Leader, Extension Marketing, Management and Resource Development

Professors Bagley*, Chalmers*, Emerson*, and Nordin*; Associate Professors DeCou*, Delehanty, Greenwood*; Assistant Professors Akkina, Gormely*, Nafziger*, Olson, and Thomas; Instructors Bradley and Hazlett.

Economics is concerned with the principles governing the production and distribution of goods and services, the principles guiding the

*The College of Arts and Sciences section of the Department of Economics; see also College of Agriculture. Courses in Agricultural Economics are offered by the College of Agriculture; courses in Accounting and Business Administration are offered by the College of Business Administration.

best use of resources—land, labor, and 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.

A student majoring in economics may be enrolled for either the Bachelor of Arts or the Bachelor of Science degree.

UNDERGRADUATE STUDY

Requirements for an economics major for either the B.A. or B.S. degree (see page 82) are (1) Econ. 110, 120, 410, 420. (2) Five additional courses numbered 400 or above in the Department of Economics in at least four branches of Economics. Economics 405 and 406 cannot be counted in fulfillment of this requirement. (3) Math. 100, Stat. 330 or 350. (4) One of the following: Math 220 or 400; Bus. Admin. 275; Stat. 351 or 521.

Secondary Education Certification. A student majoring in economics may also prepare for teacher certification at the secondary level (see page 187). This program leads to the Bachelor of Science degree (see page 83). 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 187).

Industrial Relations and Manpower Studies Options. Students planning to work in the industrial relations or manpower development utilization field (holding a government, industrial, or trade union position) will become acquainted with the economic, political, and social aspects of labor-management relations and manpower studies by taking the following courses as part of either a terminal university program or a foundation for graduate study: Econ 620, 627; Soc. 541, 643; Pol. Sc. 681; B. A. 530, 630, 632.

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, regional economics, labor economics, monetary and fiscal policy, economic development, international trade, welfare economics, economic fluctuation, 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 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 Business Administration, with the Agricultural and Engineering Experiment Stations, and with the various state agencies.

Courses in Economics

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; principles of economic development; other economic systems.

225 111. **Economics I Honors.** (3) I, II. Course description same as Econ. 110. (3) I, II, S. Basic facts, 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. Continuation 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; international economic relations.

225 399. Honors Seminar Economics. (1) I, II. Readings and discussions. Open to students in the Honors Program not majoring in economics.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

225 405. 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, economic, social and political institutions, literature and historical movements. (Same as Geog. 405, P. Sci. 405, Soc. 405, Anthro. 405.)

225 406. 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 structures and ideas. (Same as Geog. 406, P. Sci. 406, Soc. 406, Anthro. 406.)

225 410. Intermediate Macroeconomics. (3) I, II, S. 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.

225 420. Intermediate Microeconomics. (3) I, II, S. An examination of the theories of consumer behavior and demand, and the theories of production, cost and supply. The determination of product prices and output in various market structures, and an analysis of factor pricing. Introduction to welfare economics. Pr.: Econ. 120.

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.

225 432. Public Finance. (3) I, II, S. Stabilization of the economy through fiscal policy; instruments and analysis of taxation; analysis of government spending. Pr.: Econ. 110.

225 455. Urban and Regional Economics. (3) II. An examination of the determinants of the economic performance of urban and regional economies, including theory, problems, and policy. Pr.: Econ. 120.

UNDERGRADUATE AND GRADUATE CREDIT

225 620. Labor Economics. (3) I, 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 of 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.

225 632. Economics of State and Local Government. (3) II. Determinants of growth in public expenditures; analysis of state and local taxation; intergovernmental fiscal relations. Pr.: Econ. 420 or 432 or consent of instructor.

225 636. Economic Systems. (3) I, some S. A survey of economic systems. Marxian socialism and modern socialism, giving attention to the 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. Development Economics. (3) I, some S. Factors influencing the economic modernization of the less-developed countries. Emphasis on capital formation, investment allocation, structural transformation, population growth, development planning, and the international economics of development. Pr.: Econ. 110.

225 686. Business Fluctuations and Forecasting. (3) 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. Econ. 120.

225 690. Monetary, Credit, and Fiscal Policies. (3) II. Goals of aggregative economic policy, conflicts among goals, and measures to resolve conflicts; money markets; tools and targets of central bank control; the relative strength of monetary and fiscal policies; management of the public debt; term structure of interest rates. Pr.: Econ. 430.

225 699. Seminar in Economics. (1-3) Offered on sufficient demand. Seminars of special interest will be offered on demand. Pr.: Econ. 120.

225 730. Introduction to Econometrics. (3) II, some S. 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 macroeconomics; mathematical treatment of models of consumption, production, market equilibrium, and aggregate growth. Pr.: Econ. 420, 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 affecting the position and slope of the demand schedule for their products by different patterns of expenditure or advertising and selling. Pr.: Econ. 420.

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.

GRADUATE CREDIT

225 801. Topics in Monetary Theory. (3) II. Emphasis on recent literature of monetary economics; Federal Reserve control of the money stock; the demand for money; money and economic activity; monetary targets and indicators. Pr.: Econ. 410 and Econ. 430.

225 805. Income and Employment Theory I. (3) II, 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 macroeconomic systems. Other current developments in macroeconomic 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 to 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. 420 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 or consent of instructor.

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) I. 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 application 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 microeconomic 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. 682 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

FRED H. HIGGINSON*, Head of Department

Professors Davis,* Higginson,* Hummel,* Moses,* Noonan,* and Rogerson;* Associate Professors Adams,* Ansdell,* Eitner,* Jones,* McCarthy,* McGhee,* Nichols,* and White;* Assistant Professors Brondell,* Conrow,* Cunningham,* Evans,* Gillespie,* Glenn,* Houser,* Johnston,* Koch,* Lewis,* Nyberg,* Psilos,* Rees,* H. Schneider,* and M. Schneider;* Instructors Cohen,* Geissler,* and Pelischek; Emeritus: Professors Aberle and Faulkner; Assistant Professor Laman; Instructor Vance.

UNDERGRADUATE STUDY

Students may elect to earn a B.A. in the department with a specialization in either English or American Literature. The General requirement for both degrees is 30 semester hours subsequent to English 120, 125, or 126. All majors (including Secondary Education majors in English) must take the comprehensive examination (Engl. 599) in the second semester of their junior year. For the B.A. in English literature, the following courses are required: English Survey I and II, American Survey I or II, one Shakespeare course, from six to twelve hours of English literature electives, from six to nine hours of American Literature electives and up to six hours of other departmental electives. For the B.A. in American literature, the following courses are required: American Survey I and II, English Survey I or II, one Shakespeare course, from six to twelve hours of American literature electives, from six to twelve hours of English Literature electives and up to six hours of other departmental electives. At

least nine hours in either option must be in courses numbered 600 or above.

Students preparing to teach English in high school may adopt either of two programs: (1) the regular major as above, leading to the B.A. degree, or (2) the major in Secondary Education, leading to the B. S. degree. Either degree may allow teaching certification. Regular majors desiring certification should consult their advisers in the English Department; under the second option, the following courses are required: three of the Survey courses (Engl. 380, 381, 385 and 386.); one Shakespeare course; Advanced Composition (Engl. 406); Modern English Grammar (Engl. 451); Literature for Adolescents (Engl. 475); and nine hours of electives, six of which must be in courses numbered 600 or above. The English Comprehensive (Engl. 599) also is required.

The department offers many general education courses for the non-major student. All are intended to introduce such students to the appreciation of literature. Examples are: Engl. 143, 144, 146 and 147; 230; 240; 251, 256, 270 and 275; 340; 345; 350; 370 and 375. In general it is proper to substitute in any program of study an advanced course for an elementary one, if the student so elects and the teacher consents. Only one course among Engl. 230, 240, 340 and 345 may be taken for major credit.

GRADUATE STUDY

Both the M.A. and the Ph.D. are awarded by the department. For the Ph.D., the emphasis may be on either English or American literature; for the M.A., the emphasis may be on creative writing or linguistics, in addition to the two literatures.

Candidates for graduate work should have completed an undergraduate major with at least 24 hours in English above freshman composition; otherwise, they will be asked to do additional undergraduate work to make up deficiencies. The Graduate Record Examination is required for entrance, and additional requirements of the Graduate School may be found in the appropriate section of this catalogue.

Requirements for the M.A. include a minimum of 30 semester hours of course work and research. Candidates must demonstrate competence in one foreign language, usually

French or German. A written and an oral examination are required. A report, thesis, or satisfactory presentation of acceptable papers is required, as are Engl. 790 (unless waived) and 801.

Requirements for the Ph.D. include some 60 semester hours of course work and 30 of research on the dissertation. Candidates must demonstrate competence in two foreign languages or in one foreign language plus a specified substitute for the second. They must pass a written and oral preliminary examination in both English and American literature, write an acceptable dissertation and defend it in a final oral examination.

For more detailed and current information about either the M.A. or the Ph.D., consult the Director of Graduate Studies, Department of English.

Courses in English

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 for students who have difficulty in meeting standards in English Composition I and II.

229 075. **English for Foreign Students.** (3) I, II, S. Review of English usage for students whose first language is not English; designed to improve understanding and usage. While hours will count in the grade-point average, hours are not applicable toward degree requirements. Required of all students not making a satisfactory TOEFL or ETS score. Students may also be admitted on recommendation of their advisor.

229 100. **English Composition I.** (3) I, II, S.

229 110. **English Composition IH.** (3) I, II, S.

229 111. **English Composition IS.** (3) I. Reading and composition for freshmen. Composition IH is for freshmen who score high on their entrance examination in English and who are interested in pursuing a more sophisticated and challenging program than that of I. Composition IS is open only to students in the Arts and Sciences Honors Program.

229 120. **English Composition II.** (3) I, II, S. Continues Engl. 100.

229 125. **English Composition IIH.** (3) II. Continues Engl. 110.

229 126. **English Composition IIS.** (3) II. Continues Engl. 111. Engl. 120 concentrates on critical reading and evaluation. Engl. 125 and 126 place an emphasis on literary forms and themes. Students who have taken Engl. 100 may, on the recommendation of their instructor, be admitted to Engl. 125. Otherwise, admission is on a similar basis to that for Engl. 100, 110 and 111.

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. The four courses above seek to develop a greater understanding, appreciation, and enjoyment of the humanistic resources of Western culture. The student is introduced to the great works of literature, philosophy, art, music and religion in each major period. The courses may be taken individually and in any order.

229 200. **English Composition III.** (3) I, II, S. Advanced exposition and argumentation. Pr.: Engl. 120, 125 or 126.

229 230. **Introduction to Fiction.** (3) I, II. Selected short stories, novellas and novels from world literature, with emphasis on the present. Concern for the forms of fiction and critical analysis. Pr.: Engl. 120, 125 or 126, or consent of instructor.

229 240. **Introduction to the Short Story.** (3) I, II, S. American, British and Continental stories are studies. Pr.: Engl. 120, 125 or 126.

229 251. **English Literature I.** (3) I, II, S. Major works to about 1700, selected for the general student; emphasizing Chaucer, Shakespeare and Milton. Not for English majors. Pr.: Engl. 120, 125 or 126.

229 256. **English Literature II.** (3) I, II, S. Major works since about 1700, selected for the general student. Not for English majors. Pr.: Engl. 120, 125 or 126.

229 270. **American Literature I.** (3) I, II, S. Major works selected for the general student. Not for English majors. Pr.: Engl. 120, 125 or 126.

229 275. **American Literature II.** (3) I, II, S. Major works, including the modern, selected for the general student. Not for English majors. Pr.: Engl. 120, 125 or 126.

229 340. **Introduction to Poetry.** (3) I, II; S. in alt. years. Close reading of poems and analysis of poetic genres, with emphasis on modern poetry. Pr.: Engl. 120, 125 or 126.

229 345. **Introduction to Drama.** (3) I, II. Study of drama from classical times to the present. Pr.: Engl. 120, 125 or 126.

229 350. **Introduction to Shakespeare.** (3) I, II, S. Study of representative comedies, histories and tragedies. Pr.: Engl. 120, 125 or 126.

229 360. **Modern American Novel.** (3) I, II, S. An introductory study of selected novels. Pr.: Engl. 120, 125 or 126.

229 370. **Books and Men I.** (3) I, II, S. Introduction to great world classics from present to past. Not for English majors. Pr.: Engl. 120, 125 or 126.

229 375. **Books and Men II.** (3) I, II, S. Continues Engl. 370. Not for English majors. Pr.: Engl. 120, 125 or 126.

229 380. **English Survey I.** (3) I, II, S. English literature from Anglo-Saxon times to the close of the Elizabethan period. Required of majors in English literature. Pr.: Engl. 120, 125 or 126.

229 381. **English Survey II.** (3) I, II, S. English literature from Milton to the end of the nineteenth century. Required of majors in English literature. Pr.: Engl. 120, 125 or 126.

229 385. **American Survey I.** (3) I, II, S. An introductory review of our literary history from the early accounts of colonization through the American Renaissance.

Required of majors in American literature. Pr.: Engl. 120, 125 or 126.

229 386. **American Survey II.** (3) I, II, S. An introductory review of our literary history from Whitman to the present. Required of majors in American literature. Pr.: Engl. 120, 125 or 126.

229 390. **Humanities Abroad.** (0-6) Interterm and-or S. A concentrated study tour of selected European cultural centers; credit is arranged at the rate of about 1 credit hour per week abroad. Preliminary attendance for one class study session a week in the preceding semester is required of on-campus undergraduates enrolled in the course. If credit is to be applied toward the degree, at least three hours of appropriate courses in the department are required.

229 397. **Honors Seminar in Humanities.** (1) I, II. Colloquium on the interrelationships of the humanities, 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. May not be used to satisfy the three-course requirement in Humanities. Pr.: Honors students only.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

229 406. **Advanced Composition.** (3) I, II, S. Expository writing, primarily for candidates for the teaching certificate in Secondary Education. Pr.: Engl. 120, 125 or 126.

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. A systematic study of the structure of the English language and a consideration of current theories of analysis, such as traditional, structural and transformational-generative. Primarily for candidates for the teaching certificate in Secondary Education-English or for elementary Language Arts majors. Pr.: Engl. 120, 125 or 126.

229 470. **Literature for Children.** (3) I, II, S. A survey of the field of literature for children, providing an opportunity for reading and evaluating books for children. For teachers of elementary grades and students of child guidance. Pr.: Engl. 120, 125 or 126.

229 475. **Literature for Adolescents.** (3) I, II, S. Selecting, reading and evaluating books for adolescents. For teachers in the junior and senior high school and students of guidance for adolescents. Pr.: Engl. 120, 125 or 126, and junior standing.

229 520. **English Bible.** (3) I, II, S. The Bible as literature and history; cultural and historical

backgrounds of the Old Testament. Pr.: Engl. 120, 125 or 126.

229 560. **American Folklore and Folk Literature.** (3) I, II, S. Folk tales, heroes and beliefs; ballads; the literature developed from folk beginnings. Pr.: Engl. 120, 125 or 126.

229 599. **English Comprehensive.** (0) I, II, S. Required of all majors; based both on a departmental reading list and on the scope of literature covered in the English and American Survey courses. To be taken in the second semester of the junior year.

UNDERGRADUATE AND GRADUATE CREDIT

229 620. **The Epic Tradition.** (3) II. Greek and Roman masterpieces in translation as background for the study of literature. Pr.: Junior standing.

229 625. **Medieval Narrative.** (3) II. A survey of non-Chaucerian literature, with stress on the Arthurian romances. Pr.: Engl. 120, 125 or 126.

229 630. **Chaucer.** (3) I, II, S. Pr.: Engl. 120, 125 or 126.

229 641. **Elizabethan Non-dramatic Literature.** (3) I in alternate years. An introduction to the literature of the English Renaissance. Pr.: Engl. 120, 125 or 126.

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.

229 653. **Shakespearean Drama I.** (3) I; S in alt. years. A study of Shakespearean drama from the first plays through about 1600, with an emphasis on the histories and comedies; special attention to the criticism and bibliography. Pr.: Junior standing.

229 654. **Shakespearean Drama II.** (3) II; S in alt. years. A study of Shakespearean drama from about 1601 through the last plays, with an emphasis on the mature tragedies and the romances; special attention to the criticism and bibliography. Pr.: Junior standing.

229 655. **The Folk Tale.** (3) II. Study of oral tradition in the folklore of various cultures, with literary analogues. Pr.: Engl. 560 and consent of instructor.

229 665. **Seventeenth Century Literature.** (3) II, S. A survey of the principal non-dramatic writers, apart from Milton. 1600-1660. Pr.: Junior standing.

229 671. **Milton.** (3) II, S. Pr.: Engl. 120, 125 or 126.

229 681. **Eighteenth Century I.** (3) I, S. English literature from the Restoration to the death of Swift, with emphasis on Dryden, Swift and Pope. Pr.: Engl. 120, 125 or 126.

229 686. **Eighteenth Century II.** (3) II, S. The age of Dr. Johnson and the beginnings of Romanticism. Pr.: Engl. 120, 125 or 126.

229 688. **Early American Literature.** (3) I. Literary beginnings in seventeenth-century Virginia and New England; eighteenth century prose and poetry, including the first plays and novels. Special attention to Edward Taylor, John Woolman, Jonathan Edwards, Benjamin Franklin and Philip Freneau. Pr.: Junior standing and at least one other literature course.

229 691. **English Novel I.** (3) I, S. A survey of British fiction from Defoe to the Brontës. Pr.: Engl. 120, 125 or 126.

229 696. **English Novel II.** (3) II, S. A survey of British fiction from Dickens and Thackeray to Galsworthy and Bennett. Pr.: Engl. 120, 125 or 126.

229 699. **English Seminar.** (3) I, II, S. Intensive study of the writings of a single major author, British or American. Pr.: Senior or graduate standing and consent of instructor.

229 705. **The Romantic Movement.** (3) I, S. The poetry and prose of Blake, Wordsworth, Coleridge, Byron, Shelley and Keats. Pr.: Engl. 120, 125 or 126.

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. 120, 125 or 126.

229 711. **Nineteenth Century American Poetry.** (3) II in alt. years, S. A survey beginning with Bryant, and with special attention to Poe, the Brahmins, Emerson, Whitman, Melville and Dickinson. Pr.: Engl. 385 or consent of instructor.

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 and Norris. Pr.: Junior standing or consent of instructor.

229 720. **The Victorian Era.** (3) II, S. The poetry of Arnold, Browning and Tennyson; the criticism of Arnold; additional related prose. Pr.: Junior standing.

229 725. **Nineteenth Century British Prose.** Significant prose writing of the period from Edmund Burke to Samuel Butler and Walter Pater, with an emphasis on Thomas Carlyle. 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. British fiction from Conrad and Joyce to Greene and Waugh. Pr.: Engl. 120, 125 or 126.

229 744. **Twentieth Century American Novel.** (3) I, S. American fiction from Dreiser to contemporary figures. Pr.: Engl. 120, 125 or 126.

229 745. **Twentieth Century American Short Story.** (3) II, S. The development of the form since 1900. Pr.: Engl. 120, 125 or 126.

229 750. **Twentieth Century English Poetry.** (3) I. Development of English poetry from Hardy and Yeats to the present. Pr.: Engl. 381 or consent of instructor.

229 755. **Twentieth Century American Poetry.** (3) II, S. Development of American poetry from Robinson and Frost to Eliot and the present. Pr.: Engl. 386 or consent of instructor.

229 760. **Twentieth Century English Drama.** (3) I, S. 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. May not be taken more than twice. Pr.: Engl. 430 or consent of instructor.

229 780. Literary Criticism. (3) I, S. Major points of view in modern American and British criticism, with practice in the analysis and judgment of individual literary works. Pr.: Senior standing.

229 790. History of the English Language. (3) II, S. The development of British English, with digressions. Pr.: Senior standing or consent of instructor.

229 799. Problems in English. (Variable credit) I, II, S. Studies in major authors, genres and periods of English and American literature and language. Pr.: Background of courses needed for problem undertaken.

GRADUATE CREDIT

229 801. Introduction to Secondary Sources. (0) I, S. An introduction to author and period bibliography, required in the first year of study toward the M. A. in English.

229 802. Bibliography and Methods of Research. (3) I, S. An introduction to textual, bibliographic and professional problems, required of Ph. D. candidates.

229 810. Old English. (3) I, S. The elements of Old English grammar, with readings in prose and poetry. Pr.: Consent of instructor.

229 811. Old English Poetry. (3) II, S. Pr.: Engl. 810 or consent of instructor.

229 812. Middle English Poetry. (3) I. Pr.: Engl. 790 or consent of instructor.

229 820. Selected Topics in the Study of Language. (3) On demand. Pr.: Engl. 790 or consent of instructor.

229 830. Chaucer Seminar. (3) On demand. Pr.: Engl. 630.

229 845. Studies in Sixteenth Century Literature. (3) On demand. Pr.: Consent of instructor.

229 850. Shakespeare Seminar. (3) On demand. Pr.: Engl. 651.

229 855. Studies in Seventeenth Century Literature. (3) On demand. Pr.: Consent of instructor.

229 870. Milton Seminar. (3) On demand. Pr.: Engl. 671 or consent of instructor.

229 875. Studies in Eighteenth Century Literature: British. (3) On demand. Pr.: Consent of instructor.

229 876. Studies in Eighteenth Century Literature: American. (3) On demand. Pr.: Consent of instructor.

229 885. Studies in Nineteenth Century Literature: British. (3) On demand. Pr.: Consent of instructor.

229 886. Studies in Nineteenth Century Literature: American. (3) On demand. Pr.: Consent of instructor.

229 895. Studies in Twentieth Century Literature: British. (3) On demand. Pr.: Consent of instructor.

229 896. Studies in Twentieth Century Literature: American. (3) On demand. Pr.: Consent of instructor.

229 899. Master's Report. (2) I, II, S.

229 920. Topics in Poetry. (3) On demand. Intensive study of a poet or group of poets, either British or American. Pr.: Consent of instructor.

229 930. Topics in Drama. (3) On demand. Intensive study of a dramatist or group of dramatists, either British or American. Pr.: Consent of instructor.

229 940. Topics in Fiction. (3) On demand. Intensive study of a novelist or group of novelists, either British or American. Pr.: Consent of instructor.

229 999. Research in English. (Variable credit) I, II, S. Pr.: Sufficient training to carry on the research undertaken.

Courses in Linguistics Offered Jointly With the Department of Speech

UNDERGRADUATE AND GRADUATE CREDIT

229 652. Introduction to Linguistics. (3) I, II, S. Same as Speech 652.

229 664. Topics in Applied Linguistics. (3) II. Same as Speech 664.

229 669. Language Typology. (3) Same as Speech 669.

229 672. Transformational Grammar. (3) Same as Speech 672.

229 673. Introduction to Historical Linguistics. (3). Same as Speech 673.

229 674. Methods and Techniques of Learning a Second Language. (3). Same as Speech 674.

229 676. Phonetics and Phonemics of English. (3). Same as Speech 676.

229 677. Morphology and Syntax of English. (3). Same as Speech 677.

Geography

W. R. SIDDALL,* Head of Department

Professor Stacey;* Associate Professors Kromm,* Siddall,* and Stover;* Assistant Professors Bussing, Self,* and Seyler; 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.

Geographers may also pursue a more abstract inquiry into the major problems of human society by examining spatial distributions and relationships. In this more rigorously scientific approach full use is made of various techniques of quantitative and cartographic analysis of spatial phenomena, computer mapping, and remote

sensing, with the expectation of acquiring greater insight into many old problems by this more spatially-oriented approach.

A typical and traditional problem in geography concerns man's impact on the land. Deterioration of environmental quality is best understood by the geographer's characteristically broad approach. Air pollution, contamination of waterways, decaying urban landscapes, and the like, can only be well understood by examining the interrelations of numerous factors such as technology, population density, legal structure, affluence, and cultural traditions.

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 STUDY

Requirements for a major in geography under the curriculum leading to the Bachelor of Arts degree (see page 82) consist of a minimum of 28 hours in geography. Included in this total must be Geog. 150, 151, 250, 260, 350, and 550, plus a minimum of 8 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 83).

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 STUDY

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, and courses offered under the auspices of the South Asia Center, may be made an integral part of the student's program. All candidates for the Master of

Arts degree are required to take Geography 770 (except Option B students), 800, 810, and 900.

The student may choose, in consultation with his adviser, one of three programs leading to the M.A. degree. Option A requires 30 hours of graduate credit including six hours of credit for a thesis. Of the 24 hours of credit required in course work, not less than 15 hours must be in geography. Option B is for students who intend to pursue or continue a career in public school or junior college teaching. It is open only to persons who are already certified to teach at the public school or junior college level in any state, or to those who will make courses required for such certification an integral part of their program. Thirty hours of graduate level course work is required including two credits of Geography 970 which shall consist of the design of a teaching syllabus in some sub-field of geography. At least 18 credit hours must be in geography. This option is not suitable for any student who may ultimately continue for the doctorate. Option C is a non-thesis program designed for students who have a specific professional goal in mind other than teaching at any level, and who do not intend to continue for a Ph.D. The student may choose from several approved course-groupings. Thirty hours of graduate level work are required of which at least nine and no more than twelve hours must be outside the Geography Department.

The Geography Department 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

UNDERGRADUATE CREDIT

235 110. **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.

235 130. **Geography of Kansas.** (2) I, II. 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, S. 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.

235 250. Geography of 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.

235 260. Geography of Manufacturing and Commerce. (3) I, II. An inquiry into the location of the more important manufacturing industries and the patterns of commercial interchange together with an examination of these distributions in terms of current concepts of industrial location and spatial interaction.

235 350. Cartography. (3) II. Theory, interpretation, and design and drafting of maps, with emphasis on presenting quantitative data.

235 390. Experimental Studies in Geography. (1-6). Experimental and interdisciplinary studies in geography. Topics selected in consultation with instructor. Pr.: Permission of instructor.

235 399. Honors Seminar in Geography. (1) Selected topics. Open to non-majors in the Honors Program.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

235 405. Introduction to the Civilization 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, religions, culture, languages, literature, geography, social and political structure, ideas. (Same as Hist. 406, P. Sci. 406, Soc. 406, Anthro. 406.)

235 550. Pro-Seminar in Geography. (2-3) II. A survey of geography as a profession—its philosophy and its methodology. Graduation requirement for all undergraduate majors in geography. Not open to graduate students. Pr.: Four courses in geography or consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT

235 600. Geography of Anglo-America. (3) A regional analysis of the United States and Canada, giving special attention to the historical, political, and economic factors which contribute to a real differentiation within the area. Pr.: Three hours of geography or junior standing.

235 610. 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.

235 620. 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.

235 640. Geography of Western Europe. (3) The nations and regions of Europe west of the U.S.S.R.; the people and their economics; trends of development as affected by changing political and economic factors. Pr.: Six hours of geography or junior standing.

235 650. 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.

235 660. 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.

235 670. 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.

235 690. Seminar in Regional Geography. (1-3) Pr.: Consent of instructor.

235 700. 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.

235 710. Geography of World Agriculture. (3) Distribution, variations, and significance of the major types of agriculture. Pr.: Junior standing or consent of instructor.

235 720. 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.

235 740. Geography of Transportation. (3) 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.

235 750. Man's Impact on the Environment. (3). The social, economic, and political implications of the impact of human activity on the natural environment. Includes field research in environmental management problem-solving. Pr.: Six hours of geography or junior standing.

235 760. Resources 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.

235 770. **Quantitative Analysis in Geography.** (3) II. Quantitative methods employed in modern geographical research. Applications of both statistical and mathematical approaches will be treated. Emphasis will be placed on interpretation and evaluation of techniques employed in spatial analysis. Pr.: Statistics 520, or consent of instructor.

235 780. **Seminar in Cultural-Economic Geography.** (1-3) Pr.: Consent of instructor.

235 790. **Problems in Geography.** Credit arranged. I, II, S. Pr.: Nine hours of geography and consent of instructor.

GRADUATE CREDIT

235 800. **Graduate Colloquium.** (2) I. The nature, aims, methods, and evaluation of geographical research. Required of all graduate students majoring in geography.

235 810. **Seminar in Current Geographical Research.** (0). Department-wide seminar required of all graduate students.

235 820. **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.

235 860. **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) 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.

235 970. **Master's Report.** (2) I, II, S. For students enrolled in Geography Option B. Pr.: Registration in Graduate School, with sufficient training to carry on the line of research undertaken.

235 980. **Master's Thesis.** (6) I, II, S. For students enrolled in Geography Option A. Pr.: Registration in Graduate School, with sufficient training to carry on the line of research undertaken.

Geology

PAGE C. TWISS,* Head of Department

Professors Beck,* Chelikowsky,* Shenkel,* and Twiss;* Associate Professors Chaudhuri,* and Walters;* Assistant Professors Cullers, Riseman* and West;* Instructor Clark; Emeritus: Professor Sperry.*

Traditionally defined as the study of the Earth's composition, behavior, and history, geology now includes the study of the members of the solar system. As a science, it is both practical and highly theoretical. "What type of foundation is necessary to support a 14-story building in Atlantic City?,"

"Where can Kansas City find unpolluted water for an increasing population?," "What are the world's reserves in oil and natural gas and where can more be found?," "How are mountains formed?," "Is the ocean floor spreading?," and "Can Mars support life?" are some of the questions geologists try to answer.

The Earth and other members of the solar system are dynamic physical systems composed of atoms interacting under extreme conditions of temperature and pressure. Consequently, geology relies heavily on other sciences—mathematics, physics, chemistry, biology, and astronomy. In the solar system, the Earth seemingly has been the only known habitat of life for at least the last billion years.

Geologists operate in two laboratories: the Earth itself (field laboratory) and the standard chemical, physical, or biologic laboratory. However, geologists cannot control the variables affecting the natural process operating in the field, as a chemist can control the variables experimentally in a laboratory. Geologists are the observers of processes in operation or already concluded and often must deduce conclusions from incomplete data or by analogy with events that may be reproduced in part in a laboratory.

UNDERGRADUATE STUDY

Geology offers optional programs of study in Geology, Geochemistry, Geophysics, cooperates with the College of Education in an Earth Science program for high school teachers, and cooperates with the Department of Civil Engineering in a dual degree in Civil Engineering and Geology. For detailed plans of study, consult the head of the department.

Geology Option

In addition to the requirements for a geology major in the B.A. or B.S. degree program (p. 82-83), the following must be completed: Geol. 100, 420, 430, 460, 461, 470, 480, 481, 530, 603, 607, and 640; Math. 220 and 221; Phys. 211 and 212; Chem. 210, 230, and 250; Biol. 198.

Geochemistry Option

In addition to the requirements on p. 82, the following must be completed: Geol. 100, 430, 460, 461, 470, 480, 530, 603, 608, 609, 612,

614, and 640; Math. 220, 221, 222, and 240; Phys. 211 and 212; Chem. 210, 230, 250, 271, 585, and 586; Biol. 198.

Geophysics Option

In addition to the requirements on p. 82-83, the following must be completed: Geol. 100, 430, 460, 461, 470, 530, 603, and 640; Math. 220, 221, 222 and 240; Phys. 310, 311, 400, 421, and 473; Chem. 210, 230, and 250; Biol. 198.

Earth Science Options for High School Teachers

In addition to the requirements for a geology major in the B. A. or B. S. degree program (p. 82-83), the Teacher Certification requirements (p. 188) and the following must be completed: Geol. 100, 420, 430, and 460; Geog. 150; Math. 100 and 150; Chem. 210, 230, and 250; Biol. 205 and 210; Phys. 131, 135, 211, and 212.

Dual Degrees in Civil Engineering and Geology

Students interested in a career in foundation engineering and construction must complete the B. S. degree requirements in Civil Engineering and complete the requirements for a B. A. or B. S. degree program (p. 82-83) and the following: Geol. 420, 430, 460, 461, 530, 603, and 640.

GRADUATE STUDY

The prerequisite to graduate work for the M. S. degree in Geology and Geochemistry and the Ph. D. degree in Geochemistry is the completion of a four-year undergraduate program including suitable preparatory work in geology, chemistry, physics, mathematics, and the biological sciences.

Research facilities include a six-inch, 60-degree solid source mass spectrometer, hydrothermal equipment, emission spectrograph, x-ray diffractometer and spectrograph, a fully equipped geochemistry laboratory for isotopic work, complete petrographic, paleobiological and general geology laboratories. Geophysical facilities include seismic and magnetic exploration equipment.

The University area contains excellent outcrops and is unusually well situated for field work involving studies in sedimentary petrology, geochemistry, stratigraphy,

groundwater geology, soil mineralogy, petroleum geology, plains-type structures, invertebrate paleobiology, and paleoecology.

Courses in Geology

UNDERGRADUATE CREDIT

234 100. **Physical Geology.** (4) I, II, S. The Earth's structural and dynamic features; the most common minerals and rocks; processes affecting the Earth; field trips. Three hours rec. and two hours lab. a week.

234 310. **Topics in Geology.** (1) I, II. Seminar discussions of subjects of current interest in geology. Pr.: Geol. 100.

234 399. **Honors Seminar in Geology.** (1-3) I or II. Selected topics. Open to nonmajors in the Honors Program.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

234 406. **Earth Science Institute.** (8) S. A study of the integrated physical sciences encompassing the Earth's crust; patterns on the Earth's surface and in the Earth's atmosphere; includes the description and interaction of the atmosphere, weather, climate, composition, and processes of the Earth. Five hours lec., five hours rec. and 6 hours lab. a week and a five-day field trip into the Rocky Mountains. Pr.: Geol. 100 or Geog. 150.

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. 150 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 I.** (4) I. Fundamentals of crystallography and crystal chemistry; physical properties of crystals; descriptive mineralogy of non-silicates. Three hours lec. and three hours lab. a week. Pr.: Geol. 100 and Chem. 230.

234 461. **Mineralogy II.** (4) II. Descriptive mineralogy of the silicates; fundamental geochemistry; microscopic identification of minerals and rocks. Three hours lec. and three hours lab. a week. Pr.: Geol. 460.

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. **Paleobiology I.** (3) I. Concepts and problems of paleobiology; systematic approach to lower invertebrate phyla and marine calcareous algae with emphasis on fossil forms. Two hours rec. and three hours lab. a week.

Pr.: Geol. 430 or Biol. 198 or 201 or 205 or consent of instructor.

234 481. **Paleobiology II.** (3) II. Continuation of Paleobiology I dealing with higher invertebrate phyla with fossil records. Two hours rec. and three hours lab. a week. Pr.: Geol. 480.

234 530. **Structural Geology.** (4) I or II. Mechanics of the Earth's crust; interrelation of structures in the earth. Three hours rec. and three hours lab. a week. Pr.: Geol. 470.

UNDERGRADUATE AND GRADUATE CREDIT

234 601. **Geologic Reports and Illustrations.** (2) I or 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 nonmetallic minerals, including coal and petroleum, and of metallic mineral deposits. Two hours rec. and three hours lab. a week. Pr.: Geol. 430, 461.

234 603. **Stratigraphic Geology.** (4) I or 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.

234 604. **Paleoecology.** (3) I or II. Application of biological, physical, and chemical factors in modern marine environments to the quantitative study of the structure and dynamics of fossil populations and communities. Two hours rec. and three hours lab. a week. Pr.: Geol. 480 or consent of instructor.

234 607. **Introductory Geochemistry.** (3) I. Chemical principles involved in the understanding of geologic processes. Two hours rec. and three hours lab. a week. Pr.: Geology 461, or consent of instructor for non-majors.

234 608. **Optical Mineralogy and Petrology I.** (3) I. Optical properties and identification of common rock-forming minerals as crushed fragments and in thin sections; introduction to igneous petrology. Pr.: Geology 461.

234 609. **Optical Mineralogy and Petrology II.** (3) II. A continuation of introductory igneous and metamorphic petrology. Petrography of igneous, sedimentary and metamorphic rocks in thin section. Two hours lec. and three hours lab. a week. Pr.: Geol. 608.

234 610. **Applied Geology.** (3) I or 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. 609 or consent of instructor.

234 614. **Geochemistry II.** (3) I or II. Thermodynamics of high temperature and pressure phase equilibrium applied to igneous and metamorphic rocks and ore deposits. Three hours rec. a week. Pr.: Geol. 612 or equiv.

234 620. **Hydrogeology.** (3) I or II. Origin, geologic occurrence, and migration of subsurface water; laws

governing ground water flow and yield of aquifers. Three hours rec. a week. Pr.: Geol. 420, 530, or 603, or consent of instructor.

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. 481 and junior standing.

234 670. **Subsurface Methods.** (3) I, II. Study of well cutting, 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, 461 or consent of instructor.

234 680. **Vertebrate Paleontology.** (3) I or II. Evolution, geologic history, and classification of the vertebrate. Pr.: Geol. 430 or 8 hours of biology.

234 720. **Quaternary Geology.** (2) I or II. Quaternary stratigraphy and its development in North America; correlation of European and North American Quaternary rocks and sediments. Two hours rec. a week and one field trip a semester. Pr.: Geol. 603.

234 740. **Regional Geology.** (3) I or II. Structure and stratigraphy of the major tectonic units of North America. Pr.: Geol. 530, 603.

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.

234 790. **Problems in Geology.** Credit arranged. I, II, S. Work is offered in mineralogy, paleobiology, paleoecology, stratigraphy, structural geology, sedimentary petrology, and geochemistry. Pr.: Background of courses needed for problem undertaken.

GRADUATE CREDIT

234 800. **Graduate Seminar in Geology.** Variable credit. I, II. Topics in geology, geochemistry and geophysics.

234 801. **Advanced Paleobiology.** (1-4) I or II. Detailed study of the functional morphology, ecology, biogeography, evolution, and classification of selected groups. Pr.: Geol. 480, Biol. 630 or consent of instructor.

234 802. **Advanced Hydrogeology.** (3) II, alternate years. Computer applications to ground-water flow; system analysis of surface and subsurface water in the ecosystem. Three hours rec. a week. Pr.: Geol. 620 or consent of instructor for non-majors.

234 804. **Igneous Petrology.** (3) I. Selected problems in the petrogenesis of igneous rocks. Two hours lec. and three hours lab. a week. Pr.: Geol. 608.

234 805. **Metamorphic Petrology.** (3) II. Selected problems in the petrogenesis of metamorphic rocks. Two hours lec. and three hours lab. a week. Pr.: Geol. 609.

234 807. **Sedimentary Petrology II.** (3) II. Petrography, classification, and origin of limestones, dolostones, and other chemical sedimentary rocks. Two hours rec. and three hours lab. a week. Pr.: Geol. 609.

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.: Geol. 609 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.

234 840. **Planetology.** (3) II. Geologic principles applied to a study of the solar system. Pr.: Geol. 530, 614 or consent of instructor.

234 870. **Structural Mineralogy.** (3) I. Principles governing the formation and stability of different crystals; investigation of structures of various mineral groups; calculation of lattice energy of different minerals; stability relations of polymorphic substances and their petrologic significances. Three hours rec. a week. Pr.: Consent of instructor.

234 920. **Clay Mineralogy.** (3) II. Geologic occurrences, 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, paleobiology, paleoecology, stratigraphy, structural geology, igneous, metamorphic and sedimentary petrology, geochemistry and isotope geology. Pr.: Registration in the Graduate School, with sufficient training to undertake research in specific area.

History

JOSEPH J. MALONE, Head

Professors Carey,* Higham,* Malone,* Sageser,* Socolfsky,* and Wilcoxon;* Associate Professors Crawford,* Eastwood,* Jones,* Kren,* Linder,* Mulhollan,* Page;* Assistant Professors Donovan,* Ferguson,* Gray, Hagan,* Hawes,* and Kipp;* Emeritus: Professors Parrish,* and Sweedlun,* Associate Professors Alsop* and Riggs.*

UNDERGRADUATE STUDY

Requirements for a major in history consist of a minimum of 30 hours in history, including Hist. 101 and 102 (or Hist. 103 and 104, or Hist. 105 and 106, or Hist. 121 and 122), a minimum of 15 hours in courses numbered 400 and above, Hist. 397 in the junior year, and Hist. 398 in the senior year. 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 STUDY

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 degree must take a course in historiography and demonstrate reading proficiency in an approved foreign language. If they write a thesis or report they must offer two seminars and pass a written or oral final examination. If they take the non-thesis, non-report degree, they must offer three seminars and pass a written final examination. A language is not required for a terminal M.A. degree.

For the Doctor of Philosophy degree, candidates must present a general field in European or American history, two special fields in history, and an 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.

The Department co-operates with a number of other Departments in the South Asia Program, which is described in detail on page 164. It also publishes **Military Affairs**, the journal of military, naval and air history, theory, and technology.

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

Pr.: Geol. 430 or Biol. 198 or 201 or 205 or consent of instructor.

234 481. **Paleobiology II.** (3) II. Continuation of Paleobiology I dealing with higher invertebrate phyla with fossil records. Two hours rec. and three hours lab. a week. Pr.: Geol. 480.

234 530. **Structural Geology.** (4) I or II. Mechanics of the Earth's crust; interrelation of structures in the earth. Three hours rec. and three hours lab. a week. Pr.: Geol. 470.

UNDERGRADUATE AND GRADUATE CREDIT

234 601. **Geologic Reports and Illustrations.** (2) I or 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 nonmetallic minerals, including coal and petroleum, and of metallic mineral deposits. Two hours rec. and three hours lab. a week. Pr.: Geol. 430, 461.

234 603. **Stratigraphic Geology.** (4) I or 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.

234 604. **Paleoecology.** (3) I or II. Application of biological, physical, and chemical factors in modern marine environments to the quantitative study of the structure and dynamics of fossil populations and communities. Two hours rec. and three hours lab. a week. Pr.: Geol. 480 or consent of instructor.

234 607. **Introductory Geochemistry.** (3) I. Chemical principles involved in the understanding of geologic processes. Two hours rec. and three hours lab. a week. Pr.: Geology 461, or consent of instructor for non-majors.

234 608. **Optical Mineralogy and Petrology I.** (3) I. Optical properties and identification of common rock-forming minerals as crushed fragments and in thin sections; introduction to igneous petrology. Pr.: Geology 461.

234 609. **Optical Mineralogy and Petrology II.** (3) II. A continuation of introductory igneous and metamorphic petrology. Petrography of igneous, sedimentary and metamorphic rocks in thin section. Two hours lec. and three hours lab. a week. Pr.: Geol. 608.

234 610. **Applied Geology.** (3) I or 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. 609 or consent of instructor.

234 614. **Geochemistry II.** (3) I or II. Thermodynamics of high temperature and pressure phase equilibrium applied to igneous and metamorphic rocks and ore deposits. Three hours rec. a week. Pr.: Geol. 612 or equiv.

234 620. **Hydrogeology.** (3) I or II. Origin, geologic occurrence, and migration of subsurface water; laws

governing ground water flow and yield of aquifers. Three hours rec. a week. Pr.: Geol. 420, 530, or 603, or consent of instructor.

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. 481 and junior standing.

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234 990. Research in Geology. Credit arranged. I, II, S. Work is offered in mineralogy, paleobiology, paleoecology, stratigraphy, structural geology, igneous, metamorphic and sedimentary petrology, geochemistry and isotope geology. Pr.: Registration in the Graduate School, with sufficient training to undertake research in specific area.

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foreign policy; the Linda Hall Library, emphasizing materials pertaining to the history of science; the library of the United States Army Command and General Staff College at Fort Leavenworth; and the regional Federal Records Center at Kansas City, presently rich in military and civil records and eventually to have a microfilm duplication of the main holdings of the National Archives in Washington.

Courses in History

UNDERGRADUATE CREDIT

241 101. **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.

241 102. **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.

241 103. **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.

241 104. **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.

241 105. **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.

241 121. **Science and Civilization in the Western World I.** (3) I, II, S. The impact of science on the course of Western Civilization. From early times to the 17th century.

241 122. **Science and Civilization in the Western World II.** (3) I, II, S. From the 17th century to modern times.

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 1603.** (3) I. A survey of English history from Teutonic Britain to the death of Elizabeth I. Pr.: Not open to juniors and seniors except with consent of instructor.

241 222. **History of England from 1603.** (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.

241 397. **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.

241 398. **Senior Seminar.** (3). Advanced research. Required of all seniors majoring in History.

241 399. **Honors Seminar in History.** Variable credit. I, II.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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, language 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.

UNDERGRADUATE AND GRADUATE CREDIT

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 Religion and Politics. (3) I, II. A study of European religion and politics during the Middle Ages and their interrelationship, with special emphasis on men and ideas. Not open to freshmen.

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. Pr.: Junior or senior standing.

241 621. The Continental Reformation. (3) I. Lutheranism, Calvinism, the wars of religion and their impact on the political, economic, social and intellectual history of the Western World. Pr.: Junior or senior standing.

241 622. The Radical and Catholic Reformations. (3) II. A study of the Radical and Catholic Reformations with special attention to their impact on Western political, economic and social thought. 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, 1815-1914. (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. Nineteenth Century European Thought. (3) I, II. Intellectual history of nineteenth century Europe 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.

241 642. European and American Political and Social Movement. (3) I, II. Selected revolutionary, reform, or conservative movements since the 1600's. The course transcends geographic and chronological boundaries in search of unifying themes. Pr.: Hist. 101-102, Hist. 251-252, 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.

241 646. English Medieval Culture. (3) I. A detailed study of some representative institutions English Medieval life. Pr.: Junior or senior standing.

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. The course treats topically the political, diplomatic and military, economic, social, ideological and imperial currents of the period since 1900 and examines the causes for the decline of British greatness.

241 653. Modern British Culture. (3) II. Cultural History of Modern Britain. Pr.: Junior or senior standing.

241 655. Modern France. (3) II in alt. years and S. Pr.: Junior or senior standing, or consent of instructor.

241 659. Germany 1648-1789. (3) I. Development of Central Europe from the Peace of Westphalia to the outbreak of the French Revolution. Pr.: Junior or senior standing or consent of instructor.

241 660. Modern Germany to 1914. (3) I, II. Major developments in Central European history in the nineteenth century. Pr.: Junior or senior standing, or consent of instructor.

241 661. Modern Germany, 1914-1945. (3) I, II. Central European history in the twentieth century; major emphasis on the failure of German democracy and on an analysis of the national socialism. Pr.: Junior or senior standing, or consent of instructor.

241 666. Eastern Europe. (3) II. The evolution of East European societies, including the Balkans, from the Congress of Vienna to the present. Pr.: Junior or senior standing, or consent of the instructor.

241 667. History of Russia from the Beginnings to 1689. (3) I, II, and alt. S. Rise and fall of Kievan Russia, the Mongol occupation, the ascendancy of Moscow. Pr.: Junior or senior standing, or consent of instructor.

241 668. Eighteenth and Nineteenth Century Russia. (3) I, II, and alt. S. Development of the Russian Empire. Political, social, economic, and intellectual developments in Russian and the conduct of foreign policy from Peter the Great to the 1905 revolution. Pr.: Junior or senior standing, or consent of instructor.

241 671. The Russian Revolutions and the Soviet System. (3) I, II, and alt. S. The revolutions of 1905 and 1917 and the subsequent development of the Soviet system. Pr.: Junior or senior standing, or consent of instructor.

241 674. **Topics in Modern Russian History.** (3) I, II. Selected topics in the political, social, or intellectual development of Russia since the Eighteenth century. Pr.: Junior or senior standing 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 or resurgence of Chinese power. Pr.: Junior or senior standing.

241 680. **South Asia I.** (3) I, II. The traditions and civilizations 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) 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) The development of scientific thought from about 1700 to the recent past. Pr.: Junior or senior standing, or consent of instructor.

241 707. **The Scientific Revolution.** (3) I, II, S. Rise of a new world view in the 16th and 17th centuries. Pr.: Junior or senior standing.

241 708. **Science and Thought in the Eighteenth Century.** (3) 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). Scientific development in the nineteenth century. Pr.: Junior or senior standing.

241 715. **History of Biological Thought.** (3) I, II, S. Major trends in the development of biological thought. Emphasis on such topics as theories of generation, evolution theory, and genetics. Pr.: Junior or senior standing.

241 719. **Science in America.** (3) I, II, and alt. S. Survey of American science from the old 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.

241 733. **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. **Black American History.** (3) The role of slavery, Jim Crow, twentieth century reform movements and the relationship of the Negro to the totality of American culture. Pr.: Junior or senior standing or consent of instructor.

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.

241 752. **History of American Diplomacy, 1763-1900.** (3) I. The evolution of American foreign policy with emphasis on colonial origins and economic factors, prior to 1898. Pr.: Junior or senior standing or consent of instructor.

241 753. **History of American Diplomacy since 1900.** (3) I. A reluctant United States becomes the arbiter of the world's destinies. Emphasis is placed on the revolution from the isolationist instincts of the early 1900's to the internationalist policies of the post-World War II period. Pr.: Junior or senior standing, or consent of instructor.

241 756. **War in the Twentieth Century.** (3) I. World War I, World War II, the Korean War, and the Indochina War, with special emphasis on the American involvement.

241 761. **Technology and War to 1900.** (3) I. The approach is chronological with the emphasis upon the interrelationship of technology, military affairs, and the general pattern of societal and national developments.

241 762. **Technology and War 1900 to the present.** The approach is topical, a variety of problems are examined in order to provide a background for understanding present and future developments through the application of historical knowledge where weapons technology is concerned.

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.

241 766. History of American Military Affairs. (3) I. From the colonial period to the present. Emphasis on the evolution of military institutions, doctrines, and policies in peace and war, and their relationships with political, economic, and social factors. Pr.: Junior or senior standing or consent of instructor.

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. Populism and the Progressive Movement. (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.

241 781. Frontier America. (3) I, S. Environmental factors, peoples, settlements, and institutions of the frontier. 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.

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.

241 808. Quantification in History and Political Science. (3) I, II. A course for graduate students in the methodology of research using computer techniques. Stress is placed on acquiring bibliographical expertise as well as familiarity with computer technology.

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. Seminar in the History of Science. (3) I or II. 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.

Journalism and Mass Communications

EVERETTE E. DENNIS, JR*, Acting Head

Professor Howe*, Associate Professors Bontrager* and Macy; Assistant Professors Applegate, Brown, Dennis*, Eaton, Morris* Oukrop*, and Rush.*

The Department of Journalism and Mass Communications is one of 60 schools and departments in the United States accredited by the American Council on Education for Journalism and is a member of the American Association of Schools and Departments of Journalism.

UNDERGRADUATE STUDY

Students in journalism and mass communication develop individualized programs within the framework of a broad, liberal arts education. Only one-quarter (30 semester hours) of a student's total course work is taken in the department. The remainder is in the humanities, social sciences and sciences.

Courses in the department are in two areas: (1) those which focus on the relationship of mass communication to society; and (2) those designed for professional training and skill development. Interest areas for journalism majors include broadcasting (programming and production), news-editorial journalism, public relations and others. Specialized curricula at the undergraduate level include agricultural and home economics journalism.

Students in a print journalism sequence have three required courses, Reporting I, Reporting II and Editing I, with all additional work in journalism electives. Students in the broadcasting curriculum have five required courses, Reporting I, Radio-TV Speech Procedures, Radio-TV Continuity Writing, Introduction to Television and Radio-TV News. The remaining electives are taken in

radio-television and journalism. Enrollment guides for journalism majors are available in the department office.

GRADUATE STUDY

Advanced students in mass communication at Kansas State University may work toward a master of science in journalism or a master of arts in radio and television.

The programs of study are planned to provide specialized professional work and a mastery of theoretical concepts in the fields of journalism, radio, television and general communications. Programs are structured upon a series of professional media-oriented courses along with studies in research methods and in communication theory and process.

Individualized programs are designed to meet the student's needs and goals. The programs are focused more on the strategic application of communication knowledge and technology than on technical competence in media operation per se. Each student is assigned a graduate academic adviser, appropriate to the student's area of emphasis.

Prerequisite to advanced work in the department is the completion of a four-year college curriculum. Students not having an undergraduate degree from a department accredited by the American Council on Education for Journalism or from a department which is a member of the Association for Professional Broadcasters in Education may be held for as many as 12 semester hours of course work at the undergraduate level. Decisions regarding the number of hours are made on an individual basis with professional experience and other relevant circumstances considered.

There are two options in completing work for a master's degree, 30 semester hours including a six-hour thesis or 36 semester hours and a written comprehensive examination. Additional details on the graduate program are included in the department's "Guide to Graduate Study," available in the department office.

The department also offers a specialized master's program in behavioral science writing, supported by a Federal grant. The Mental Health Mass Communications Program is fully described in literature also available in the department office.

Courses in Journalism

UNDERGRADUATE CREDIT

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. Not open to upper-classmen journalism majors.

289 300. Editing I. (3) I, II, S. Survey of graphic arts principles; fundamentals of the editing process; relationship of the graphic arts principles to the elements of newspaper design and the total editing function. Pr.: consent of instructor or Journ. 306.

289 306. Reporting I. (3) I, II. Instruction in news gathering and reporting techniques. Pr.: Sophomore standing; ability to type 30 words a minute.

289 316. Reporting II. (3) I, II. Three hours rec. and six hours reporting for the Kansas State Collegian each week. Pr.: Journ. 306.

289 320. Principles of Advertising. (3) I, II. An examination of the advertising field and its relationship to marketing and journalism.

289 331. Editing II. (3) I, II. Advanced study of the editing processes with emphasis on handling the story, writing headlines, use of all elements for packaging the news, and creative use of the editing tools. Two hours of recitation and six hours editing for the Kansas State Collegian each week. Pr.: Consent of instructor.

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. (3) I, II. Study and actual application of the principles of selling advertising, emphasis on the print media. Pr.: Consent of instructor.

289 358. Publications Practice. (1-4) I, II, S. Practical work in newspaper and yearbook production, and photography on student publications under supervision of an instructor. Three hours lab. a week for each hour of credit. Pr.: Consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

289 400. Radio and Television News. (3) II. Processing and broadcasting of radio news. Pr.: Journ. 306.

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.

289 425. The Family Page. (3) I, II. Study of contemporary trends in community and family life reporting, emphasizing feature writing and creative editing. Pr.: Journ. 330 or consent of instructor.

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.

289 455. Advertising Copy and Layout. (3) I, II. The creating, designing and writing of advertising copy for

the print media stressing the production of a workable advertising campaign. Pr.: Journ. 320.

UNDERGRADUATE AND GRADUATE CREDIT

289 600. Public Affairs Reporting. (2) II. Investigative reporting of local, state and national affairs. Pr.: Journ. 316 or consent of instructor.

289 605. The Black Press in America. (3) I. Consideration of the growth, development and current status of the black press in the United States. Junior standing or consent of instructor.

289 606. History of Journalism. (3) II. Pr.: Junior standing and Hist. 165, 170 or consent of instructor.

289 615. Magazine Article Writing. (3) II. Preparation of feature stories and articles; techniques of marketing, market analysis and publishing articles written in course. Pr.: Journ. 610 or 620 or consent of instructor.

289 617. Magazine Production. (3) I. The practical application of theory on 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. Critical questions of the day; interpretive articles and editorials which document and analyze the news; introduction to research methods in depth reporting.

289 626. Formation of Public Opinion. (3) I. Role of interpersonal and mass communication information of public opinion. Practical survey experience. Pr.: Junior standing and consent of instructor.

289 635. Public Relations. (3) I. Media, methods, principles, and practices of public relations. Pr.: Junior standing or consent of instructor.

289 640. Law of Mass Communications. (3) II. A study of the legal system as it relates to the law of mass communications. Emphasis on libel, copyright law, obscenity, administrative law as related to broadcasting and other areas. Pr.: Senior standing or consent of instructor.

289 650. International Communication. (3) Comparative study of world press systems and the role of communication in national development.

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. 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.

289 670. Communication Theory. (3) An examination of major communication theories as they relate to individual, interpersonal, group and mass communication.

289 671. Mental Health Information Seminar I. (3) I. Survey of public attitudes toward mental illness and mass media's role in reporting.

289 672. Mental Health Information Seminar II. (3) Examines specific issues in the mental health field

(alcoholism, drug abuse, mental retardation, etc.) as they relate to the journalist in mental health communication.

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) I. Reporting and writing on problems of human behavior. For Fellows in Mental Health Mass Communications Program or consent of instructor.

289 680. Public Information Methods. (2) I. Advanced media, methods, principles, and practices of public relations. Pr.: Journ. 635 or consent of instructor.

289 720. Research Methods in Journalism. (3) I, II, S. Survey of research methods used in the study of the mass media.

289 765. Seminar in the New Journalism. (3) I. An examination of contemporary developments in reportage with emphasis on new journalism practitioners and media outlets. Restricted to seniors and graduate students.

289 775. Seminar in the Future of the Media. (3) II. A study of philosophical and technological advances in mass communication with emphasis on projected patterns of future growth and development. Restricted to seniors and graduate students.

289 798. Colloquium in Mass Communication. (1-3) I, II. Discussion of selected topics in mass communication research and practice. Restricted to seniors and graduate students.

289 799. Problems in Journalism and Mass Communications. (1-4) I, II, S. Pr.: Background of courses needed for problem undertaken.

GRADUATE CREDIT

289 999. Research in Journalism and Mass Communications. Credit arranged, I, II, S. Pr.: Registration in the Graduate School and sufficient training to carry on the line of research undertaken.

Courses in Radio and Television

UNDERGRADUATE CREDIT

290 132. KSDB-FM Participation. (1) Supervised performance in the operation of all regulation broadcast department of the University's student FM radio station. Pr.: Journ. 152 for majors.

290 152. Radio-Television Speech Procedures. (3) Basic training in design, delivery and operational procedures of broadcasting. Three hours lec. and two hours lab. a week. For and required of all radio-television majors only.

290 160. Survey of Broadcasting. (2) History of the radio industry; its effects on American life; the 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 emphasis.

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.

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. Instructional 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. (3) Study of the principles and 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 Series Writing. (3) Cont. of Journ. 685. Development of complete scripts for series of documentary and dramatized broadcast programs. Pr.: Journ. 685 or consent of instructor.

290 726. Radio-Television Station Management. (3) Study of the practices 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.

Mathematics

JOHN E. MAXFIELD,* Head of Department

Professors Chawla,* Dixon,* Fuller,* Hsu,* Kirmser,* Marr,* Maxfield,* T. Parker,* Stamey,* Stromberg,* and Young;* Associate Professors Burckel,* Greechie,* P. Grillet,* Lee,* Sloat,* Strecker and Yee;* Assistant Professors Curtis,* Dressler,* M. Grillet,* Herman,* Huff,* Miller,* W. Parker,* Pigno,* J. Spears,* W. Spears,* and Williams;* Instructor Ratcliffe; Emeritus: Professors Babcock* and White;* Associate Professors Janes,* Mossman;* Instructor Woldt.

UNDERGRADUATE STUDY

For credit by examination in College Algebra, Trigonometry and Calculus, See page 7.

The Mathematics Honors Program

This degree will prepare students of extraordinary ability to enter graduate school to prepare themselves to become research mathematicians. It is an invitational program. In order to be considered for this program the student should contact the department.

(1) Math. 230, 231, 330, 331, 399.

(2) Major requirement of 21 hours in mathematics numbered 400 and above. The recommended courses to be included in these 21 hours are:

Math. 477, 478	Intro. to Set Theory and Metric Spaces I, II	6
Math. 512, 513	Intro. to Modern Algebra I, II	6
Math. 530, 531	Intro. to Real Analysis I, II	6
Math. 603	Intro. to Linear Algebra	3
		<hr/> 21

(3) In addition to the above at least 12 more hours numbering 600 and above are strongly recommended: Math. 604 Introduction to the Theory of Groups, and Math. 721, 722 Real and Complex Analysis, I, II or Math. 771, 772 General Topology I, II, should be included.

(4) The student should study at least one foreign language as a tool for mathematical research. These languages should be chosen from French, German and Russian.

(5) The student should include Chemistry I and II, and the General or Engineering Physics I and II if he is interested in applied mathematics.

This curriculum is designed for the preparation of research mathematicians. The

first two years include the standard basic material. The inclusion of Set Theory and Metric Topology in the second year serves two purposes. One is to provide a background of material used in almost all advanced courses. A special year course giving this material avoids duplication and scanty coverage. The second is to give, early in the student's career, an exposure to abstract thinking and the development of an appreciation of the nature and the role of definitions and proofs.

By the third year, students in the honors curriculum will have been exposed to a great deal more material and rigorous thinking than the students in the regular curricula in mathematics. They will be able to handle a more comprehensive course in Real Analysis. Following the recommendations of the Committee on the Undergraduate Program in Mathematics of the Mathematical Association of America, we include a thorough development of differential forms.

All other Mathematics majors are expected to take a course in Symbolic Logic in the Philosophy Department: Stat. 410 in the Statistics Department and Math. 220, 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
		<hr/> 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. 617	The Real Number system	3
Math. 511	Intro. to Algebraic Systems	3
or		
Math. 512	Modern Algebra I	3
Math. 475	Modern Geometry	3
Math. 619	Found. of Analysis	3
Math. 691	Topics in High School Math.	3
		<hr/>
		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) In his lower division years, the student is to take one semester of FORTRAN, and take Math 301.

(2) In his upper division years,

(a) The student is to take:

Math. 512	Introduction to Modern Algebra I	3
Math. 621	Analysis I	3
Math. 761	Numerical Analysis I	3
Math. 603 or 701	Linear Algebra or Matrix Theory	3

(b) He is required to select at least 9 hours from

Math. 762	Numerical Analysis II	3
Math. 550	Complex Variables	3
Math. 622 or 623	Analysis	3
Math. 702	(for those students who have chosen Math 701)	3
Math. 513	Modern Algebra II	3

(c) He is to take at least one six-hour upper division year-course outside of the Mathematics Department. These courses ought to be in the area of applications in which the student is interested.

GRADUATE STUDY

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. 266. 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.

Courses in Mathematics

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 $1\frac{1}{2}$ 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 $1\frac{1}{2}$ 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 III.** (4) I, II, S. Cont. of Math. 221 to include functions of more than one variable. Pr.: Math. 221.

245 224. **Elements of Applied Linear Analysis.** (3) I, II, S. A survey of mathematical techniques useful in the solution of problems arising in engineering and scientific analysis. Pr.: Math. 221, co-requisite, Math. 222.

245 225. **Analytic Geometry and Calculus I-S.** (4) I, II. Analytic geometry, differential and integral calculus. Distinguished from Math 230 in concrete orientation of content. Pr.: Consent of Department.

245 226. **Analytic Geometry and Calculus II-S.** (4) I, II. Continuation of Math 225 to include transcendental functions. Distinguished from Math 231 in concrete orientation of content. Pr.: Math 225.

245 230. **Honors Calculus I.** (4) I. Analytic geometry, differentiation and integration of functions of one variable, infinite sequences and infinite series, elements of differential equations. Pr.: Consent of Department.

245 231. **Honors Calculus II.** (4) II. Continuation of Math. 230. Pr.: Math. 230 and consent of Department.

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.

245 330. **Algebra and Calculus in Euclidean Spaces I.** (4) I. Differentiation and the Chain Rule on E^n , Gradient Potential Functions, Line Integrals, Taylor's Formula, Multiple Integrals, Linear Spaces, Applications to Functions on E^n , Determinants. Pr.: Math. 231 and consent of Department.

245 331. **Algebra and Calculus in Euclidean Spaces II.** (4) II. Continuation of Math. 330. Pr.: Math. 330 and consent of Department.

245 399. **Seminar in Mathematics.** Credit arranged. On sufficient demand. Primarily for Honors Students. Pr.: Consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

245 400. **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 student having credit in Math 220.

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, quadri-laterals, nonmetric geometry, similarity, volumes, elementary coordinate geometry. Pr.: Consent of instructor.

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.

245 477. **Introduction to Set Theory and Metric Spaces I.** (3) I. Set Theory, Zorn's Lemma, Ordinal and Cardinal Numbers, Transfinite Induction, Topological Spaces, Separators, Tietze Theorem, Connectedness, Compactness, Tychonoff's Theorem, Metric Spaces. Pr.: Math. 231 and consent of Department.

245 478. **Introduction to Set Theory and Metric Spaces II.** (3) II. Continuation of Math. 477. Pr.: Math. 477 and consent of Department.

245 511. **Introduction to Algebraic Systems** (3) I. Properties of groups, rings, domains and fields. Examples selected from subsystems of the complex numbers. Elementary number theory and solving equations. Pr.: Math. 222.

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.

245 530. **Introduction to Real Analysis I.** (3) I. Topics in Calculus of One Variable, Stone-Weierstrass Theorem, Differentiation on R^n , Implicit Function Theorem, Vector Fields, Differential Forms, Integration on Manifolds and Stoke's Theorem, Green's Identities. Pr.: Math. 331 and Math. 478 and consent of Department.

245 531. **Introduction to Real Analysis II.** (3) II. Continuation of Math. 530. Pr.: Math. 530, and consent of Department.

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. Matrix algebra, systems of linear equations, vector spaces and functions of vector spaces, approximation techniques for the eigenvalue problem and matrix inversion. Pr.: Junior standing.

245 552. **Introduction to Applied Mathematics III.** (3) I. Orthogonal functions, Fourier Series, boundary value problems in partial differential equations. Pr.: Math 240.

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.

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.

245 915. **Semigroup Theory I.** (3) I every third year. Main properties of regular semigroups, inverse semigroups; completely 0-simple semigroups. Rees-Sushkevitch 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.

245 922. **Topics in Harmonic Analysis.** (3) On sufficient demand. Selected topics in harmonic analysis. May be taken more than once for credit. Pr.: Consent of instructor.

245 925. **Banach Algebra I.** (3) I in alternate years. Basic Gelfand Theory, function algebras, numerical range, *-algebras, B^* - and von-Neumann algebras. Pr.: Consent of instructor.

245 926. **Banach Algebra II.** (3) II in alternate years. Continuation of Math 925. Pr.: Math 925.

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.

245 961. **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.

245 981. **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

COLONEL ARCHIE R. HYLE, Head of Department

Professor Hyle; Assistant Professors Bass, Burns, Fielden, Lightfoot; Instructors Reed, Nesler.

Kansas State University offers a General Military Science curriculum for all male students. This curriculum is designed to give students who complete the program the basic knowledge of skills necessary for 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. Specializaion in a particular branch will come after graduation and commissioning.

All ROTC at KSU is completely voluntary. The first two years constitute the Basic Course and a student may enroll as a freshman or a sophomore without any obligation whatsoever for taking additional ROTC training. All students enrolled in the Basic Course are furnished free of charge complete uniforms, texts, and other necessary equipment. In the Basic Course, students receive one credit hour a semester, and attend recitation one hour per week.

The third and fourth years constitute the Advanced Course in which students receive a total of twelve semester hours credit, three a semester. They attend class three hours a week, receive \$100 per month and are issued tailored uniforms. Once a cadet enters the Junior program he is required to sign a contract which obligates him to complete the ROTC program and serve a tour of duty in the Army as an officer.

As part of the Advanced ROTC Course, in any semester the student chooses, enrollment in History 761, 762, 763, 764 or 766 is required. However, if the student's curriculum does not allow sufficient elective time for one of the above courses, the requirement can be waived.

A student earns an Army Reserve Commission by completing the Advanced ROTC program (junior and senior years) and receiving a baccalaureate degree. 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 Basic Course Summer Camp prior to enrolling as a junior. The latter is called "The Two-Year Program." This program is especially suited to junior college transferees and graduate students beginning post-graduate work at KSU. Application is made during the spring prior to attendance at the Summer Camp. Students in the Advanced Course must complete an Advanced Course Summer Camp between their junior and senior years.

Cadets who have demonstrated outstanding achievement in academic and military subjects are eligible for designation as Distinguished Military Students (DMS) during their ROTC senior year. This can lead to the designation of Distinguished Military Graduate (DMG) upon receipt of the baccalaureate degree. Those cadets chosen DMG can be commissioned in the Regular Army, should they so desire.

Under present regulations, freshmen are eligible for a 1-D draft deferment upon enrollment in Basic Course ROTC. Students enrolled in the Advanced Course must sign a deferment agreement. The deferment agreement exempts the student from selective service induction in return for agreement to accept a commission, if tendered, upon completion of the course of instruction and to serve on active duty for a period of either two years or three 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 voluntary 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 can qualify students for Federal Aviation Administration Private Pilot's Certificate. Students completing ROTC flight training must agree to serve at least three years on active duty with the Army following graduation from Army flight school.

The ROTC program offers to selected students one, two, three, and four-year scholarships. These scholarships pay tuition and fees, up to \$150 a year for books and special fees, and pay the students a subsistence of \$100 a month. A student must apply for and be approved for a four-year scholarship prior to coming to the University.

The other scholarships are available only to students who are enrolled in ROTC. Application for these scholarships is made in the spring semester of the year, prior to the fall semester in which the scholarship would become effective.

Basic Course

UNDERGRADUATE CREDIT

249 113. **Military 1A.** (1) I. Introduction to National Defense Establishment, an introduction to the history of warfare and organization of the Army, a discussion of organization and importance of the ROTC program. Leadership Lab (drill and command). One hour recitation and one hour Leadership Lab a week. No prerequisites.

249 114. **Military 1B.** (1) II. Introduction to National Defense Establishment (con't)—organization of Department of Defense and national power and policies. Leadership Lab (drill and command). One hour recitation and one hour Leadership Lab a week. No prerequisites.

249 125. **Military 2A.** (1) I. American Military History in 20th Century. Leadership Lab (drill and command). One hour recitation and one hour leadership lab a week. Pr.: Completion of MS I.

249 126. **Military 2B.** (1) II. Map and Aerial Photograph Reading. Leadership Lab (drill and command). One hour recitation and one hour leadership lab a week. Pr.: Completion of MS I.

Advanced Course

UNDERGRADUATE CREDIT

249 233. **Military 3A.** (3) I. Principles of Leadership, Methods of Instruction, Internal Defense-Development and Management. Leadership Lab (drill and command). Three hours recitation and one hour leadership lab a week. Pr.: Completion of MS I and MS II or attendance at ROTC Basic Course Summer Camp.

249 234. **Military 3B.** (3) II. Small Unit Tactics, Communications, Branches of the Army. Leadership Lab (drill and command). Three hours recitation and one hour leadership lab a week. Pr.: Completion of MS I and MS II or attendance at ROTC Basic Course Summer Camp.

249 243. **Military 4A.** (3) I. Theory and dynamics of the military team. Leadership Lab (drill and command). Three hours recitation and one hour leadership lab a week. Pr.: Completion of MS I, MS II, and MS III.

249 244. **Military 4B.** (3) II. Seminar in Leadership and Management. Leadership Lab (drill and command). Three hours recitation and one hour leadership lab a week. Pr.: Completion of MS I, MS II, and MS III.

Modern Languages

ROBERT L. COON*, Head of Department

Professor Coon;* Associate Professors Beeson* and Coates;* Assistant Professors Alexander, McGraw, C. Miller,* Slishman,* Terrill,* and Vazquez;* Acting Assistant Professor Azim; Instructors Driss, Ossar, Shopmaker, and Swietlicki; Emeritus: Professors Limper* and Moore;* Associate Professors Munro* and Pettis.*

UNDERGRADUATE STUDY

Students majoring in languages should enroll for the Bachelor of Arts degree.

For a minor, 18 hours in a single language at college level are required.

Majors are offered in French, German, and Spanish.

For a language major, 30 hours in a single language above the level of I and II must be completed. The student majoring in languages must take two survey courses in his chosen language, plus three literature courses above the level of 600.

The attention of the student preparing for graduate school or for high school teaching is directed to the corollary courses: 455, 652, and 664. Six hours of history in the country and period of the student's major language interest are desirable.

Entering students who have had previous language experience and who plan to continue language study are required to take a language placement examination at the beginning of the fall semester. If there is any doubt as to proper placement, the head of the Department of Modern Languages should be consulted.

GRADUATE STUDY

The Master of Arts degree is offered in French, German, and Spanish.

Prerequisite to graduate work in French, German, or Spanish is completion of a B.A. or B.S. curriculum or equivalent including sufficient work in languages to permit the student to do advanced work in the language of his choice. Every candidate for the M.A. degree must demonstrate a reading knowledge of an additional foreign language.

Courses in Modern Languages

UNDERGRADUATE CREDIT

253 399. Honors Seminar in Modern Languages. Credit arranged. I, II. Selected topics. Open to non-majors in the Honors Program.

Linguistics

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

253 455. General Phonetics. (3). Same as Speech 455.

UNDERGRADUATE AND GRADUATE CREDIT

253 652. Introduction to Linguistics. (3) I, II, S. Same as Speech 652.

253 664. Topics in Applied Linguistics. (3) II. Same as Speech 664.

253 669. Language Typology. (3). Same as Speech 669.

253 672. Transformational Grammar. (3). Same as Speech 672.

253 673. Introduction to Historical Linguistics. (3). Same as Speech 673.

253 674. Methods and Techniques of Learning a Second Language. (3). Same as Speech 674.

253 676. Phonetics and Phonemics of English. (3). Same as Speech 676.

253 677. Morphology and Syntax of English. (3). Same as Speech 677.

French

UNDERGRADUATE CREDIT

253 001. Orientation for Summer School Program in Paris. (0).

253 102. French for Reading Knowledge I. (3). The grammar and syntax of French and the reading of basic material from French texts in the humanities, sciences and social sciences. Not a prerequisite for Mod. L. 135.

253 103. French for Reading Knowledge II. (3). Continued reading of selected French texts. Not considered as prerequisite for Mod. L. 230. Pr.: Mod. L. 102 or equiv.

253 131. French I. (4). Introduction to the structure of modern French, emphasizing the spoken language with practice in the language laboratory.

253 135. French II. (4). Continuation of French I, completion of basic presentation of the structure of French. Emphasis on spoken language, use of language laboratory. Pr.: Mod. L. 131 or equiv.

253 230. French III. (4). Intensive review of the structure of the French language. Reading and discussion of French prose. Pr.: Mod. L. 135 or equiv.

253 231. Elementary French Conversation IIIA. (1). Course not open to fluent speakers of French. Normally to be taken concurrently with French III. Pr.: Mod. L. 135 or equiv.

253 235. French IV. (3). Reading and discussion of modern French prose and review of the more difficult points of French grammar. Pr.: Mod. L. 230 or equiv.

253 236. French Conversation IVA. (2). Continued practice in conversational French. Not open to fluent speakers of French. Normally to be taken concurrently with French IV. Pr.: Mod. L. 230 or equiv.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

253 422. French Civilization. (3). Introduction to French culture with special emphasis on social and historical developments since World War II. Pr.: Mod. L. 235 or equiv.

253 431. French Composition and Conversation. (3). Review in depth of the structure of the language. Intensive practice in written and conversational French. Pr.: Mod. L. 235 or equiv.

253 451. Survey of French Literature I. (3). The reading and discussion of French literature from the Middle Ages to the end of the eighteenth century. Pr.: Mod. L. 235 or equiv.

253 452. Survey of French Literature II. (3). The reading and discussion of French literature from the early nineteenth century to the present. Pr.: Mod. L. 235 or equiv.

253 495. Special Studies in French. Credit arranged. Pr.: Consent of department head and instructor involved.

UNDERGRADUATE AND GRADUATE CREDIT

253 628. Sixteenth-Century French Literature. (3). Reading and discussion of selected prose and poetry of the French Renaissance. Pr.: Twenty-one hours of college French or equiv.

253 629. Seventeenth-Century French Literature I. (3). The literature of the Baroque period. Pr.: Twenty-one hours of college French or equiv.

253 630. French Novel. (3). The development of the novel from the 17th century to the present, seen through selected masterworks. Pr.: Twenty-one hours of college French or equiv.

253 635. Twentieth-Century French Prose and Poetry. (3). Readings in non-dramatic literature of the contemporary period. Pr.: Twenty-one hours of college French or equiv.

253 636. Nineteenth-Century French Literature I. (3). A study of Pre-romanticism and Romanticism. Pr.: Twenty-one hours of college French or equiv.

253 637. Nineteenth-Century French Literature II. (3). A study of Realism, Naturalism and Symbolism. Pr.: Twenty-one hours of college French or equiv.

253 638. Seventeenth-Century French Literature II. (3). The literature of French Classicism. Pr.: Twenty-one hours of college French or equiv.

253 639. Eighteenth-Century French Literature. (3). Critical study of the literature of the Enlightenment. Pr.: Twenty-one hours of college French or equiv.

253 645. Twentieth-Century French Drama. (3). Reading and analysis of the contemporary French theater from Cocteau through the Existentialist and Absurdist playwrights. Pr.: Twenty-one hours of college French or equiv.

253 646. Advanced French Syntax. (3). An intensive study of the syntax and structure of the language. Introduction to French stylistics. Pr.: Twenty-one hours of college French or equiv.

253 647. Seminar in French. (3). A seminar with variable topics. Pr.: Senior standing or consent of the instructor.

German

UNDERGRADUATE CREDIT

253 003. Orientation for Summer School Program in Salzburg. (0).

253 105. German for Reading Knowledge I. (3). The grammar and syntax of German and the reading of basic

material selected from modern German texts. Not considered as a prerequisite for Mod. L. 126.

253 111. German for Reading Knowledge II. (3). Continued reading of material from modern German texts. Not considered as a prerequisite for Mod. L. 221. Pr.: Mod. L. 102 or equiv.

253 121. German I. (4). Introduction to the structure of modern German. Practice of the spoken language with additional experience in the language laboratory.

253 126. German II. (4). Continuation and conclusion of the introduction to modern German, reading of selected prose texts. Pr.: Mod. L. 121 or equiv.

253 221. German III. (4). Reading and discussion of a selection of modern German prose and review of the structure of German. Pr.: Mod. L. 126 or equiv.

253 222. Elementary German Conversation IIIA. (1). Practice in beginning conversational German. Course not open to fluent speakers of German. Course normally taken concurrently with German III. Pr.: Mod. L. 126 or equiv.

253 225. German IV. (3). Reading and discussion of modern German prose and review of the more difficult points of German grammar. Pr.: Mod. L. 221 or equiv.

253 226. German Conversation IVA. (2). Continued practice in conversational German. Course not open to fluent speakers of German. Normally taken concurrently with German IV. Pr.: Mod. L. 221 or equiv.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

253 423. German Civilization. (3). The political and cultural development of the German speaking people and their role and influence in the history of the western world. Pr.: Mod. L. 225 or equiv.

253 427. German Composition. (3). A study of German syntax and exercises in composition. Pr.: Mod. L. 225 or equiv.

253 428. Introduction to German Literature I. (3). Literary movements of the 19th century are introduced through the reading and discussion of texts in various forms and by representative authors. Pr.: Mod. L. 225 or equiv.

253 429. Introduction to German Literature II. (3). Discussion of significant works of 20th century prose, poetry, and drama. Special emphasis is placed on the literature of recent decades. Pr.: Mod. L. 225 or equiv.

253 496. Special Studies in German. Credit arranged. Pr.: Consent of department head and instructor involved.

UNDERGRADUATE AND GRADUATE CREDIT

253 650. German Classicism and Its Precursors. (3). I, 1973-1974. Reading and discussion of the late 18th century texts, including works by Lessing, Goethe, Schiller, etc. Pr.: Twenty-one hours of college German or equiv.

253 651. German Romanticism. (3). II, 1972-1973. A study of representative works of German Romantic literature by such authors as Schlegel, Tieck, Eichendorff, Novalis. Pr.: Twenty-one hours of college German or equiv.

253 653. Goethe and Faust. (3). I, 1972-1973. The writings of Goethe and his masterpiece Faust. Pr.: Twenty-one hours of college German or equiv.

253 654. **German Prose and Drama of the 19th Century.** (3). II. 1973-1974. A consideration of post-Romantic German literature with special emphasis on the novella. Authors including Grillparzer, Keller, and Meyer are discussed. Pr.: Twenty-one hours of college German or equiv.

253 655. **Early 20th Century German Literature.** (3). II. 1972-1973. A study of the drama and lyric of Naturalism, Neo-Classicism, Neo-Romanticism, and Expressionism. Pr.: Twenty-one hours of college German or equiv.

253 656. **German Literature Since 1945.** (3). I. 1973-1974. A discussion of the post-war writings of the Gruppe 47, Swiss playwrights and others. Pr.: Twenty-one hours of college German or equiv.

253 657. **The Modern German Novel.** (3). II. 1973-1974. Theory of the German novel with examples from authors such as Mann, Hesse, Grass, and others. Pr.: Twenty-one hours of college German or equiv.

253 658. **History of the German Language.** (3). I. 1972-1973. A study of the development of the sounds, forms, and syntax of standard German. Fulfills distribution requirements for major. Pr.: Senior standing or consent of instructor.

253 659. **Seminar in German.** (3). A seminar with variable topics, including: Literature of Social and Political Protest, Austrian and Swiss Literature, Literature of the Middle Ages, Emigre Literature, etc. Pr.: Senior standing or consent of instructor.

Greek

UNDERGRADUATE CREDIT

253 171. **Greek I.** (4). Introduction to the grammar of classical Greek and reading of elementary prose.

253 172. **Greek II.** (4). Completion of the grammar of classical Greek and continuation of the reading of elementary prose. Pr.: Mod. L. 171 or equiv.

Italian

UNDERGRADUATE CREDIT

253 151. **Italian I.** (4). Introduction to the structure of modern Italian.

253 155. **Italian II.** (4). Continuation and completion of the study of modern Italian grammar, using the facilities of the language laboratory for audiolingual practice. Pr.: Mod. L. 151 or equiv.

253 251. **Italian III.** (4). Grammar review and reading selections from Italian literature. Pr.: Mod. L. 155 or equiv.

253 253. **Italian IV.** (3). Selective review of grammar and reading of examples of modern Italian literature. Pr.: Mod. L. 251 or equiv.

Latin

UNDERGRADUATE CREDIT

253 115. **Latin I.** (4). An introductory study of the structure of Latin.

253 116. **Latin II.** (4). Continuation and completion of the study of the structure of Latin. Pr.: Mod. L. 115 or equiv.

253 270. **Latin III.** (4). 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). Continuation of the study of Latin syntax and grammar, based upon the reading of Roman prose and poetry. Pr.: Mod. L. 270 or equiv.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

253 449. **Vergil.** (3). A study of the Latin epic as exemplified by Vergil's. Pr.: Mod. L. 450 or equiv.

253 450. **Cicero.** (3). A study of the versatility of Cicero as evidenced in various works. Pr.: Mod. L. 271 or equiv.

253 497. **Special Studies in Latin.** Credit arranged. Pr.: Consent of the department head and instructor involved.

253 501. **Horace.** (3). A critical study of the major works of Horace. Pr.: Mod. L. 451 or equiv.

253 502. **Roman Comedy.** (3). A study of the techniques of Roman comedy. Pr.: Mod. L. 501 or equiv.

Russian

UNDERGRADUATE CREDIT

253 161. **Russian I.** (4) I. Introduction to the structure of modern Russian. Emphasis on the sounds of Russian, the use of the Cyrillic alphabet, and oral drills with added practice in the language laboratory.

253 165. **Russian II.** (4) II. Continuation of the study of Russian grammar and oral communication. Pr.: Mod. L. 161 or equiv.

253 261. **Russian III.** (4) I. Completion of the study of Russian grammar. Reading of selected prose on the intermediate level. Pr.: Mod. L. 165 or equiv.

253 265. **Russian IV.** (3) II. Intensive review of Russian grammar. Exercises in reading selected modern Russian texts in the original. Pr.: Mod. L. 261 or equiv.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

253 447. **Survey of Russian Literature.** (3). A history of Russian literature from its beginnings until the present, with emphasis on the works of the nineteenth century, including those of Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, and Tolstoy.

253 448. **Russian V.** (3). Reading of Russian short stories of the 19th and 20th centuries, including works by Pushkin, Lermontov, Dostoevsky and Chekhov.

253 460. **Russian Conversation and Composition.** (3). Discussions in Russian. Extensive practice in writing Russian compositions.

253 498. **Special Studies in Russian.** Credit arranged. Pr.: Consent of department head and instructor involved.

UNDERGRADUATE AND GRADUATE CREDIT

253 694. **Russian Literature in Translation.** (3) II. A study of 19th-century Russian literature in English translation, from Pushkin to Chekhov.

Spanish

UNDERGRADUATE CREDIT

253 002. **Orientation for Summer School Abroad Program in Mexico City.** (0).

253 141. **Spanish I.** (4). 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). Continuation 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.** (4). An intensive review of syntax and a comprehensive structural review of Spanish, with emphasis on composition and conversation. Pr.: Mod. L. 145 or equiv.

253 242. **Elementary Spanish Conversation IIIA.** (1). Practice in beginning conversational Spanish. Emphasis on oral communication within the classroom. Course not open to fluent speakers. Should be taken concurrently with Spanish III.

253 245. **Spanish IV.** (3). Reading and discussion of selections from contemporary prose, and review of grammatical structures as needed. Pr.: Mod. L. 241 or equiv.

253 246. **Elementary Spanish Conversation IVA.** (2). Continuation of Elementary Spanish Conversation IIIA. Should be taken concurrently with Spanish IV.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

253 435. **Spanish Literature I.** (3). Introduction to the verse, prose, and drama of Spain from the Middle Ages to 1700. Pr.: Eighteen hours of college Spanish or equiv.

253 436. **Spanish Literature II.** (3). Verse, prose, and drama of Spain from 1700 to the present. Pr.: Eighteen hours of college Spanish or equiv.

253 444. **Spanish Grammar.** (3). A systematic study of the structure of Spanish. Pr.: Mod. L. 245 or equiv.

253 446. **Advanced Spanish Composition and Conversation.** (3). Continuation of the study of the grammar and syntax of modern Spanish and its phonetic basis. Pr.: Mod. L. 444 or equiv.

253 499. **Special Studies in Spanish.** Credit arranged. Pr.: Consent of department head and instructor involved.

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.: Eighteen hours of college Spanish or equiv.

253 601. **Hispanic-American Civilization.** (3). Survey of Spanish-American culture and civilization from 1492 to the present. Pr.: Eighteen hours of college Spanish or equiv.

253 660. **Spanish-American Literature I.** (3). Reading and discussion of a broad selection of the prose and verse of Spanish America. Pr.: Eighteen hours of college Spanish or equiv.

253 661. **Spanish-American Literature II.** (3). Continuation of Spanish-American Literature I. Pr.: Eighteen hours of college Spanish or equiv.

253 662. **The Works of Benito Perez Galdos.** (3). Study of his novels. Pr.: Twenty-one hours of college Spanish or equiv.

253 663. **Spanish-American Novel I.** (3). The reading and study of selected Spanish-American novels. Pr.: Twenty-one hours of college Spanish or equiv.

253 665. **Spanish-American Novel II.** (3). Continuation of Spanish American Novel I. Pr.: Twenty-one hours of college Spanish or equiv.

253 666. **Spanish-American Prose Writings.** (3). Nineteenth and twentieth century Spanish-American prose writings. Generally covered are the short story and the essay. Pr.: Twenty-one hours of college Spanish or equiv.

253 680. **Spanish Novel I.** (3). Reading and analysis of Golden Age novels. Pr.: Twenty-one hours of college Spanish or equiv.

253 681. **Spanish Novel II.** (3). Reading and analysis of several nineteenth century novels. Pr.: Twenty-one hours of college Spanish or equiv.

253 682. **Spanish Drama I.** (3). Reading and analysis of Golden Age Dramas. Pr.: Twenty-one hours of college Spanish or equiv.

253 683. **Spanish Drama II.** (3). Reading and analysis of nineteenth century dramas. Pr.: Twenty-one hours of college Spanish or equiv.

253 685. **Cervantes.** (3). Reading of the works of Cervantes 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). Reading and analysis of twentieth century Spanish literature. Pr.: Twenty-one hours of college Spanish or equiv.

253 688. **The Works of Federico Garcia Lorca.** (3). Study of his drama and poetry. Pr.: Twenty-one hours of college Spanish or equiv.

253 691. **Spanish-American Drama.** (3). Study of modern Spanish-American plays. Pr.: Twenty-one hours of college Spanish or equiv.

GRADUATE CREDIT

253 999. **Research in Modern Languages.** Credit arranged. Pr.: Thirty hours in one modern language or equiv.

South Asian Languages

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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.

253 692. **Tamil I.** (5). The elementary study of the principal modern Dravidian tongue. Pr.: some knowledge of another foreign language desirable.

253 693. **Tamil II.** (5). Continuation of Tamil I. Pr.: 692.

253 780. **Introduction to Hindi.** (5). Concentration on Devanagari script and Hindi idiom with graded readings and grammatical exercises. Pr.: 791 or equiv.

253 781. **Individual Study in Hindi.** (5). Readings, composition and conversational practice relevant to the students' interests and disciplinary needs. May be repeated for credit.

253 790. Urdu I. (5). The week's work consists of five hours of grammar, vocabulary study, reading and supervised conversation, and three hours of laboratory work. Urdu is a major language of both India and Pakistan, and the chief link language between them. Pr.: None. Some knowledge of another foreign language desirable.

253 791. Urdu II. (5). Continuation of Urdu I. Pr.: 790.

253 792. Urdu III. (4). Readings in graded texts, conversation drills and applied grammar. Pr.: 791 or equivalent.

253 793. Urdu IV. (4). Continuation of Urdu III. Reading and discussion of contemporary literature and grammatical analysis. Pr.: 792 or equiv.

253 794. Urdu V. (4). Individual study in Urdu. Readings, composition and conversational practice relevant to the student's interests and disciplinary needs. Pr.: 793 or equiv. May be repeated for credit.

Music

ROBERT A. STEINBAUER,* Head of Department

Professors Leavengood,* Steinbauer,* Steunenberg* and Walker*; Associate Professors Flouer, Langenkamp,* Pelton* and Shull;* Assistant Professors Caine,* Hewett, Jackson,* Polich, P. Roby,* Sidorfsky,* Sloop,* and Walker;* Instructors L. Roby and Walker.

UNDERGRADUATE STUDY

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 theory and composition, voice, piano, organ, strings, woodwind and brass instruments are offered. For specific requirements of each curriculum, see pages 136 and 137.

Bachelor of Arts

A major program of music leading to the degree of Bachelor of Arts 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, 551, 552 (Music History and Music Literature), and 506, 507 (Theory of Music), are required in each field. Recital Attendance (Music 050) is required for eight semesters.

If the field is Music Literature, the program also calls for Music 401, 402 (Theory of Music), and 6 semester hours selected from Music 609, 661, 663, 664 (Music History and Literature). In addition, 8 semester hours in a single applied area are required.

If the field is Music Theory, the program calls for Music 401, 402, 503 (Theory of Music); 2 semester hours chosen from Music 609, 661, 663, 664 (Music History and Literature) and 8 semester hours of Applied Piano.

If the field is Applied Music, the program also calls for 2 semester hours selected from other courses which are in the 600 series. Sixteen hours of Applied Music in either Piano or Voice are required.

The major in music in the Bachelor of Arts Degree is not intended to prepare students to teach in the public schools in Kansas.

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. 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 2 credits a semester will be granted for Applied Music as an elective.

Program In Applied Music

A four-year program is offered in Applied Music with majors in voice, keyboard, strings, wind and percussion instruments. This program leads to 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, 551, 552 (Music History and Literature and Physics for Musicians (Physics 126.) Instrumental majors are required to take Music 503 (Theory of Music). Vocal majors must elect 8 additional hours in music; instrumental majors, 5 hours.

Requirements in General Education are stated on page 83.

In the vocal program, 32 semester hours of voice (Music 286), 4 semester hours of piano and 4 semester hours of Vocal Ensemble (Music 290) are required.

In the instrumental program, 32 semester hours of the major instrument, 4 semester hours of Instrumental Ensemble (Music 288), and 4 semester hours of applied minor are required. If a keyboard instrument is not the major, one must be chosen as a minor.

For the program in Theory and Composition, the basic courses in General Education for the instrumental major are required. In addition, the following courses are required: Piano (8 hours), Music 601, 602, 604, 605 (Theory of Music), Music electives (8 hours), General electives (16 hours).

A minimum of 8 hours in musical Organizations is required in all the above programs. Recital Attendance (Music 050) is also required for each semester of the course.

Requirements for Entrance And Graduation

Preliminary examinations in piano, the applied major and theory must be taken by all students majoring in music regardless of the curriculum selected.

General Information

Attendance at a minimum of 15 recitals per semester is required for graduation. Concert offerings include the following: student and faculty recitals; major organization concerts; and all subscription series.

Practice room privileges are included in the fees for students who are enrolled in applied music.

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 strings must pass grade 6 of the major instrument upon entrance and complete grade 10 by the end of the senior year. In addition, all string majors must pass grade 1 in piano for entrance and complete grade 3 by the end of the senior year.

Wind Majors: Students majoring in wind instruments must pass grade 4 on their major instrument upon entrance and complete grade 8 by the end of the senior year. In addition, all instrumental 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: A student should possess the ability to sing in time and in tune. Students majoring in voice must pass grade 1 in piano upon entrance. For graduation, voice majors must complete at least grade 4 of the voice curriculum and grade 3 of the piano curriculum.

Organ Majors: Students majoring in organ must pass grade 3 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 strings must pass grade 3 on 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.

Wind Majors: Students majoring in wind instruments must pass grade 2 on their major instrument and grade 1 of the piano curriculum upon entrance. They must complete grade 6 on the major instrument and grade 3 of the piano curriculum by the end of the senior year.

Outlines of each of the curricula in music may be secured upon request from the Chairman of the Department of Music. In each case, the major applied area should be specified.

GRADUATE STUDY

Graduate work leading to the degrees 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 4-year undergraduate curriculum leading to the

degrees B.M., B.M.E., or B.S. in Music Education, with graduation requirements substantially equivalent to those of the music curricula in this University.

For the degree Master of Music, either Music Education or Applied Music may be chosen as a field of concentration, equalling a minimum of 14 semester hours including a Master's Report. In the field of Music Education such cognate courses as Psychology of Music, Problems in Music, Research in Music and Master's Report may be used for partial fulfillment of this requirement. In the field of Applied Music, a graduate recital is required.

Electives to the extent of ten 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 4 semester hours in Applied Music are required, provided proficiency warranting enrollment for graduate credit can be shown at time for enrollment.

For the degree Master of Arts, the field of concentration may be in Music Literature equalling a minimum of 14 semester hours including a Master's Report. In addition, 4 semester hours of applied music is required. A minor carrying a minimum of 6 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

UNDERGRADUATE CREDIT

257 100. **Music Fundamentals.** (3). I, II, S. Elementary instruction in the Theory of Music. 3 hours recitation a week.

257 201. **Theory of Music I.** (3). I, II, S. An integrated course comprising ear-training, sight-singing, and elementary part-writing. Principles of diatonic harmony and melodic construction with emphasis on choral arranging. 5 hours recitation a week.

257 202. **Theory of Music II.** (3). I, II, S. Continuation of Music 201; keyboard arranging, harmonic analysis, and writing in small forms. 5 hours recitation a week. Pr.: Music 201 or consent of instructor.

257 303. **General Principles of Harmony.** (3). Offered on demand. 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, II, S. Continuation of ear training and sight-singing. Chromatic melody and harmony: modulatory technique and harmonic analysis of selected 19th century works. 5 hours recitation a week. Pr.: Music 202 or consent of instructor.

257 305. **Theory of Music IV.** (3). I, II, S. Continuation of ear training and sight-singing. Basic 2 and 3 part counterpoint in the 18th century style; emphasis on analysis. 5 hours recitation a week. Pr.: Music 304 or consent of instructor.

257 390. **Problems in Music.** (1-3). I, II, S. Offered on demand. Pr.: Background of courses needed for problems undertaken.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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 (Theory) 305.

257 402. **Counterpoint II.** (2). II, S. Continuation of Music 401. Contrapuntal composition in three or four voices; analysis of the fugue. Pr.: Music (Theory) 401.

257 503. **Instrumentation and Orchestration.** (3). II, S. Instruments of the band and orchestra studied with relation to range, function and tone color. Simple and more difficult familiar and non-familiar composition scored for ensembles, full orchestra and full band. 1 hour lab. each week as needed. Pr.: Music (Theory) 305.

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 (Theory) 305.

257 507. **Musical Form and Analysis II.** (2). II. Continuation of Music 506. Forms and compositional techniques as used by major composers of the 20th century. Pr.: Music (Theory) 506 or consent of instructor.

257 516. **Conducting I.** (2). I, S. Basic meters and the proper manner of executing each; introduction to score reading and transposition. Pr.: Music (Theory) 305.

257 517. **Conducting II.** (2). II, S. 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. Pr.: Music (Theory) 516.

257 521. **Composition I.** (2). I, S. Composition in the small forms for piano, voice and instruments; development of style concept. Pr.: Music (Theory) 402, or consent of instructor.

257 522. **Composition II.** (2). II, S. Continuation of Music 521 with emphasis on more complex treatment of the small and compound forms. Pr.: Music (Theory) 521.

UNDERGRADUATE AND GRADUATE CREDIT

257 601. **Advanced Analysis I.** (2). I and alternate S. Combination of harmony, counterpoint and form as used in compositions in their historical settings. Pr.: Music (Theory) 506, or consent of instructor.

257 602. Advanced Analysis II. (2). II and alternate S. Modern chord structures, atonality, polytonality and form used in contemporary compositions. Pr.: Music (Theory) 601.

257 604. Composition III. (2) Offered on demand. Continuation of Composition II. An exploration of larger forms of music. Pr.: Music (Theory) 522.

257 605. Composition IV. (2). Offered on demand. Continuation of Composition III. Pr.: Music (Theory) 604.

257 611. Practical Composition and Arranging. (2). Offered on demand. Explanation of styles and techniques applicable to contemporary commercial music. Practical arranging for the stage band. Pr.: Music 305 or consent of instructor.

257 614. Advanced Orchestration. (2). Offered on demand. The study of contemporary (20th century) orchestra and band scores. Exercises in orchestrating this type of music for different choirs of instruments, as well as scoring for full orchestra and symphonic band. Pr.: Music 503 or consent of instructor.

257 632. Seminar in Electronic Musical Acoustics. (2). Offered on demand. Techniques of modern experimental music; related music theory; voltage-controlled systems and computational synthesis. Individual projects. Pr.: Music 522, or consent of instructor.

257 636. Advanced Conducting. (2) S. Choral and Instrumental experiences plus score reading and preparation. Pr.: Conducting I & II or consent.

Courses in Music History and Literature

UNDERGRADUATE CREDIT

257 150. Music Listening Laboratory. (1). I, II. A direct listening laboratory. Includes recorded musical works of all major periods and styles. Performances from the major university organizations and faculty artists. Limited to non-music majors. 2 sessions a week.

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 curricula other than music.

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 curricula other than music.

257 245. Program Music. (2). Offered on demand. The presentation of a number of programmatic compositions with non-musical sources from which they are derived. This course is designed for students majoring in curricula other than music.

257 250. Appreciation of Music. (2). I, II, S. 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 music majors. Pr.: Honors students only.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD.

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. Continuation of Music 421. Pr.: Music 421.

257 551. Survey of Music Literature I. (2). I, S. Style characteristics of music as revealed through a careful analysis of the music of different periods. Pr.: Music 422 and Music 305.

257 552. Survey of Music Literature II. (2). II, S. Continuation of Music 551. Pr.: Music 551.

UNDERGRADUATE AND GRADUATE CREDIT

257 609. Music of the 20th Century. (2). Offered on demand. The historical aspect in musical analysis of composition since the romantic period. Pr.: Music 422 and Music (Theory) 506.

257 613. Afro-American Music. (3). II. Negro music of the new world viewed in a culture historical framework. Examination of the social conditions under which African and European music styles came into contact in the New World and the ways in which they blended to form the unique styles of calypso, blues, and jazz.

257 661. Music of the Baroque Period. (2). In alternate years. Survey of music from 1600 through Handel and Bach. The study of Baroque idioms of the opera, instrumental forms, and the sacred compositions. Pr.: Music 421.

257 663. Music of the Classic Period. (2). In alternate years. The development of the sonata, symphony and the classic forms in general from Sammartini through Beethoven. Pr.: Music 421.

257 664. Music of the Romantic Period. (2). In alternate years. A study of musical trends in the 19th century through the analysis of works by representative composers. Pr.: Music 421 or consent.

257 799. Problems in Music. Credit arranged. I, II, S. Pr.: Background of courses needed for problem undertaken.

GRADUATE CREDIT

257 801. Graduate Seminar in Music. (2). I, S. Library procedures, research methods and practice in preparing scholarly papers.

257 803. Seminar in Music History. (2). S. The History of Music with emphasis on the correlation of stylistic factors and man's cultural environment. Pr.: Graduate standing or consent of instructor.

257 804. Music in History I. (2). I, Alternate summers. A study of musical compositions and style characteristics from the 6th Century B.C. through the Renaissance, with a correlated examination of historic events, prevailing ideas in philosophy, architecture, art and drama. Pr.: Graduate standing.

257 805. Music in History II. (2). Alternate summers. Continuation of Music in History I from the Renaissance through the 20th century. Pr.: Graduate standing.

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

UNDERGRADUATE CREDIT

257 405. **Music for Elementary Teachers.** (3). I, II, S. The contribution of music to child development in elementary schools. A study of Music literature suited to children through the development of purposive listening and the expressive phases of music including rhythmic response, singing, playing, reading and writing. Laboratory (2 hours without credit) required of all students who have had insufficient piano experience. Pr.: Junior standing or consent of instructor. (Course open to elementary education majors only.)

257 412. **Elementary School Music.** (3). I. The study of music as it contributes to child development in the elementary school. Principles of reading readiness applied to music with study of various music series. Pr.: Music major, junior standing.

257 413. **Secondary School General Music.** (2). II. Objectives, organization, content, methods, materials involved in development and teaching of non-performance courses in secondary schools. Concentrated attention given to junior high school. Pr.: Music 412, or consent.

257 512. **Organization of School Music.** (1). I, II. Study of music education with reference criteria for evaluation of activities, methods, materials in a well-balanced program of music. Two classes weekly on the "block" during professional semester. Pr.: Music 412, 413.

257 513. **Secondary School Vocal Music.** (2). II. Organization, administration, operation of vocal music programs in junior and senior high schools. Emphasis on voice-training, methods, ensemble development, techniques, selection of repertoire. Pr.: Recommended after student teaching.

257 514. **Secondary School Instrumental Music.** (2). II. Organization, administration, operation of instrumental music programs in junior and senior high schools. Emphasis on teaching music through performance, selection of literature; discussion and evaluation of marching and stage bands. Pr.: Recommended after student teaching.

UNDERGRADUATE AND GRADUATE CREDIT

257 606. **Survey of Choral Literature.** (2). Offered on Demand. 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). Offered on demand. Administration and organization of the choral program; study and discussion of method and techniques used for effective choral presentation. Pr.: Senior standing or consent of instructor.

257 610. **School Music Electronics.** (2). S. A course to acquaint the teacher with electronic instruments. Use of voltage-controlled systems, *musique concrete*, notational procedures and teaching applications. Individual or team projects. Pr.: Senior or graduate standing.

257 612. **The Junior High Music Program.** (3). II, 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 student. Pr.: Consent of instructor.

257 620. **Workshop in Marching Band.** (1). S. Survey of the methods, materials and the teaching techniques of the Marching Band. Pr.: Music 115 or consent.

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.

257 623. **Workshop in Secondary Vocal Music.** (1). S. Choral techniques and interpretation of Baroque, Classical, Romantic, and Modern styles.

257 624. **Workshop in Instrumental Music.** (1). S. Teaching techniques, methods, and materials for woodwind, brass, string, and percussion sections of bands and orchestras.

257 625. **Workshop in Piano Pedagogy.** (1). S. Methods, materials, and teaching techniques for all grade levels.

257 626. **High School Music Theory.** (3). Offered on demand. The High School Theory course, its objectives and content; ear training techniques and development of creative work; music history and appreciation in a high school program. Pr.: Music 305.

257 627. **Music Theory in the Junior College I.** (3). Given in alternate summers and on demand. A course presenting a thorough review of music fundamentals and the methods of presenting sight-singing, ear training part-writing and keyboard harmony to first year classes in Music theory in the Junior College. Pr.: Graduate standing or consent of instructor.

257 628. **Music Theory in the Junior College II.** (3). Given in alternate summers and on demand. Methods of presenting elementary counterpoint, contemporary idioms, and correlated ear training procedures for second year classes in Music Theory in the Junior College. Pr.: Music 627.

257 629. **Music History and Appreciation in the Junior College.** (3). Given summers on demand. A study of course content, texts, and materials leading to effective courses in music history and music appreciation in the Junior College. Pr.: Graduate standing or consent of instructor.

257 630. **Instrumental Administration, Methods and Techniques.** (3). II, S. The school instrumental program, its administration, training and materials. Emphasis on senior and junior high problems. Pr.: Junior standing.

257 631. **Marching Band and Stageband Techniques.** (3). S. Show ideas and organization, music selection, rehearsal techniques, organization and administration of the marching band and stage band. Pr.: Junior standing.

257 660. **Survey of Writings on Music and Music Education.** (3). II, S. A survey of writings in the field of aesthetics, criticism, psychology of music, and philosophy of music education. Pr.: Graduate standing or consent of instructor.

Courses in Applied Music

UNDERGRADUATE CREDIT

257 050. **Recital Attendance.** (0). I, II.

257 111. **Concert Choir.** (1). I, II. Membership by tryout.

257 115. **Band.** (1). I, II. Membership by tryout.

- 257 121. **Collegiate Chorale.** (1). I, II, S.
- 257 125. **K-State Singers.** (1). I, II. Membership by tryout. (not open to Music majors.)
- 257 130. **Orchestra.** (1). I, II. Membership by tryout.
- 257 135. **Varsity Men's Glee Club.** (1). I, II, 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.
- 257 206. **Piano Class I.** (1). I, II. Instruction in the rudiments of playing the piano. Open to students without previous study.
- 257 207. **Piano Class II** (1). I, II. Continuation of Music 206.
- 257 208. **Piano Class III.** (1). I, II. Continuation of Music 207.
- 257 209. **Piano Class IV.** (1). I, II. Continuation of Music 208.
- 257 233. **Wind Techniques and Materials.** (2). II, S. The fundamentals of playing and methods for teaching wind instruments.
- 257 234. **String Techniques and Materials.** (2). I, S. The fundamentals of playing and methods of teaching stringed instruments.
- 257 235. **Percussion Techniques and Materials.** (1). II, S. The fundamentals of playing and methods of teaching percussion instruments.

The following undergraduate courses in Applied Music offered each semester and summer carry from 1 to 4 hours per semester, with a maximum of 32 hours in any one applicable to a degree.

- 257 251. **Pre-Applied Study.**
- 257 252. **Baritone**
- 257 254. **Bassoon**
- 257 256. **Clarinet**
- 257 258. **Double Bass**
- 257 260. **Flute**
- 257 262. **French Horn**
- 257 263. **Harpsichord**
- 257 264. **Oboe**
- 257 266. **Organ**
- 257 267. **Harp.**
- 257 268. **Percussion**
- 257 270. **Piano**
- 257 272. **Saxophone**
- 257 275. **Trombone**
- 257 276. **Trumpet**
- 257 278. **Tuba**
- 257 280. **Viola**
- 257 282. **Violin**
- 257 284. **Violoncello**
- 257 286. **Voice**
- 257 287. **Singer's Diction** (0). I, II, S. For all Applied Voice majors and Music Education majors with voice option. Rules for pronouncing and translating foreign language texts. Requirements: 6 semesters with a

minimum grade of C. Normal sequence: Freshman, Italian diction; Sophomore, German diction; Junior, French diction.

- 257 288. **Instrumental Ensemble.** (1). I, II, S. Elective for selected students.
- 257 289. **Stage Band Ensemble.** (1). I, II, S. Elective for selected students.
- 257 290. **Vocal Ensemble.** (1). I, II, S. Elective for selected students.
- 257 291. **Madrigal Singers.** (1). I, II.
- 257 350. **Studio Accompanying.** (1). Offered on demand. Piano student assigned to studio instructor. Accompanies applied lessons for at least 2 hours per week. Ensemble credit for pianists. Pr.: Consent of instructor.
- 257 351. **Recital Accompanying.** (1). Offered on demand. Piano student assigned to a music major preparing for graduation recital. Pianist accompanies student in his lessons and presents the formal public program as course requirement. Pr.: Consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

- 257 403. **Piano Proficiency.** (0). I, II, S. Required for graduation of all music majors.
- 257 475. **Opera Workshop.** (1-6). I, II, S. Courses may be repeated until 6 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 opera. Offered jointly by the Departments of Music and Speech. Vocal Ensemble credit may be earned in this course. Same as Speech 475.
- 257 530. **Advanced String Techniques and Materials.** (2). II. Playing and teaching skills beyond fundamentals and presentation of materials suitable for private and public school instruction at the secondary level. Required of brass and woodwind majors in the Music Education program. Pr.: Music (Applied) 234.
- 257 531. **Advanced Woodwind Techniques and Materials.** (2). I, II. Playing and teaching skills beyond fundamentals and presentation of materials suitable for private and public school instruction at the secondary level. Required of string and brass majors in the Music Education program. Pr.: Music (Applied) 233.
- 257 532. **Advanced Brass Techniques and Materials.** (2). I, II. Playing and teaching skills beyond fundamentals and presentation of materials suitable for private and public school instruction at the secondary level. Required of string and woodwind majors in the Music Education program. Pr.: Music Applied 233.

UNDERGRADUATE AND GRADUATE CREDIT

- 257 637. **Literature for Pipe Organ I.** (2). I. Survey of organ literature of the Renaissance and Baroque Eras. Pr.: Music (Applied) 266 and consent of instructor.
- 257 638. **Literature for Pipe Organ II.** (2). II. Continuation of Music 637, with emphasis on literature from the Romantic and Modern Eras. Pr.: Music (Applied 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 fundamental techniques; selection of teaching materials; outlining courses of study. For students in the curriculum in Applied Music. Taught in divisions according to the major.

257 644. **Practice Teaching in Applied Music.** (1). II, S. Studio teaching for students in Applied Music. Pr.: Music Applied 642.

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 major. May be repeated for credit.

The following courses in Applied Music offered each semester and summer carry from 1 to 4 hours credit per semester.

- 257 852. Baritone
- 257 854. Bassoon
- 257 856. Clarinet
- 257 857. Advanced Composition
- 257 858. Double Bass
- 257 860. Flute
- 257 862. French Horn
- 257 863. Harpsicord
- 257 864. Oboe
- 257 866. Organ
- 257 868. Percussion
- 257 870. Piano
- 257 872. Saxophone
- 257 875. Trombone
- 257 876. Trumpet
- 257 878. Tuba
- 257 880. Viola
- 257 882. Violin
- 257 884. Violoncello
- 257 886. Voice

Fees for Private Music Lessons

University students enrolled in the Applied Music or Music Education curriculum 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 curricula 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.
- Single lessons, each — \$4.

Philosophy

B. R. TILGHMAN,* Head of Department

Professors Miller* and Tilghman;* Associate Professor Scheer;* Assistant Professors Greenberg and Reagan;* Instructor Hamilton.

The program in philosophy is designed to give the student a broad knowledge of philosophy, its history, problems, and methods. Philosophy is the study of the conceptual foundations of virtually every area of human thought and activity, art, science, religion, moral conduct, politics, etc., and anyone who engages in any kind of reflective thinking about these areas of thought and activity is bound to encounter problems of a philosophical nature. Courses in philosophy are intended to teach students to identify these problems and to deal with them in an intelligent and informed manner.

While at the present time the only professional opportunities for trained philosophers are in college and university teaching, philosophy is recommended as a highly suitable major for undergraduates desiring general training in the liberal arts and as excellent preparation for specialized graduate study in a number of other disciplines and as preparation for professional training in such fields as law, the ministry, and government service.

UNDERGRADUATE STUDY

A major in philosophy requires 30 hours in philosophy and must include the following courses: Phil. 171, 221, 450, and 451. At least 15 of the 30 hours must be in courses numbered 400 or above.

GRADUATE STUDY

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 covering (1) the history of philosophy, (2) logic, (3) ethics, and (4) one of the following: epistemology, metaphysics, philosophy of science, aesthetics, social and political philosophy; a thesis; and successful performance on the final oral examination.

Students seeking admission to the graduate program should have adequate undergraduate preparation in logic, ethics, and the history of philosophy. When evidence of

such preparation is lacking students may be required to take the appropriate undergraduate courses before being admitted to full graduate standing.

Courses in Philosophy

UNDERGRADUATE CREDIT

259 165. Introduction to Philosophy. (3) I, II, S. An introduction to the main problems of philosophy based on the study of selected writings of important philosophers, both classical and contemporary. Not open to juniors and seniors.

259 166. Honors Introduction to Philosophy. (4) I, II. An introduction to the main problems of philosophy. For freshmen and sophomores in the Honors Program.

259 170. Introduction to Logic. (3) I, II, S. An introduction to both deductive and inductive logic. A study of elementary formal logic and problems about the nature of knowledge and scientific method.

259 171. Symbolic Logic I. (3) I, II, S. A systematic introduction to modern logic. Truth-functions, truth-tables, and calculus of propositions, classes and relations.

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.

259 221. 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.

259 397. Experimental Studies in Philosophy. (1-6). I, II. Experimental and interdisciplinary studies in philosophy. Topics selected in consultation with instructor. Pr.: Permission of instructor.

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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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. Cannot be counted toward the major in philosophy nor as satisfying a philosophy requirement.

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 or permission from the instructor.

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.

259 450. 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.

259 451. History of Philosophy II. (3) II. The development of philosophical ideas from the Renaissance to the nineteenth century.

259 500. Introduction to the Philosophy of the Social Sciences. (3) II. An examination of the possibility of a science of man and of specific issues in the social sciences such as models and measurement, reduction, functional analysis, ideal types and axiomatization. For students in sociology, anthropology, political science, psychology, geography and history. Pr.: One course in philosophy or permission of the instructor.

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.

259 545. 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.: One course in philosophy or consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT

259 600. The Philosophy of Science. (3) I or II. Philosophical problems concerning science, its methods, laws and theories. Pr.: One course in philosophy or consent of instructor.

259 610. Studies in Ancient Philosophy. (3) I. A detailed study of a selected philosopher or movement in the history of Greek and Roman philosophy. Pr.: Phil. 450 or consent of instructor.

259 612. Studies in 17th and 18th Century Philosophy. (3) II. A detailed study of a selected philosopher, school, or problem drawn from the history of philosophy in the 17th and 18th centuries. Pr.: Phil. 451 or consent of instructor.

259 614. Recent Continental Philosophy. (3) I or II. An examination of important issues and movements in 20th century European philosophy. Emphasis upon existentialism and phenomenology. Pr.: One course in philosophy or consent of instructor.

259 616. The Development of Analytical Philosophy. (3) I. The history of analytical philosophy in the first four decades of the 20th century. A study of the work of Moore, Russell, the early Wittgenstein, and the logical positivists. Pr.: One course in philosophy or consent of instructor.

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.

259 632. Recent British-American Philosophy. (3) II. A detailed study of selected philosophical writings of current interest in Great Britain and the United States. Pr.: One course in philosophy or consent of instructor.

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 consent of instructor.

259 705. **Epistemology.** (3) I. An examination of philosophical problems about the nature of our knowledge of the world. Pr.: one course in philosophy or consent of instructor.

259 710. **Metaphysics.** (3) II. A critical examination of theories about things and their qualities, causality, space, and time. Both traditional and contemporary sources will be used, but emphasis will be placed on the latter. Pr.: one course in philosophy or consent of instructor.

259 715. **The Philosophy of Mind.** (3) I. The philosophy of psychology. An examination of philosophical problems about such psychological concepts as mind, consciousness, thinking, emotion, and dreaming. Pr.: one course in philosophy or permission of instructor.

259 720. **Recent Aesthetic Theory.** (3) II. A study of selected work of current importance in the philosophy of art. Pr.: Phil. 515 or consent of instructor.

259 760. **Symbolic Logic II.** (3) I. An advanced study of logical systems and problems in logical theory. Pr.: Phil. 171 or consent of instructor.

259 765. **The Philosophy of Language.** (3) I or II. Philosophical problems concerning the nature of language and such concepts as meaning and truth. Pr.: one course in philosophy or consent of instructor.

259 780. **Problems in Philosophy.** Credit arranged. I, II, S. Independent study for qualified students. Pr.: Background of courses required for problem undertaken.

GRADUATE CREDIT

259 800. **Tutorial in Philosophy.** (3) I, II. Directed study of a topic selected in consultation with the instructor. Designed to develop skill in philosophical techniques, paper writing, and library research. Required of all philosophy students in first semester of graduate study.

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.** (3) II. Required of all graduate students in philosophy. May be repeated once for credit. Pr.: Phil. 800.

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

CHARLES B. CORBIN*, Head of Department

Professors Corbin,* Evans* and Geyer;* Associate Professor Wauthier;* Assistant Professors Gench, McKinney,* Merriman, Snyder* and Thompson;* Instructors Bolan, Laurie, Poole and Wardell; Emeritus: Professor Myers.

UNDERGRADUATE STUDY

Basic Physical Education Requirement

David Laurie, Coordinator

Freshman students enroll in two semesters of non-credit physical education to satisfy the physical education requirement. One semester must be the course 261 001, Concepts in Physical Education; the other may be selected from those listed in this catalog (261 004 through 261 059). After completion of Concepts in Physical Education and one other non-credit class, students are encouraged to enroll in one credit hour course (261 101 through 261 159) where an opportunity will be given for gaining knowledge, skill, and appreciation of lifetime recreational activities.

Undergraduate Major in Physical Education

Barbara Gench, Coordinator

For a degree in physical education, students should take the following:

I. General Education Requirements — see page 84.

II. Professional Education Requirements — see below.

III. Professional Physical Education Core.

Core Courses (to be taken by all majors):

261 465	Physiology of Exercise	4
261 290	Kinesiology	3
261 526	First Aid-Instructors	3
261 470	Motor Behavior and Skill Learning	3
261 230	Social Dimensions of Physical Activity	3
261 356	Personal and Community Health	3
261 206	Intro. to Phys. Ed.	3
261 001(m)	Concepts in Phys. Ed.	0
	Elective in Phys. Ed.	0
	(to be selected from courses numbered 261 004 through 261 059)	
261 460	Practice Teaching in Phys. Ed.	2

IV. Physical Education Specialization Area

To graduate with a bachelor of science degree in physical education a student must complete one of the following:

A. Elementary Physical Education Specialization

261 380	Phys. Ed. Materials for the Elem. Schools.	3
261 353	Rhythms for Elem. Schools	3
261 355	Movement Exploration	3
261 241	Gymnastics and Lead-up Games for Elem. Schools	3
261 612	Test and Measurement for Elem. School Phys. Ed.	3
261 469	Methods and Curriculum in Phys. Ed. for Elem. Schools	3

B. Secondary Physical Education Specialization

261	331	Individual Activities for Sec. Schools	3
261	366	Team Sports for Sec. Schools	3
261	351	Rhythms for Sec. Schools	3
261	306	Gymnastics and Recreational Games for Sec. Schools	3
261	610	Test and Measurement for Sec. School Phys. Ed.	3
261	476B	Methods and Curriculum in Phys. Ed. for Sec. Schools	3*

C. Health Education Specialization

261	483	Current Health Issues	3
261	614	Tests and Measurements in Health	3
215	200	Public Health Biology	3
215	303	Ecosystems and Man	3
		Elective	3
261	476A	Teaching Health in Elem. and Sec. Schools	3*

D. General Non-Teaching Area

Students not planning teaching careers may complete the physical education major by electing any eighteen hours from courses numbered 261 101 through 261 699, in addition to those hours included in the core. Students planning careers in recreation related areas are encouraged to elect from the following:

261	320	Recreation Leadership	
261	382	Camp Counseling	
261	615	Community Recreation	
261	620	Organization and Administration of Intramural Programs	

Coaching Program

This program is designed to prepare coaches in all areas of varsity athletics, and is open to non-majors as well as physical education majors. Students completing the following courses will receive an athletic coaching endorsement from the Department of Physical Education. Majors taking this program must also complete the required core courses as well as one area. Non-majors are not required to take any work in the physical education department in addition to the coaching program.

261	359	Org. and Adm. of Athletics	3
261	310	Treatment of Athletic Injuries	3
261	358	Tech. of Training and Conditioning	2
261	357	Exercise Science or Physiology of Exercise	3
261	465	or	
261	375	First Aid	2-3
261	377	or	

Four hours elected from the following:

261	302	Tech. of Basketball	2
261	305	Tech. of Football	2
261	301	Tech. of Gymnastics	2
261	217	Tech. of Wrestling	2
261	245	Tech. of Swimming	2
261	385	Tech. of Tennis and Golf	2
261	303	Tech. of Baseball	2
261	304	Tech. of Track & Field	2
261	300	Tech. of Volleyball	2

GRADUATE STUDY

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 an undergraduate major in physical education or equivalent. Specific deficiencies may be made up prior to final acceptance for the graduate program.

Students may choose from the following degree options: (1) 30 hours including a six to eight hour thesis and an oral comprehensive examination; (2) 30 hours including a two hour master's report and an oral comprehensive examination; or (3) 34 hours including oral and written comprehensive examinations. A minimum of 18 semester hours must be earned in physical education and a minimum of 9 hours in areas outside the major.

Courses in Physical Education

UNDERGRADUATE CREDIT

The following undergraduate courses in Physical Education may be taken to meet the Physical Education requirement. All courses are coed unless otherwise indicated.

- 261 001. Concepts in Physical Education. (0).
- 261 002. Concepts in Physical Education. (Majors) (0).
- 261 003. Concepts in Physical Education. (Honors) (0).
- 261 004. Adaptive Physical Education. (0).
- 261 005. Beginning Swimming. (0).
- 261 006. Intermediate Swimming. (0).
- 261 007. Advanced Swimming. (0).
- 261 008. Diving. (0).
- 261 009. Synchronized Swimming. (0).
- 261 010. Beginning Scuba Diving. (0).
- 261 011. Advanced Scuba Diving. (0).
- 261 012. Senior Life Saving. (0).
- 261 013. Wrestling for Men. (0).
- 261 014. Weight Training for Men. (0).
- 261 015. Calisthenics and Weight Conditioning Exercises for Men. (0).
- 261 016. Calisthenics and Fitness Conditioning for Women. (0).
- 261 017. Folk Dance. (0).
- 261 018. Social Dance. (0).
- 261 019. Square Dance. (0).
- 261 020. Tap Dance. (0).
- 261 021. Beginning Modern Dance. (0).
- 261 022. Intermediate Modern Dance. (0).
- 261 023. Advanced Modern Dance. (0).
- 261 024. Tumbling and Trampoline. (0).
- 261 025. Beginning Gymnastics and Apparatus. (0).

*Included as part of the professional education requirement.

- 261 026. Advanced Gymnastics and Apparatus. (0).
- 261 027. Beginning Bowling. (0).
- 261 028. Advanced Bowling. (0).
- 261 029. Beginning Golf. (0).
- 261 030. Advanced Golf. (0).
- 261 031. Fencing. (0).
- 261 032. Billiards and Snooker. (0).
- 261 033. Table Tennis. (0).
- 261 034. Horse Shoes. (0).
- 261 035. Beginning Tennis. (0).
- 261 036. Advanced Tennis. (0).
- 261 037. Beginning Badminton. (0).
- 261 038. Advanced Badminton. (0).
- 261 039. Archery. (0).
- 261 040. Field Archery. (0).
- 261 041. Beginning Riflery. (0).
- 261 042. Advanced Riflery. (0).
- 261 043. Roller Skating. (0).
- 261 044. Handball. (0).
- 261 045. Paddle Ball. (0).
- 261 046. Horsemanship. (0).
- 261 047. Soccer for Men. (0).
- 261 048. Power Volleyball. (0).
- 261 049. Cycling. (Bicycle) (0).
- 261 050. Jogging. (0).
- 261 051. Water Skiing. (0).
- 261 052. Camping. (0).
- 261 053. Hiking. (0).
- 261 054. Bait and Fly Casting. (0).
- 261 055. Angling. (Fishing) (0).
- 261 056. Canoeing. (0).
- 261 057. Field Hockey for Women. (0).
- 261 058. Judo. (0).
- 261 059. Trap Shooting. (0).

The following undergraduate courses in physical education may be taken for elective credit.

- 261 101. Concepts in Physical Education. (1).
- 261 102M. Concepts in Physical Education (Majors). (1).
- 261 103H. Concepts in Physical Education (Honors). (1).
- 261 104. Adaptive Physical Education. (1).
- 261 105. Beginning Swimming. (1).
- 261 106. Intermediate Swimming. (1).
- 261 107. Advanced Swimming. (1).
- 261 108. Diving. (1).
- 261 109. Synchronized Swimming. (1).
- 261 110. Beginning Scuba Diving. (1).
- 261 111. Advanced Scuba Diving. (1).
- 261 112. Senior Life Saving. (1).
- 261 113. Wrestling for Men. (1).
- 261 114. Weight Training for Men. (1).
- 261 115. Calisthenics and Weight Conditioning Exercises for Men. (1).
- 261 116. Calisthenics and Fitness Conditioning for Women. (1).

- 261 117. Folk Dance. (1).
- 261 118. Social Dance. (1).
- 261 119. Square Dance. (1).
- 261 120. Tap Dance. (1).
- 261 121. Beginning Modern Dance. (1).
- 261 122. Intermediate Modern Dance. (1).
- 261 123. Advanced Modern Dance. (1).
- 261 124. Tumbling and Trampoline. (1).
- 261 125. Beginning Gymnastics and Apparatus. (1).
- 261 126. Advanced Gymnastics and Apparatus. (1).
- 261 127. Beginning Bowling. (1).
- 261 128. Advanced Bowling. (1).
- 261 129. Beginning Golf. (1).
- 261 130. Advanced Golf. (1).
- 261 131. Fencing. (1).
- 261 132. Billiards and Snooker. (1).
- 261 133. Table Tennis. (1).
- 261 134. Horse Shoes. (1).
- 261 135. Beginning Tennis. (1).
- 261 136. Advanced Tennis. (1).
- 261 137. Beginning Badminton. (1).
- 261 138. Advanced Badminton. (1).
- 261 139. Archery. (1).
- 261 140. Field Archery. (1).
- 261 141. Beginning Riflery. (1).
- 261 142. Advanced Riflery. (1).
- 261 143. Roller Skating. (1).
- 261 144. Handball. (1).
- 261 145. Paddle Ball. (1).
- 261 146. Horsemanship. (1).
- 261 147. Soccer for Men. (1).
- 261 148. Power Volleyball. (1).
- 261 149. Cycling (Bicycle). (1).
- 261 150. Jogging. (1).
- 261 151. Water Skiing. (1).
- 261 152. Camping. (1).
- 261 153. Hiking. (1).
- 261 154. Bait and Fly Casting. (1).
- 261 155. Angling (Fishing). (1).
- 261 156. Canoeing. (1).
- 261 157. Field Hockey for Women. (1).
- 261 158. Judo. (1).
- 261 159. Trap Shooting. (1).

The following courses may be taken by students majoring in physical education or other students meeting prerequisite requirements.

- 261 206. Introduction to Physical Education. (3). Introductory survey of the field and study of the historical background philosophy and principles of physical education and health. Field experience in the public schools.
- 261 215. Techniques of Officiating Team Sports. (2). Principles and practices of officiating team sports.
- 261 216. Techniques of Officiating Individual Sports. (2). Principles and practices of officiating individual sports.

261 217. Techniques of Wrestling. (2). Study of rules, theory and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 230. Social Dimensions of Physical Activity. (3). An in-depth review of pertinent research dealing with the social significance of physical activity and the implications of that research to physical education and athletic programs.

261 241. Gymnastics and Lead-Up Games for Elementary Schools. (3). A selection of activities and techniques of teaching beginning tumbling and apparatus work and games suitable for acquiring skills and basic concepts used in sports activities for grades K-6. One hour recitation, four hours lab.

261 245. Techniques of Swimming. (2). Study of rules, theory and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 290. Kinesiology. (3). Basic mechanics of human motion, action of joints and muscles, major types of motor skills and application to physical education activities. Laboratory exercises supplement this. Two hours recitation, two hours lab. Pr.: Biology 215.

261 300. Techniques of Volleyball. (2). Study of rules, theory, and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 301. Techniques of Gymnastics. (2). Study of rules, theory, and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 302. Techniques of Basketball. (2). Study of rules, theory and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 303. Techniques of Baseball. (2). Study of rules, theory, and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 304. Techniques of Track and Field. (2). Study of rules, theory, and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 305. Techniques of Football. (2). Study of rules, theory and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 306. Gymnastics and Recreational Games for the Secondary Schools. (3). Theory and practice of tumbling and gymnastics, and recreational games, one-half semester each. One hour rec. and four hours lab. a week. Required for secondary program.

261 310. Treatment of Athletic Injuries. (3). Principles and practices of massage, taping and care of minor athletic injuries. Pr.: Ph. Ed. 230 or 455.

261 320. Recreational Leadership. (3). Principles and methods of organizing communities for leisure activities.

261 331. Individual Activities for Secondary Schools. (3). Theory and practice of selected activities from the following list: archery, badminton, tennis, bowling, golf, fencing, and wrestling. One hour rec. and four hours lab. a week. Required for secondary program.

261 341. Life Saving and Water Safety Instruction. (2). 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 water safety instructor. Not open to students in physical education. Pr.: Advanced swimming.

261 345. Life Saving and Water Safety Instruction. (2). 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. For majors in physical education only.

261 351. Rhythms for Secondary Schools. (3). Fundamental rhythms, techniques and materials for teaching folk, square, modern, and social dance in secondary schools. One hour rec. and four hours lab. a week. Required for secondary program.

261 353. Rhythms for Elementary Schools. (3). An introduction to and techniques of basic dance moves, including creative, folk, country, and square for grades K-6. One hour rec. and four hours lab. a week.

261 355. Movement Exploration. (3). A study of a problem solving approach to teaching movement and motor skills to elementary school children. One hour rec. and four hours lab. a week. Pr.: Ph. Ed. 380.

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.

261 357. Exercise Science. (3). To teach the basic principles of physiology, psychology, and use of audio-visual analysis in reference to coaching. Pr.: Sophomore standing.

261 358. Techniques of Training and Conditioning. (2). A study of the anatomical and physiological responses of the body to specific forms of exercise such as calisthenics, isotonic and isometric exercise, aerobics, and interval training.

261 359. Organization and Administration of Athletics. (3). A study of the organization of athletics, including budgeting, equipment, legal aspects and public relations. Pr.: Junior standing.

261 360. Dance Composition. (2). Principles and methods of modern dance composition. Discussion of costuming and staging dance. Four hours lab. a week. Pr.: Ph. Ed. 011, one semester of modern dance, or consent of instructor.

261 366. Team Sports for Secondary Schools. (3). Theory and practice of selected activities from the following list: basketball, soccer, speedball, speedaway, field hockey, flag football and softball. One hour rec. and four hours lab. a week. Required for secondary program.

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.

261 377. First Aid. (3). First aid training for prevention and treatment of injuries in an emergency. Upon satisfactory completion of this course certificates are awarded by the American Red Cross as a standard, advanced, and instructor in first aid. For majors in physical education only. Pr.: Biology 215, 425.

261 380. Physical Education Materials for Elementary Schools. (3). Selection and presentation of physical education activities suitable for use with elementary school age children, with emphasis on fundamental movements and skills, games of low organization,

classroom games, self-testing activities, body mechanics and warm-up activities, physical fitness, stunts and tumbling. One hour recitation, four hours lab. Required for elementary program.

261 382. Camp Counseling. (3). Basic principles and skills in camping for future counselors. Pr.: Sophomore standing or consent of instructor.

261 385. Techniques of Tennis and Golf. (2). Study of rules, theory, and practices; methods of coaching. Pr.: Ph. Ed. 230 or 357, or consent of head of department.

261 460. Practice Teaching in Physical Education. (2). Supervised students assist in basic physical education classes. Four hours lab. a week. Pr.: Junior standing.

261 461. Adapted Physical Education. (3) I, II. Developmental, Remedial and Corrective Physical Education. Emphasis placed on adaptations designed to meet the needs of individuals requiring special attention beyond the regular physical education program. Pr.: Biology 215, 245; Ph. Ed. 261 290, or consent of instructor.

261 465. Physiology of Exercise. (4). A study of the effects of exercise on the human organism, and a survey of the health benefits of exercise. Specific areas of study include exercise and child development, exercise metabolism, ergogenic aids to performance, and techniques of physical fitness development. Three hours rec. and two hours lab. a week. Pr.: Biol. 215, 425 or consent of instructor.

261 469. Methods and Curriculum in Physical Education for Elementary Schools. (3). Methods of teaching and organization of material in a progression for an elementary physical education program. Pr.: Ph. Ed. Core, 241, 380, 353, 355. Same as Educ. 476.

261 470. Motor Behavior and Skill Learning. (3). A study of learning in the psychomotor domain. Specific areas of study include motor learning theories, motor development, physiological bases of skill behavior, motor and skill learning, the state of the performer, and the application of instructional techniques. Two hours rec. and two hours lab. a week.

261 476. Methods and Curriculum Development in Physical Education for Secondary Schools. (3). Methods of teaching and organization of material in a progression for a secondary school physical education program. Pr.: Ph. Ed. Core, 306, 331, 351, and 366. Required for Secondary Program. Same as Educ. 476.

261 481. Teaching Health in Elementary and Secondary Schools. (3). Materials and practices of teaching health in the elementary and secondary schools. Pr.: Ph. Ed. 356; Biol. 215, 425.

261 483. Current Health Issues. (3). A study and discussion of current issues of concern such as drug abuse, sexuality, human diseases and relationship of ecology to health. Pr.: Open only to students in the Health Education Program. Junior Standing.

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.

261 566. Methods and Materials of Dance. (3). History of the dance; methods of dance. One hour rec. and three

hour lab. a week. Pr.: Semester each of beginning and intermediate dance.

UNDERGRADUATE AND GRADUATE CREDIT

261 600. Principles and Philosophy of Physical Education. (3). Study of historical and philosophical foundations of physical education and an analysis of the principles of physical education.

261 601. Sport and Human Behavior. (3). A study of the state of the sport performer and the effects of sport on human behavior. Pr.: Ph. Ed. 470.

261 610. Test and Measurements for Secondary School Physical Education. (3). Designed to give the student a foundation in techniques of evaluation, including elementary statistical procedures, the preparation and administration of skill and written tests, and the use of other evaluative materials in the fields. Pr.: Ph. Ed. 306, 331, 351, and 365.

261 612. Test and Measurement for Elementary School Physical Education. (3). Techniques of measuring and evaluating the achievements of fundamental motor skill performance, physical fitness, and other major objectives of elementary school physical education programs. Required for elementary program. Pr.: Ph. Ed. 241, 353, 355, 380.

261 614. Test and Measurements in Health. (3). Techniques in administration of testing and evaluating health attitudes and knowledge. Pr.: Senior standing and students in the Health Education Program.

261 615. Community Recreation. (3). A study of organization and administration of municipal recreation programs including club work for youth, camping, playground and indoor recreation centers. Pr.: Ph. Ed. 230, Psych. 110.

261 618. Film Analysis of Sport. (3). The use and analysis of film, tape and other related aids for coaches. Pr.: Junior standing.

261 620. Organization and Administration of Intramural Programs. (3). Policies and procedures in organizing and administering an intramural program.

261 630. Curriculum Construction in Physical Education. (3). A study of behavioral physical education objectives, methods of electing program content, and the guiding principles of curriculum development. Pr.: Ph. Ed. 476A, 476B, or 476C.

261 650. Teaching Concepts of Physical Education. (3). A study of teaching methods applied to instruction of the basic concepts of physical education; organization of teaching materials for a foundations or conceptual program on physical education.

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.

GRADUATE CREDIT

261 800. Advanced Physiology of Exercise. (4). Effects of exercise on the human organism with special emphasis

on current research in sport medicine and exercise science. Pr.: Ph. Ed. 465

261 810. Evaluation in Physical Education. (3). A study of basic techniques used to evaluate objectives, conduct research, and conduct laboratory experiments in physical education. Pr.: Ph. Ed. 612, 614, or 610.

261 815. Research Methods in Physical Education. (3). A study of techniques of research including the design of experiments and the use of appropriate statistics.

261 820. Supervision of Physical Education. (3). A study of the objectives, organization, and methods of supervising elementary and secondary physical education programs.

261 825. Mechanical Analysis of Human Movement. (3). A study of mechanical principles applied to analysis of human movement including cinematographical analysis of sports activities. Pr.: Ph. Ed. 490.

261 840. Administration of School Health Education Programs. (3). A study of the organization and administration of health services, health instruction, and health environment for primary and secondary schools health councils. Pr.: Ph. Ed. 481.

261 999. Research in Physical Education. Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken.

Varsity Athletics Program

The following courses may be taken for one hour elective credit. They will not meet the requirements for physical education credit and will not be applied toward a major in physical education.

261 101. Advanced Varsity Baseball. (1).

263 102. Advanced Varsity Basketball. (1).

263 103. Advanced Varsity Football. (1).

263 104. Advanced Varsity Golf. (1).

263 105. Advanced Varsity Gymnastics. (1).

263 106. Advanced Judo Sports. (1).

263 107. Advanced Varsity Rowing. (1).

263 108. Advanced Varsity Swimming. (1).

263 109. Advanced Varsity Tennis. (1).

263 110. Advanced Varsity Track. (1).

263 111. Advanced Varsity Wrestling. (1).

263 112. Advanced Women's Intercollegiate Sports. (1).

263 113. Advanced Soccer. (1).

Physics

CHARLES HATHAWAY,* Head of Department

Professors Bark,* Cardwell,* Curnutte,* Dale,* Dragsdorf,* Ellsworth,* Leachman,* and Williams;* Associate Professors Bhalla* Hathaway,* Legg,* Macdonald,* Manney,* Seaman,* Shore,* and Spangler;* Assistant Professors Brown, Cocke,* Eck,* Evans,* Folland,* Jack,* Lee,* Rosenkilde,* Weaver, Zollman; Research Associates Bird, Brown, Costanzi, Laumer, Robertson, Rudy, Emeritus: Associate Professors Avery, Chapin,* Crawford,* Maxwell, Instructor Green.

Physics is a quantitative science based on observation and experiment. A student of physics learns, often by performing experiments himself, how a body of experimental data suggests an experimental law. Then he sees how this experimental law can be generalized and always tested by further experiment. However, it is as the originator of the next step in the method of science that physics emerges as the foundation of our technological age. The collection of experimental laws is studied and when properly generalized and tested is unified into a fundamental physical principle. This is a continuing process in which the only limitations are the minds of man and nature's willingness to divulge her secrets.

UNDERGRADUATE STUDY

A major in physics equips a liberal arts student with a broad education which is uniquely adapted to our time. The program for majors is designed for the individual who will apply his knowledge in research or teaching. Although physics does not exclude the intuitive mind, the emphasis on mathematics tends to favor the more analytically inclined.

In addition to the general requirements for the Bachelor of Science degree a physics major must complete the following core courses: 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. These courses are chosen in consultation with the student's departmental advisor. Option I. Physics and Astronomy: Nine additional hours in physics and mathematics, usually Phys. 640, 645 and Math. 551. Option II. Engineering Physics: Nine additional hours in physics or approved engineering courses.

Option III. Physics Teaching: Requirements of the College of Education for a Teaching Certificate.

GRADUATE STUDY

The Department of Physics offers work leading to the degrees, Master of Science and Doctor of Philosophy. Students planning a career in research or teaching physics in a college or university should plan a program leading to an advanced degree. Students planning a career in teaching physics at the high school or junior college level might consider a program leading to the degree, Master of Science in Physical Science Teaching. The latter program provides a broader choice of course work in several science fields, than do the professionally oriented programs.

Students who plan to teach physics in college should consider a program administered by the College of Education leading to the degree, Doctor of Philosophy in Education with a specialty in College Physics Teaching. Courses are taken in both physics and education and a student's thesis research may involve work in either area.

For admission with full graduate standing into an advanced degree program in physics a student must have completed undergraduate courses equivalent to those in the undergraduate physics core described above. Prospective graduate students whose undergraduate training does not meet these requirements may be admitted on a provisional basis. Such students are required to remedy deficiencies in their undergraduate preparation by completing the undergraduate courses without receiving graduate credit.

Information on the undergraduate and graduate programs, the supporting facilities, financial support, and the research activities in physics may be obtained from the Head, Department of Physics. (Some of the major items of scientific equipment are described under the heading "Scientific Equipment" on page 18).

Courses in Physics

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. Open only to freshmen, sophomores, and first semester transfer students (effective September 1971).

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. Three hours lec., one hour quiz, and two hours lab. a week. Pr.: High School algebra.

265 126. **Physics for Musicians.** (3) II. Selected topics applied to the physics of music and musical instruments.

265 131. **Descriptive Astronomy.** (3) I, S. A qualitative study of the sun and planets, stars and galaxies; a survey of what is known and how it is known. Occasional planetarium and telescopic observing sessions.

265 135. **Descriptive Meteorology.** (3) II, S. Non-technical treatment of the fundamentals of modern meteorology and associated physical processes.

265 140. **Freshman Physics Seminar I.** (1) I. Topics of special interest to freshmen majoring in physics. Subjects discussed include possible careers in physics, current research at KSU, and selected developments illustrating the methodology of physics.

265 143. **Freshman Physics Seminar II.** (1) II. Continuation of 265 140.

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.

265 397. **Independent Study in Physics.** (1-3) I, II, S. Independent theoretical or experimental investigation of a topic for physics majors. May be repeated for credit up to a maximum of six hours. Pr.: Junior standing and consent of instructor.

265 398. **Junior Honors Colloquium.** Variable credit. Open only to juniors in the Arts and Sciences Honors Program.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

265 400. **Atomic Physics.** (3) I, II, S. An introduction to contemporary theories and problems in physics. Pr.: Phys. 212 or 311; Math. 222.

265 401. **Microclimatology.** (3) I. (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) I. 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. 222 or conc. enrollment.

265 408. Intermediate Physics II. (3) II. Cont. of Phys. 407. Pr.: Phys. 407.

265 410. Light. (3) I. Alt. years. The application of the fundamentals of geometrical and physical optics to optical instruments. Phenomenology of the interaction of light and matter. Characteristics of light sources, filters, and detectors. Measurement of light and radiation. Prerequisites: Physics 212 or equiv. or consent of instructor.

265 421. Geophysics. (3) II. alt. years. Principles and methods of exploration geology by physical methods. Pr.: Phys. 212 or 311; Math. 221.

265 425. Solar Physics. (3) II. A quantitative study of the sun's atmosphere: the quiet sun; the photosphere and chromosphere; sunspots and solar activity; the solar corona; solar-terrestrial relations. Occasional observing sessions. Pr.: Phys. 212 or 311; Math. 221.

265 432. Mechanics I. (3) I. 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) II. 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) I. alt. years. A study of d. c. and a. c. circuits and measuring instruments. One hour rec. and three hour lab. a week. Pr.: Phys. 212 or 311; Math. 222.

265 502. Physics Laboratory I. (3) I. See Phys. 610. One hour rec. and six hours lab. a week. Pr.: One year of college physics.

265 503. Physics Laboratory II. (3) II. 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.

UNDERGRADUATE AND GRADUATE CREDIT

265 602. Electronic Physics. (3) II. alt. years. Basic vacuum tube and transistor circuit analysis. Studies of pulsed circuits and circuit logic. Pr.: Phys. 473.

265 604. X-ray and Crystal Physics. (3) II. alt. years. Pr.: Phys. 472.

265 607. X-ray Laboratory. (1) II. alt. years. Three hours lab. a week. Pr.: Phys. 604 or conc. enrollment.

265 610. Advanced Physics Laboratory. (1-3) I, II. 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) I. alt. years. The physics of astronomy. A qualitative survey of astronomical objects: the sun and planets; stars and galaxies; radio sources. A quantitative study of astronomical observations: magnitudes; parallax; stellar motions and statistics; stellar spectra; planetary motion. Occasional observing sessions. Pr.: Phys. 432, 472.

265 630. Semiconductor Physics. (3) II. alt. years. 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) II. Cont. of Phys. 432. Pr.: Phys. 432.

265 640. Introductory Quantum Mechanics I. (3) I. Methods of quantum mechanics and solution of selected problems in atomic, molecular, solid-state and nuclear physics. Special theory of relativity. Pr.: Phys. 432, 400; Math. 240.

265 642. Introductory Quantum Mechanics II. (3) II. Cont. of Phys. 640. Pr.: Phys. 640.

265 645. Thermodynamics and Statistical Physics. (3) II. Pr.: Phys. 432; Math. 240.

265 650. Physical Measurements Instrumentation. (4) II. A laboratory oriented course to acquaint students with electronic circuits, their interfacing with measuring instruments, and their use in making physical measurements. Two hours of lecture and six hours of laboratory each week. Pr.: Phys. 311 or consent of instructor.

265 672. Electricity and Magnetism II. (3) I. Cont. of Phys. 472. Pr.: Phys. 472.

265 675. Nuclear Physics. (3) II. Modern theories of nuclear physics. Pr.: Phys. 640.

265 685. Introduction to Optics. (4) I. Introduction to modern concepts in the study of optics: electromagnetic waves, interference, coherence, Fraunhofer and Fresnel diffraction, holography, non-linear optics, lasers, photon counting. Three hours lecture and three hours lab. a week. Pr.: Phys. 472 or E. E. 497.

265 701. Journal Club. Credit arranged. I, II. Seminar in current topics in physics. Pr.: Consent of instructor.

265 705. Introduction to Theoretical Physics. (3) I. Pr.: Consent of instructor.

265 710. Electrodynamics I. (3) II. Pr.: Phys. 705.

265 720. Introduction to Solid State Physics. (3) I. Pr.: Phys. 640.

265 725. Atomic Spectra. (3) I. Atomic energy levels and the origin of spectra. Pr.: Phys. 640.

265 726. Molecular Spectra. (3) II. Molecular energy levels and the origin of spectra. Pr.: Phys. 640.

265 730. Astrophysical Processes. (3) II. alt. years. A quantitative study of atomic processes in astrophysics: opacity; radiative transfer; reaction rates in plasmas; gas dynamics and shock waves; equilibrium properties of hot gasses; plasma spectroscopy. Pr.: Phys. 640, 645 or conc. enrollment; Phys. 613 recommended.

265 740. Colloquium in Physics. (0) I, II. Required of graduate majors and undergraduate majors.

265 799. Topics in Physics. Credit arranged. I, II, S.

GRADUATE CREDIT

- 265 825. Advanced Dynamics. (3) II. Pr.: Phys. 705.
- 265 835. Electrodynamics II. (3) I. Pr.: Phys. 710.
- 265 855. Statistical Mechanics. (3) II. 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) I. Pr.: Phys. 640, 705, 825.
- 265 875. Quantum Mechanics II. (3) II. Pr.: Phys. 865.
- 265 885. Advanced Quantum Mechanics. (3) I. Relativistic quantum mechanics; scattering theory; second quantization and the many-body problem; introduction to quantum electrodynamics. Pr.: Phys. 875.
- 265 890. Stellar Physics I. (3) I alt. years. Quantitative theory of the atmospheres of stars: radiative transfer; formation of spectral lines; atmospheric instabilities; hydromagnetics. Application to the analysis and syntheses of solar and stellar spectra. Pr.: Phys. 725, 730.
- 265 891. Stellar Physics II. (3) II. alt. years. Quantitative theory of the interior of stars: equilibrium structure of stars; energy sources; synthesis of elements; models of stars and stellar evolution. Application to the sun, stellar classification, cosmology. Pr.: Phys. 705, 730, 865.
- 265 899. Problems in Physics I. (1) Independent study of the solution of advanced problems in physics at a level appropriate to the M.S. degree. Pr.: Graduate standing and consent of instructor.
- 265 915. Advanced Topics in Molecular Spectroscopy. (3) I. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.
- 265 916. Advanced Topics in Optics. (3) II. 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) I. Pr.: Phys. 720, 855, 875 or conc. enrollment.
- 265 937. Advanced Topics in Solid State Physics. (3) II. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.
- 265 945. Advanced Nuclear Physics I. (3) I. Pr.: Phys. 675, 865.
- 265 946. Advanced Nuclear Physics II. (3) II. Cont. of Phys. 945. Pr.: Phys. 945.
- 265 955. Advanced Topics in Mathematical Physics. (3) II. 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) I. 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. I, II, S. Pr.: Consent of instructor.

Political Science

H. PIERRE SECHER,* Head of Department

Professors Secher,* Douglas,* and Franklin;* Associate Professors Gustafson,* Hajda,* Suleiman,* and Williams;* Assistant Professors Althoff,* Brady,* Herzon, Linford,* Lynn, and Richter;* Emeritus Professor: Iles.

UNDERGRADUATE STUDY

The major in political science acquaints the student with the political aspects of society and encourages the student to develop a critical and imaginative spirit with which to look at public issues. Since political issues reflect the broader contemporary situation, the program in political science also provides the foundation for a liberal education on which to build a continuing, responsible interest in political activity and public affairs. At the same time, scientific training in the analysis of political problems is intended to equip the student with the skills necessary to choose among a wide variety of careers in public service, both national and international, business, teaching, research, and administration. Qualified students should be stimulated to seek advanced training in political science at the graduate level.

A political science major should complete a broad liberal arts program which includes study in related social sciences, such as economics, history, psychology, sociology, anthropology, and geography. The political scientist should also develop awareness of the intimate relationships between social and physical science. In addition, the major will find familiarity with statistics and mathematics indispensable in using the tools now available for describing and explaining political phenomena.

Advisory Services

A pre-law program also may be pursued through a major in political science. An especially qualified pre-law adviser helps the student select an appropriate course of study leading toward a career in law, and offers individual assistance in selecting a law school.

Several members of the department have backgrounds in non-academic careers—including national and international government service, business, party politics, and journalism—besides their professional training in political science. Students contemplating careers in these and other fields

will find non-academic perspectives available to help them in their choices.

Specialized Curricula

The department takes part in several interdepartmental programs whereby students can coordinate their course work around a specific set of phenomena. Two such firmly established programs include:

South Asia Area Studies

The department participates in the University-wide South Asia Area Studies (see detailed information under South Asia Center, page 164).

Armed Forces and Society

Political science and several other departments offer coordinated coursework in military phenomena and security processes—ranging from the technology of war and military policy making to the problems of civil-military relations in peacetime and the development of viable disarmament policies. Some of the relevant courses include Political Science 620, 720, and 739; History 761, 762; Geography, 645 and 750; Sociology 450; Economics 627; and Nuclear Engineering 200.

Requirements for the Major

The requirement for the undergraduate major in political science is 24 hours. The department strongly recommends that students begin their political science curriculum with Principles of Political Science, to be followed by one or two courses numbered below 500. It is suggested that either United States Politics (269 325) or World Politics (269 333) normally be taken during the freshman or sophomore year. Another fundamental course, Political Behavior (269 301) or an acceptable substitute, should normally be taken during the sophomore or junior year after completing at least six hours in political science. The department also strongly recommends that the remaining 15 to 18 hours be taken from among the courses numbered 500 or above and be widely distributed in terms of subject area.

Information for Non-Majors

To encourage the widest possible undergraduate involvement in systematic political analysis, most political science

courses numbered 100 through 799 are open to non-majors without prerequisite courses and without prejudice to non-majors in mixed classes of majors and non-majors. As a discipline, the study of politics is expansive enough to permit intraclass adjustments to different backgrounds and objectives, while not compromising with the rigor sought in social science.

Principles of Political Science (269 110) is designed for freshman and sophomore—majors, non-majors, and undeclared majors. Non-majors with questions about opportunities and requirements for non-majors in political science courses should consult the head of the department or faculty members concerned. The Political Science Association, a student group of majors, also is a source of information and guidance for undeclared majors and non-majors.

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 at least 24 shall be in political science. Each candidate must take Political Science 800, and at least one graduate seminar in political science in each field, which the student selects as a field for specialization; candidates must also successfully complete a comprehensive examination in the general area of political science. Research requirements may be satisfied either with a thesis or a research paper for which six or two credits respectively will be awarded. The research paper option is possible only if approved by the student's adviser.

Facilities for research include the resources of the University and Departmental libraries, Computing Center, and, in the vicinity of the University — Eisenhower and Truman Libraries, the State Historical Library and other research centers.

Courses

UNDERGRADUATE CREDIT

269 110. Principles of Political Science. (3). Introduction to principles and major fields of Political Science.

269 111. Principles of Political Science. (Honors). (4). Introduction to principles and major fields of Political Science. Prerequisite: Membership in Arts and Sciences Honors Program.

269 301. Political Behavior. (3). An examination and explanation of the basic terms and distinctions necessary for the study of politics, government and political behavior emphasizing the dimensions of political behavior including, politicization, identification, ideology, participation, socialization, class, structure and situations.

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.

269 325. United States Politics. (3). The national government with emphasis on constitutional principles, basic structure, functions, and the political process.

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.

269 355. Contemporary Issues. (3). Study and analysis of selected political topics of immediate relevancy and concern. May be repeated only one time.

269 385. Internship in Politics. (1-3). Supervised field work or internship at international, national or sub-national levels of government, parties and other voluntary associations; also supervised teaching at the undergraduate level. Pr.: A minimum of 12 hours in political science and consent of the instructor.

269 399. Honors Seminar in Political Science. (1-3).

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

269 405. Introduction to the Civilization of South Asia I. (3). An interdisciplinary survey of the development of civilization in South Asia, including consideration of the geographical and demographic context, dominant 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 Civilization of South Asia II. (3). 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 structures and ideas. (Same as Geog. 406, Hist. 406, Soc. 406, Anthro. 406).

269 511. Contemporary Chinese Politics. (3). Principal components of Communist Chinese ideology, conditions determining organizational structure composition of present leadership, role of social forces, impact of external relations on other Asian nations and on the major world powers.

269 555. Senior Honors Seminar. (3). Open to senior majors who have attained a 3.0 Grade Point Average in political science.

American Government and Politics

UNDERGRADUATE AND GRADUATE CREDIT

269 605. The American Presidency. (3). The presidency as an institution, its evolution, Congressional relationships, executive organization.

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.

269 620. National Security Policy and Process. (3). Formation and management of contemporary U.S. security policies and establishment of domestic and international politics with emphasis on arms-control, competition for resources, civilian-military relations, and interaction among Congress, the President, and the bureaucracy.

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 of power.

269 626. Constitutional Law II. (3). Constitution as a positive instrument of government: fiscal 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 Constitutional liberties in the Bill of Rights and the Fourteenth Amendment.

269 670. Sex and Politics. (3). Analysis of the role of sex in political behavior, including sexual differences in voting and political participation, legal and cultural restrictions on women's rights and political activity, and women's liberation and other sex-based political movements.

269 677. Political Parties and Elections. (3). Origins, structure and function 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 data, and utilization of computers in political research.

269 690. 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.

269 699. Pro-Seminar in Political Science. (3). Study and analysis in various areas of the discipline with emphasis on critical evaluation of political conflicts and issues. Pr.: Junior or senior standing or consent of instructor.

Comparative Government and Politics

269 711. European Political Systems. (3). Comparative analysis of British democracy, totalitarianism, and contemporary Continental European political systems.

269 712. Latin American Politics. (3). Comparative analysis of selected political systems of Latin America emphasizing political inputs, political organization, and political outputs. Special consideration is given to problems of political change. Pr.: Intro. to Political Science.

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.

269 715. Southeast Asian Political Systems. (3). Comparative analysis of selected political systems in Southeast Asia including consideration of problems of nationalism and political development.

269 716. African Political Systems. (3). Comparative analysis of selected political systems of sub-Sahara Africa, including consideration of problems of nationalism and political development.

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 politics, 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.

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.

269 743. International Politics of the Middle East. (3). Consideration of the Arab-Israeli conflict, inter-Arab relations, foreign policies of Middle Eastern states, and the impact of the major foreign powers on the area.

269 745. The Professional Diplomat and Foreign Policy Formulation. (3). Present day foreign policy formulation in the United States Government, including especially the role therein of the Professional diplomat and foreign affairs specialist.

Political Thought

269 751. Political Thought: Classical to 16th 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 16th Century. (3). Study of the development of Western political thought from the 16th 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.

269 765. Church and State. (3). The history, theory, and development of church-state relationships in the United States. A theoretic and legal analysis of the relationship.

269 766. Psychological Bases of Politics. (3). Interrelations between personality and political behavior. Implications for the stability of democratic political systems. Authoritarianism, the organization of opinion, and analysis of dictatorship and totalitarianism. Prerequisite: 2 social science courses or consent of the instructor.

Readings and Problems

269 785. Readings in Political Science. (1-3). 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. Pr.: Consent of the instructor.

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).
 269 842. Seminar: Comparative Ideologies. (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. (1-3).

Psychology

E. JERRY PHARES*, Head of Department

Professors Brown,* Danskin,* Langford,* Perkins,* Phares,* Rohles,* Samelson,* and Sinnett,* Associate Professors Cowan,* Griffitt,* Mitchell,* Rappoport,* and Thompson,* Assistant Professors Frieman,* Press, Shanteau,* and Uhlarik,* Emeritus: Professors Alm and Showalter.

UNDERGRADUATE STUDY

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, such as medicine, law, theology, business, teaching, and engineering.

The undergraduate major requires Stat. 330 or 520 and an additional 22 hours of course work, including Psych. 110, 350, and either Psych. 560, 575 or 580, and either Psych. 605 or 720. Additional courses are determined in consultation with the student's adviser.

Students majoring in psychology can obtain, depending on their interests, either the B.S. or the B.A. degree by fulfilling the appropriate curricular requirements, which are explained on p. 82-83.

Students interested in the industrial relations field should take relevant electives in economics, Business Administration, and Sociology, selected in consultation with their adviser. Students interested in teaching or guidance work in the secondary schools

should prepare for teacher certification with a major in psychology.

GRADUATE STUDY

Professional training in psychology is obtained in graduate programs of study leading to the M.S. and Ph.D. degrees.

At KSU, doctoral programs are offered in six areas of general-experimental and personality-social psychology. These areas are: sensation and perception, physiological psychology, animal learning and behavior, human learning, social psychology, and personality.

At the master's level, students may specialize in most of the traditional areas of psychology (training in clinical and counseling psychology is not available). However, primary emphasis is placed on work leading to the doctoral degree. Students who complete the doctoral program are thus eligible for a variety of positions, including teaching and research positions in colleges and universities, governmental agencies, and industry.

For most students, the master's program requires two years beyond the bachelor's level — the doctorate, two more years. Prerequisites to admission into the graduate program are a superior academic record and background work essentially equivalent to the undergraduate psychology degree at KSU, essentially courses in experimental psychology and statistics. In some cases, deficiencies in preparation can be made up after admission to the program.

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.

Courses in Psychology

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.

273 300. Applications of Research to Human Behavior. (2). Interim Sem. Applications and evaluation of psychological research findings in such areas as education, psychotherapy, psychopathology, child-rearing, etc. Pr: Psych 110 and consent of instructor.

273 302. Drugs and Behavior. (2) Interim Sem. Effects of drugs on human performance, cognition, and physiological processes will be discussed and the empirical evidence surveyed and critically evaluated in relation to both use and abuse of drugs in society. Pr.: Psych 110 and consent of instructor.

273 350. Experimental Methods in Psychology. (4). Laboratory investigation of learning, motivation, social-personality processes, and perception and sensation. Includes two hours recitation and four hours lab per week. Pr.: Psych 110 or consent of instructor.

273 390. Innovative Studies in Psychology. (1-6) I, II. Topics selected in consultation with the instructor. To be used for interdisciplinary and innovative approaches to psychological topics. Pr.: Consent of instructor.

273 399. Honors Seminar in Psychology. (1-3). Selected topics. Open to non-majors in the Honors Program.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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.

273 415. 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.

273 510. Psychology in Business and Industry. (3) II. Survey of psychological principles and facts as they are applied in such areas as: consumer problems, advertising, personnel selection, and other business and industrial activities. Pr.: Sophomore standing; Psych. 110.

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.

273 560. Fundamentals of Learning. (3). I. Empirical and theoretical approaches to the study of human and animal learning. Pr.: Psych. 350 or consent of instructor.

273 561. Laboratory in Learning. (1). I. May be taken only in conjunction with Psych. 560. Supervised experimentation in learning. Pr.: Conc. enrollment in Psych. 560.

273 570. Psychobiology. (3). Human and animal behavior from viewpoints of psychology, physiology, and zoology. Includes neurophysiology, control of behavior by simple "brains," homeostasis in mammals, and the regulation of behavior by internal and external events. Pr.: Biol. 205, Psych. 110, or consent of instructor.

273 575. Principles in Motivation. (3). II. Empirical and theoretical approaches to the study of motivation, including its physiological basis. Pr.: Psych. 350 or consent of instructor.

273 567. Laboratory in Motivation. (1). II. May be taken only in conjunction with Psych. 575. Supervised experimentation in motivation. Pr.: Conc. enrollment in Psych. 575.

273 580. Fundamentals of Perception and Sensation. (3). I. Empirical and theoretical approaches to phenomena of sensation and perception. Pr.: Psych 350 or consent of instructor.

273 581. Laboratory in Perception and Sensation. (1). I. May be taken only in conjunction with Psych. 580. Supervised experimentation in perception and sensation. Pr.: Conc. enrollment in Psych. 580.

UNDERGRADUATE AND GRADUATE CREDIT

273 605. Foundations of Social Behavior. (3). II. Selected empirical and theoretical approaches to such areas as attitudes, social influence, and the social bases of human behavior. Pr.: Psych. 435 and either Psych. 560, 575, 580 or consent of instructor.

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 and emotion. Three hours rec. and three hours lab. a week. Pr.: Biol. 205 and Psych. 110 or consent of instructor.

273 625. Engineering Psychology. (3). The role of behavioral factors in the design and operation of machines and equipment. Pr.: Psych. 110, Stat. 330 or 520 and 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. 330 or 520 or equiv.

273 716. Comparative Psychology. (3). Behavior at different phylogenetic levels as an aid to the clarification of behavioral principles. Pr.: Consent of instructor.

273 720. Psychology of Personality. (3). Discussion of different approaches to the study of personality. Pr.: Any of the following: either Psych. 560, 575, or 580; or consent of the instructor.

273 775. History of Current Trends. (3). 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.

273 780. Experimental Psychology Seminar. (2-3). Intensive discussion of selected topics. May be repeated. Pr.: Psych. 560, 575, 580, or consent of instructor.

273 785. Personality-Social Seminar. (2-3). Intensive discussion of selected topics. May be repeated. Pr.: Psych. 605, 720, or consent of instructor.

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.

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.

273 801. Logic and Methods of Psychology. (3). Methods of psychological research including general scientific and theoretical problems. Emphasis on methods of empirical investigation in such representative areas as learning, motivation, perception, and personality-social. Pr.: Consent of instructor.

273 805. Experimental Design in Psychology. (3). Introduction to techniques of research planning and experimental design, including critical evaluation of selected experiments. Pr.: Psych. 705 or Stat. 521 or consent of instructor.

273 808. Advanced Physiological Psychology. (3). A study of the neural and endocrinological correlates of behavior. Pr.: Psych. 611 and consent of instructor.

273 809. Sensory Processes. (3). Experimental study of sensory and perceptual processes, with emphasis on recent developments in the field. Pr.: Psych 350 or consent of instructor.

273 810. Motivation and Learning. (3). Experimental study of learning and motivation, with emphasis on recent developments in the field. Pr.: Psych 350 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 350 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.

273 825. Psychological Development of Children. (3). Analysis of theoretical and empirical approaches to the study of psychological child development. Includes representative approaches such as cognitive-developmental, S-R, and psychoanalytic. Pr.: Psych. 415 or equiv. and 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.

273 847. 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.

273 851. Seminar in Physiological Psychology. (1-3). Selected topics in physiological psychology. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 852. Seminar in Sensory Processes. (1-3). Selected topics in sensory psychology. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 853. Seminar in Personality. (1-3). Intensive discussion of current problems of theoretical and empirical interest in the field of personality. May be

repeated with consent of supervisory committee. Pr.: 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.

273 855. Seminar in Animal Behavior. (1-3). Discussion of selected topics of current experimental interest in the areas of animal learning and-or comparative psychology. May be repeated with consent of supervisory committee. Pr.: 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.

273 857. Seminar in Cognitive Processes. (1-3). Selected topics in the study of human thinking and cognition. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 859. Seminar in Social Psychology. (1-3). Emphasis on discussion of advanced topics of current interest in social psychology. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 860. Practicum in Counseling Psychology. Credit arranged. Supervised practical experience in counseling. Pr.: Consent of instructor.

273 865. Internship in Psychology. Credit arranged. Pr.: Consent of the supervisory committee.

273 868. Seminar in Professional Problems. (1-3). Intensive study and discussion of current professional problems in psychology. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 870. Seminar in Human Performance. (1-3). Discussion of current professional problems in psychology. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

273 999. Research in Psychology. Credit arranged. Pr.: Consent of supervisory committee.

Sociology and Anthropology

EUGENE A. FRIEDMANN, Head of Department

Professors Friedmann,* Rohrer,* and Schnur;* Associate Professors Edelman,* Hiebert,* and Taylor;* Assistant Professors Brede, Camp, Dushkin, C. Flora,* J. Flora,* Miley, O'Brien,* H. Ottenheimer, M. Ottenheimer, Peters,* and Lecturers Orbach and Shanline; Emeritus Hill* and Long.*

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 82-83). 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 188) 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 82-83) are: 24 semester hours of sociology beyond the introductory course (Soc. 211) including Soc. 410, 620, and 710 and two of the following: Soc. 430, 440, 450, and 460. Nine hours of electives in sociology are to be taken, all at or above the 500 course level.

Students enrolled in the Pre-Social Work Option will be required to take 27 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.

Students preparing for professional careers in correctional administration may enroll in the undergraduate Corrections option. These courses are intended to help people prepare for a variety of correctional positions concerned with integrating and reintegrating law violators into society. These positions include, among others: Probation and parole officers, prison classification officer, reformatory counselors, juvenile institution case manager, probation and parole supervisors, regional and state directors of probation and parole, parole board members, community correction center positions, institutional supervisors and program directors, deputy and associate wardens, superintendents, wardens, directors and commissioners of state correctional systems, teachers, and

researchers. Students interested in preparing for careers in correctional administration should enroll in 27 hours of sociology beyond the introductory course to include the following: Soc. 211, 410, 620, 658, 659, 660, 710, and 761; plus two of the following: Soc. 440, 450, 460.

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.

Areas of specialized training include Community Organization, Social Change and Demography. Specialized training in Corrections is also offered, and a degree option in this area is available.

Graduate training is conducted in small class and seminar format; the program features close faculty supervision of graduate work. Requirements include a master's thesis or report, an oral defense of thesis or report and a written master's final examination. Thirty hours of graduate course credit is required for the thesis option and 32 hours for the report option.

Courses in Sociology

UNDERGRADUATE CREDIT

277 104. **Freshman 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.

277 301. **Topics in Sociology.** (3). Supervised independent and-or interdisciplinary study projects. Pr.: Soc. 211 and consent of instructor.

277 399. **Honors Seminar in Sociology.** (1-3) I, II. Readings and discussion of selected topics. Open to non-majors in the Honors Program.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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 of 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 or 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.

277 542. **The Social Organization of the Future** (3) Examination of alternative social arrangements presented in speculative and science fiction. Con-

sideration of fictional extrapolations of social, scientific and technological trends in terms of specific institutions. Analysis of possible social and interpersonal structures imaginatively conceived. Pr.: Soc. 211 or consent of instructor.

277 545. The Sociology of Women. (3). The position of women in the United States and cross-culturally is studied empirically and in theoretical perspective; analysis of social structural inputs to female status; examination of socialization and sex roles. Pr.: Soc. 211.

277 565. Social Service Field Placement. (3) An introductory course in social agency functioning. Part-time field placement in social service agency under supervision of agency staff. Observation and participation in agency function plus weekly seminar meetings. Pr.: Soc. 260. Junior standing. Consent of instructor required.

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.

277 618. Religion in Culture. (3) I or II. The nature of religion in nonliterate and peasant societies, and its manifestations in different cultural systems. Pr.: Anthropology 200 or Sociology 211 or consent of instructor.

277 620. Methods of Social Research I. (3) Treatment of the logic and procedures involved in the formulation of a research problem and the difficulties encountered in conducting research. Examines problems of explanation and prediction, the process of inquiry, elements of the scientific method, the design of research and analysis in the social sciences. Pr.: Soc. 211, Stat. 320 or consent of instructor.

277 621. Methods of Social Research II. (3) Treatment of current sociological research techniques and applications. Examines the logic and strategy of sociological measurement, data gathering procedures, and data analysis. Considers problems of conceptualization and operationalization, measurement and scaling, sampling, the construction of research instruments, the presentation and analysis of data in tabular and graphic form, and the selection and application of standard techniques for data analysis. Pr.: Soc. 620 or consent of instructor.

277 630. Sociology of Agricultural Systems. (3). Comparative rural systems in U. S. and other countries; emphasis on land tenure, farmers social movements, role of agricultural technology and relationship between agriculture and rest of society. Pr.: Soc. 211 or consent of instructor.

277 635. Human Ecology. (3) The interrelationships among population, technology, environment, and social organization. An examination of the origins and development of human ecology in sociology, and recent attempts to redefine the area. Special emphasis on current theoretical and research efforts. Pr.: Soc. 211 or consent of instructor.

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.

277 641. Social Gerontology: An Introduction to the Sociology of Aging. (3). Analysis of the phenomenon of human aging in its individual, social and cultural aspects with special attention to the problems of aging populations in western societies. 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 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.

277 658. Criminology. (3) I, II, some S. Nature, extent, and causes of crime; programs for prevention and treatment. Pr.: Soc. 211 or consent of instructor.

277 659. 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.

277 660. 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.

277 661. Classification, Training and Treatment in Correctional Institutions. (3) The organization and delivery of classification, training, and treatment services in prisons, reformatories, and other correctional institutions. Evaluation of the impact of these services upon subsequent criminal behavior. Pr.: Soc. 659 or consent of instructor.

277 662. Security, Custody and Discipline in Correctional Institutions. (3) Analysis of the maintenance of security, custody, and discipline in prisons, reformatories, and other correctional institutions. Purpose, principles, definitions, problems and the role of social control in institutions. Implications for the integration and reintegration of law violators. Pr.: Soc. 659 or consent of instructor.

277 663. Correctional Treatment Practices. (3). Theories and methods for treatment of delinquents and criminals. Social and cultural variables affecting treatment. Evaluation of treatment effectiveness. Pr.: Soc. 211 and 659.

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.

277 742. South Asian Social Systems. (3) II. Survey of contemporary research and analysis of family and caste structures, demography, mobility, urbanization and modernization in India and Pakistan. Focus on social change: intentions, methods, consequences. Pr.: Soc. 211 or Anthro. 200 and either Soc. 405, Anthro. 405 or Anthro. 645, or consent of instructor.

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.

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 in 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 relations 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, for example, 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 a B.A. or B.S. in anthropology consist of a minimum of 27 hours in anthropology as follows:

I. Anthro. 200, 260, 280, and 660 (or equivalent courses approved by anthropology faculty).

II. Anthro. 602.

III. Twelve elective hours at or above the 500 level to be distributed among at least two of the following: 1) ethnology and ethnography, 2) linguistic anthropology, 3) archaeology, and 4) physical anthropology.

Courses In Anthropology

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). 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. (1-3) Offered on demand. Readings and discussion of selected topics. Open to non-majors in the Honors Program.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

278 405. Introduction to the Civilizations of South Asia I. (3) 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) 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. Pr.: Three hours of anthropology or consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT

278 600. Cultural Dynamics. (3) 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. Anthropological Theory. (3). Review and integration of the major theoretical approaches in the principal branches of anthropology, history and contemporary methodology and theory. Pr.: Anthro. 200 or consent of instructor.

278 604. Culture and Personality. (3) Anthropological contributions to personality study; cross-cultural comparisons to personality types; means of personality formation in nonliterate and folk cultures; culture change and personality. Pr.: Three hours of anthropology or consent of instructor.

278 610. Social Organization in Nonliterate Cultures. (3) 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.

278 613. Afro-American Music. (3) Negro music of the New World viewed in a culture-historical framework. Examination of the social conditions under which African and European music styles came into contact in the New World and the ways in which they blended to form the unique style of calypso, blues and jazz. Pr.: Anthropology 200 or consent of instructor.

278 615. Expressive Culture. (3) II. How anthropologists view the expressive and creative aspects of culture. A cross-cultural survey of the verbal, visual and performing arts in non-literate societies. Pr.: Anthro. 200 or consent of instructor.

278 618. Religion in Culture. (3) The nature of religion in nonliterate and peasant societies, and its manifestations in different cultural systems. Pr.: Anthropology 200 or Sociology 211 or consent of instructor.

278 619. Applied Anthropology. (3). Application of anthropological principles and insights to programs of planned change and cultural innovation. Pr.: Anthro. 200 or consent of instructor.

278 620. **Senior Seminar.** (3) Review and integration of the several aspects of anthropology. Pr.: Senior standing and 15 hours of anthropology.

278 622. **Special Topics in Anthropology.** (3) Offered on sufficient demand. Variable topics within cultural anthropology, anthropological linguistics, archaeology, or physical anthropology. Pr.: Relevant anthropology courses or consent of instructor.

278 625. **Independent Reading and Research in Anthropology.** (1-3) 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) Aboriginal cultures of Canada and the United States; culture contact and change among surviving groups.

278 632. **Indians of Middle America.** (3) Description and comparison of Tarahumara, Aztec, Maya, Cuna, and other civilizations and non-literate cultures of Mexico, Central America, and the Caribbean ring. Culture contact and change in surviving tribes.

278 634. **Indian Cultures of South America.** (3) A survey of the nature and variability of the aboriginal cultures of South America. Analysis of sample cultures, stressing economic, social, political, and religious structures.

278 645. **Cultures of South Asia.** (3) 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 Africa.** (3) Description and comparison of the aboriginal cultures of Africa south of the Sahara. Culture contact and change.

278 660. **Linguistic Anthropology** (3) 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.

278 705. **Archaeology of North America.** (3) 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, or 260, or consent of instructor.

278 710. **Precolumbian Civilization of Mexico and Guatemala.** (3) 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. 220, or 260, or consent of instructor.

278 718. **Archaeology of the Old World.** (3) 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.

278 720. **Archaeological Field Methods.** (3) 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.

278 730. **Field and Laboratory Techniques in Archaeology.** (8) Participation in archaeological excavations; techniques, methods, and procedures in a field research situation. The laboratory work of cleaning, cataloging, analyzing and preliminary report preparation of materials recovered. Credit may be received twice for this course if the area or problem involved are different. Pr.: Anthropology 200 or 260 or consent of instructor.

278 740. **Race and Culture.** (3) 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.

278 741. **Fossil Man and Human Evolution.** (3) 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, or 280, or consent of instructor.

Center for South Asian Studies

PROFESSOR ALBERT B. FRANKLIN, Director

The general scope of the South Asia Center is described under the heading "Interdisciplinary Programs" on page 87 of this catalog.

The core of the Center's area offerings is the **Introduction to the Civilizations of South Asia** which is offered for credit by the departments of Anthropology, Art, Economics, Geography, History, Political Science and Sociology, as well as in the Center's own numbered listing below. The South Asia Center participates to a greater or less degree in the presentation of all the following courses which it considers to be part of the developing South Asia Curriculum.

UNDERGRADUATE CREDIT

209 399. **Honors Seminar in Art.** (1-3) I. Selected topics in art (South Asian art). May be taken for credit more than once. Pr.: For students in the Honors Program only.

269 345. **The Politics of Developing Nations.** (3). Comparative analysis of politics in emergent states, with emphasis on processes of modernization and nation building.

280 399. **Honors Seminar in Hindu Thought.** (1-3) I. Selected topics in ancient and modern Hindu philosophy and thought. May be taken for credit more than once. Pr.: For students in the Honors Program only.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

010 401. **International Agricultural Development.** (3) II. A study of economic conditions in underdeveloped

countries, with emphasis on population, food supply, and agricultural conditions. Attention is directed toward principles of economic growth and national and international policies that will stimulate development. Pr.: Econ. 110.

209 400. History of South Asian Art. (3) I, II. History of South Asian art (including Islamic art) from the third millennium B.C. to the 19th century A.D. and related history of art of Ceylon, Nepal and Indo-China.

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, but not necessary.

280 400. Religions of South Asia. (3) I. An analysis and comparison of the central concepts of the religions of South Asia. The course will focus upon the historically important systems and modes of thought associated with Saivite and Vaishnava modes of Hinduism, Mahayana and Hinayana Buddhism, Jainism, Islam, and Sikkism. Pr.: South Asia 405.

280 405. Introduction to the Civilizations 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. (Offered also as Anthro. 405, Econ. 405, Geog. 405, Hist. 405, Pol. Sci. 405, and Soc. 405.) Pr.: May be required depending upon the department for which course is being offered.

280 406. 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 and literature, geography, social and political structure and ideas. (Offered also as Anthro. 406, Econ. 406, Geog. 406, Hist. 406, Pol. Sci. 406, and Soc. 406.) Pr.: May be required depending upon the department for which course is being offered.

280 470. Indian and Pakistani Literature in Translation. (2). Translated short stories and folk literature from Pakistan and India; introduction to the cultural background of the sub-Continent.

UNDERGRADUATE AND GRADUATE CREDIT

225 682. Development Economics. (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.

235 735. Geography of East 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.

241 680. South Asia History I. (3) I, II. The traditions and civilization of South Asia-Pakistan, India and Ceylon prior to the intrusion of the Europeans. Examination of social, intellectual, religious and political history. Pr.: Junior or senior standing.

241 681. South Asia History 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.

241 690. 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.

269 713. South Asian Political Systems. (3) Analysis of selected political systems of South Asia.

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.

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.

277 742. South Asian Social Systems. (3). Survey of contemporary research and analysis of family and caste structures, demography, mobility, urbanization and modernization in India and Pakistan. Focus on social change: intentions, methods, and consequences. Pr.: Soc. 211 or Anthro. 200, Soc. 405, Anthro. 645, or consent of instructor.

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.

253 692. Tamil I. (5). The elementary study of the principal modern Dravidian tongue. Pr.: some knowledge of another foreign language desirable.

253 693. Tamil II. (5). Continuation of Tamil I. Pr.: South Asia 692.

253 780. Introduction to Hindi. (5). Concentration on Devanagari script and Hindi idiom with graded readings and grammatical exercises. Pr.: South Asia 791 or equivalent.

253 781. Individual Study in Hindi. (5). Readings, composition and conversational practice relevant to the students' interests and disciplinary needs. May be repeated for credit.

253 790. Urdu I. (5). The week's work consists of five hours of grammar, vocabulary study, reading and supervised conversation, and three hours of laboratory work. Urdu is a major language of both India and Pakistan, and the chief link language between them. Pr.: None. Some knowledge of another foreign language desirable.

253 791. Urdu II. (5). Continuation of Urdu I. Pr.: South Asia 790.

253 792. Urdu III. (4). Readings in graded texts, conversation drills and applied grammar. Pr.: South Asia 791 or equivalent.

253 793. Urdu IV. (4). Continuation of Urdu III. Reading and discussion of contemporary literature and grammatical analysis. Pr.: South Asia 792 or equivalent.

253 794. Urdu V. (4). Individual study in Urdu. Readings, composition and conversational practice relevant to the student's interests and disciplinary needs. Pr.: South Asia 793 or equivalent. May be repeated for credit.

GRADUATE CREDIT

010 801. Seminar in International Agricultural Development. (3) II. Reading, study, analysis and group discussion of (a) important problems of agricultural development in underdeveloped regions, (b) relevant development theories and (c) approaches to agricultural development, including contribution of education, development of institutions and other actions to advance the welfare of rural people. Intended mainly for persons interested in careers in International Agricultural Development. Pr.: Econ. 110.

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

241 850. Seminar in South Asian History. (3) I, II, S. Pr.: Consent of instructor.

269 845. Seminar: South Asian Politics. (3).

405 868. International Education. (3) I, II, S. Developing, administering, conducting, and evaluating educational programs from a world perspective. Pr.: Teaching experience or consent of instructor.

Speech

NORMA D. BUNTON,* Head of Department

Professors Bunton,* Dace,* Engler,* and Flanagan,* Associate Professors Burke,* Climenhaga,* Fedder,* and Rainbolt,* Assistant Professors Carlson, Cleary, Hinrichs,* Longhurst,* Lowe,* Nichols, Ollington, Robinson* and Van Tassel,* Instructors Aseneta, Barnes, Knowles, Molineux, Thoms, Williams; Emeritus: Given.*

UNDERGRADUATE STUDY

The Department of Speech offers study in the areas of General Speech, Linguistics, Theatre, and Speech Pathology-Audiology.

The undergraduate major requires at least 21 hours in one of the four areas and nine hours in other areas within the department.

GRADUATE STUDY

In the Department of Speech major work is offered leading to the degree Master of Arts in the following fields: General Speech, Linguistics, Speech Pathology-Audiology, and Theatre. (see Interdepartmental Program in Linguistics, p. 87).

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.

The Master of Arts degree may be pursued by students in the department under one of the following plans: Plan A: A minimum of 30 semester hours of graduate credit including a master's thesis of six to eight semester hours. Plan B: A minimum of 30 semester hours of graduate credit including a written report of two semester hours either of research or of problem work on a topic in the major field. Plan C: A minimum of 30 semester hours of graduate credit in course work only, but including a project which discloses evidence of creative ability.

Students in Theatre and Linguistics may, with graduate faculty approval, elect any one of the plans: A, B, or C.

Students in General Speech may, with graduate faculty approval, elect plans A or B. Students in Speech Pathology-Audiology may, with graduate faculty approval, elect plans A or C.

Written and oral examinations will be required in all areas.

Courses In General Speech

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. (3) 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

*Three hours academic credit, not applicable toward degree requirements. Student in curriculum requiring 120 credit hours must therefore accumulate 123 or 124 hours when taking this course. Hours will apply toward grade-point average.

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.

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. (1-3). Readings and colloquia on selected topics. For non-speech majors in the Honors Program. Pr.: Honors students only.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

281 420. Analysis of Experimental Research Literature in Speech. (3). A study of the literature employing the experimental method in general speech, speech pathology and audiology, and theatre. Pr.: 6 hrs. in speech.

UNDERGRADUATE AND GRADUATE CREDIT

281 608. Persuasion. (3). The study of communication as persuasion; examination of contemporary approaches to persuasion.

281 616. Group Discussion Methods. (3). Examination of research, 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.

281 640. Seminar in General Semantics. (3). The writings of Alfred Korzybski and other germinal contributors to a modern theory of relationships among experience, linguistic habits and behavior. Pr.: 360.

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.

281 733. Modern Rhetoric. (3). Readings in the rhetorical theories of Kenneth Burke and other twentieth century contributors. Pr.: 665.

281 799. Problems in Speech. Credit arranged. Open to students in any speech area. Pr.: Junior standing and consent of instructor.

GRADUATE CREDIT

281 999. Research in Speech. Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken and consent of instructor.

Linguistics

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

281 230. Introduction to the Study of Language. (3). Survey of the scientific study of language and of the field of linguistics. Presupposes no previous formal work in linguistics.

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. Laboratory sessions, by arrangement, are an integral part of the course. (Same as Engl. 455 and Mod. Lang. 455.)

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. Lang. 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. Pr.: Speech 652, Mod. Lang. 652, or English 652. (Same as Engl. 664 and Mod. Lang. 664).

281 669. Language Typology. (3). Presentation and discussion of the languages of the world and the variant methods of their classification. (Same as Engl. 669 and Mod. Lang. 669).

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. Pr.: Spch. or English or Mod. Lang. 652 and 677, or consent of instructor and junior standing. (Same as Engl. 672 and Mod. Lang. 672).

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. Lang. 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.: 12 hours of a modern language, including English, or Mod. Lang. or Spch. 652. (Same as Engl. 674 and Mod. Lang. 674).

281 675. Generative Phonology. (3). Study in depth of the distinctive features approach to classification of speech sounds, and development of phonological rules for various languages, with particular reference to English. Pr.: Speech 455 and 676.

281 676. Phonetics and Phonemics of English. (3). Phonemic theory, with particular reference to English but including reference to sound systems of other selected languages. Pr.: Spch., English, or Mod. Lang. 455 and 652, or consent of instructor and junior standing. (Same as Engl. 676 and Mod. Lang. 676.)

281 677. Morphology and Syntax of English. (3). Consideration of current theories of grammar with emphasis on American structuralist, tagmemic, and transformational-generative approaches, with particular reference to English but including references to grammar systems of selected other languages. Pr.: Engl. 451 or Spch., English, or Mod. Lang. 652. (Same as Engl. 677 and Mod. Lang. 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.: Spch., English, or Mod. Lang. 455 and 652, or consent of the instructor. (Same as Mod. Lang. 678).

GRADUATE CREDIT

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 equivalent.

SPEECH PATHOLOGY/AUDIOLOGY

The Speech Pathology-Audiology program exists to train professional personnel who are competent to help children and adults with communicative problems of speech, hearing and language. As a minimum, Speech Pathology-Audiology undergraduate majors complete 18 hours in courses concerned with normal communicative processes. Selected courses from the disciplines of Speech and Hearing Science, Linguistics, and Human Development meet this requirement.

Evidence of meeting the professional competency requirements includes 42 hours in courses which provide information about the training in the management of speech, hearing, and language disorders, and other supplementary professional areas. Of these 42 hours, no fewer than nine may be in audiology. A maximum of six of these 42 hours may be in the several courses which provide academic credit for clinical practicum. Of the 42 hours, a minimum of 24,

exclusive of credit for thesis, must be in the speech pathology courses. Furthermore, 30 of these 42 hours must be acceptable for graduate credit toward the degree of Master of Arts. In addition, the graduate must have completed a minimum of 275 clock hours of supervised direct clinical experience with a variety of disorders and age groups in the Campus Speech and Hearing Clinic and the cooperating school and hospital training sites. Each student's specific course of study is selected in consultation by the student and his major adviser.

The Speech Pathology-Audiology program at Kansas State University has been designed to meet the January 1, 1969 requirements for Certification of Clinical Competence of the American Speech and Hearing Association and the State of Kansas Department of Education requirements for Speech Clinician.

Courses in Speech Pathology/Audiology

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) A survey of all speech disorders and certain hearing and language problems; introduction to the clinical management of these disorders, and to the field which is responsible for them.

281 324. Orientation to Clinical Practicum. (2) An introduction to the clinical procedures, methodology and instrumentation employed in the treatment of individuals with speech and-or hearing disorders. Demonstration therapy included. Pr.: Spch. 213.

281 370. Speech and Hearing Mechanisms I. (3) Anatomy and physiology of normal and abnormal speech mechanisms, including respiration, phonation, resonance and articulation.

281 371. Speech and Hearing Mechanisms II. (3) Study of the ear and the mechanics of hearing. Pr.: Spch. 370.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

281 446. Speech Handicapped School Child. (3) Study of the disorders of speech, language, and hearing found among school age children, their educational implications, and how the classroom teacher can facilitate the rehabilitative process. Pr.: Junior standing.

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 Tests. (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. 371.

281 623. Audiology. (3) Theory and techniques of audiometric evaluation including supervised practice in a simulated clinical setting with selected auditory tests. Pr.: Spch. 622.

281 632. Speech and Language Development. (3) Research and theory of early development of vocalization, phonology, morphology, syntax, and semantics are reviewed. Variables which influence acquisition are discussed.

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. 621.

281 646. Disorders of Articulation. (3) Research, theories, and principles concerning the diagnosis and management of articulation disorders. Pr.: Spch. 213.

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. Pr.: Spch. 622.

281 679. Functional Analysis of Language Retardation. (3) Application of behavior modification principles to communication habilitation of language retarded children. Pr.: Spch. 632 and Spch. 621 or 645.

281 710. Hearing Conservation and Rehabilitation. (3) Principles and practices involved in conservation, preservation, and rehabilitation of hearing. Pr.: Spch. 622.

281 720. Cleft Palate and Laryngeal Disorders. (3) Research and theory concerning causes, evaluation and management of speech disorders resulting from cleft lip and/or cleft palate. Pr.: Spch. 370 and 646.

281 742. Practicum in Audiology. (0-6) Supervised clinical procedures in screening 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 Audiology or Speech Pathology.

281 750. Speech Disorders of the Orthopedically Handicapped (3) Diagnostic and therapeutic aspects of speech, hearing, and language disorders associated with cerebral palsy. Pr.: Speech 370 and 646.

281 761. Practicum in Speech Pathology. (0-6) Supervised clinical methods in speech pathology. Experience in screening, diagnosis, organization, and administration of therapy. May be repeated for a maximum of six hours credit. Pr.: Major in Speech Pathology or Audiology.

GRADUATE CREDIT

281 802. Neuropathologies of Speech and Language. (3) Research and theory concerning nature, etiologies,

evaluation, and principles of neuropathologies. Pr.: Spch. 645.

281 821. Experimental Phonetics. (3) Methods and logic for experimental analysis of the physical and perceptual properties of speech signals; function 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 neutral 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 nine hours with change in topic.

281 860. Diagnostic Methods in Speech Pathology. (3) Standardization and applications of tests and procedures utilized in the evaluation of speech and language disorders. Pr.: Spch. 370 and 646.

281 863. Psycholinguistic Analysis of Language Retardation. (3) Relation of current research and theory in developmental psycholinguistics to bilingualism and subcultural language differences. Methodology of research and assessment of psycholinguistic abilities in children is reviewed. Pr.: Spch. 632.

THEATRE AND INTERPRETATION

The undergraduate program in Theatre exists to educate students who are interested in theatre as a profession or for cultural enrichment as an avocation. Three fields of concentration are offered: (1) a liberal arts program in theatre, (2) an experimental theatre and new play program, and (3) a repertory theatre training program. Students in all fields are required to take at least six semester hours of course work in each of the following groups: history, literature, and criticism of theatre; technical production, design, and lighting; and acting, directing, and playwriting. A detailed description of undergraduate requirements in each field of concentration may be obtained by writing the Director of Theatre in the department.

Course offerings are available leading to the degree of Master of Arts. Prerequisite to admission into the graduate program in

Theatre are a superior academic record and background work essentially equivalent to our undergraduate major. In some cases, students are admitted on a provisional basis so they may make up deficiencies in undergraduate preparation. Graduate students in Theatre may elect any one of the plans: A, B, or C (as described on page 166). Six semester hours of graduate credit are required of all graduate students in each of the following groups: history, literature, and criticism of theatre; technical production, design, and lighting; and acting, directing, and playwriting. An additional 12 semester hours or more of graduate credit is required of each student. Each student's total program is decided upon through regular consultation between him and his graduate committee. Further information about opportunities for financial support, and copies of the preparatory reading list for the written and oral examinations may be obtained by writing the Director of Graduate Studies in Theatre in the department.

In neither the undergraduate nor the graduate program in Theatre may the following courses be used to discharge group requirements (they may be used only to discharge elective requirements in the major): 120, 145, 150, 410, 449, 472, 536, 614, 627, 639, 730, 735, and 760.

Courses in Theatre and Interpretation

UNDERGRADUATE CREDIT

281 050. **Theatre Laboratory.** (0) Required each semester for all students enrolled in acting and-or directing courses. Planning and rehearsal sessions for student productions.

281 145. **Introduction to Theatre.** (3) Consideration of the basic elements of theatre: aesthetics, dramatic literature, theatre technology, and producing organizations.

281 150. **Appreciation of Theatre.** (2) Direct experience with live theatre through an investigation of theatrical materials, forms, and styles and attendance at the University theatrical productions.

281 235. **Stage Movement.** (3) An investigation of the techniques of movement in dramatic and musical productions. Major emphasis is placed on practical application.

281 253. **Fundamentals of Acting.** (3) Theory and practice of acting with emphasis on voice building, stage movement, fencing, and oral interpretation of dramatic literature.

281 255. **Fundamentals of Technical Production.** (3) An introduction to the technical problems of theatre production, including planning, painting, and mounting scenery as well as other aspects of backstage organization.

281 345. **Fundamentals of Costuming for the Theatre.** (3) A lecture-laboratory course covering the principles and techniques of construction and design of stage costuming.

281 350. **Techniques of Makeup.** (3) Techniques of makeup for stage, movies, and television.

281 353. **Fundamentals of Playwriting.** (3) Theoretical study and practical application of fundamentals of playwriting with regard to plot, characters, and production; emphasis placed on the one-act form.

281 363. **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, nonfictional prose, scenes from plays, and selected short stories.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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 may be earned in this course. Same as Music 475. May be repeated until six hours of credit have been earned.

281 433. **Fundamentals of Directing.** (3) Study of the principles and techniques of directing for the theatre; investigation into the historical emergence of the director; study of current theories.

281 436. **History of the Theatre.** (3) A survey of the development of the theatre from ancient times to the present day.

281 447. **Vocal Expression for Actors.** (3) Studies and application of vocal techniques for stage productions; emphasis on development of the actor's vocal mechanism. May be repeated for a total of 9 hours credit by qualified students. Pr.: Consent of the instructor.

281 449. **Advanced Stage Movement.** (3) Studies in the techniques of stage movement for stylized dramatic and musical productions. Emphasis is placed on practical application. May be repeated for a total of 9 hours credit by qualified students. Pr.: Consent of the instructor.

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.

281 536. **Creative Dramatics.** (3) Study of techniques for the training and development of creative imagination in primary and secondary school children by means of group improvisation of plays. Emphasis placed on both skillful guidance of the children and the pursuit of original research.

UNDERGRADUATE AND GRADUATE CREDIT

281 603. **Playwriting for Children's Theatre.** (3) Study in the writing of dramatic and musical plays specifically intended for child audiences. May be repeated for a total of 6 hours credit by qualified students. Pr.: Spch. 353 or its equivalent and consent of the instructor.

281 607. **Roman, Medieval, and Baroque Theatre.** (3) Studies in the drama and stagecraft of the Roman, Medieval, and Baroque periods.

281 610. Advanced Costuming for the Theatre. (3) Studies in stage costuming: history, characterization, fabrics, construction and design. A lecture-laboratory course including student planning, construction, and designing of costumes for university productions. Pr.: Spch. 345 or consent of the instructor.

281 612. Greek Theatre. (3) Studies in the drama and stagecraft of the Greek period.

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.

281 617. Romantic Theatre. (3) Studies in the drama and stagecraft of the Romantic era.

281 619. Modern European Theatre. (3) Studies in the European drama and stagecraft of the period from 1876 to the end of World War II.

281 620. Avant-Garde Theatre. (3) Studies in Avant-Garde drama and stagecraft since World War II.

281 627. Theatre Management. (3) Theatre management, promotion, finance, organization; emphasis on contract negotiations and use of facilities.

281 628. Oriental Theatre. (3) Studies in the drama and stagecraft of India, China, and Japan.

281 629. Advanced Playwriting. (3) Further study in the writing of drama; emphasis on problems of writing full-length plays. May be repeated for a total of 9 hours credit by qualified students. Pr.: Consent of instructor.

281 631. Practice in Directing. (3) A lecture-laboratory course with emphasis on directing dramatic productions under performance conditions. May be repeated for a total of 9 hours credit by qualified students. Pr.: Consent of the instructor.

281 633. Advanced Acting. (3) Studies in style, techniques, and characterization. May be repeated for a total of 9 hours credit by qualified students. Pr.: Consent of the instructor.

281 634. Aesthetics of the Theatre. (3) Principal emphasis on theoretical problems of dramatic art.

281 637. Reader's Theatre. (3) The nature, purpose and production of oral interpretation of literature in the theatre; emphasis on monologue, lecture-recital, and play reading. May be repeated for a total of 6 hours credit by qualified students. Pr.: Consent of the instructor.

281 639. Children's Theatre. (3) Introductory course in theory and practice for Children's Theatre. 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 the instructor.

281 663. Scene Design. (3) Principles and styles of design for the stage, utilizing sketches, diagrams, plates, and models. May be repeated for a total of 6 hours credit by qualified students. Pr.: Consent of the instructor.

281 667. Stage Lighting. (3) History and technique of lighting for the stage and television.

281 680. Advanced Technical Production. (3) A lecture-laboratory course in advanced technical theatre problems of organization, planning, and execution of scenery, costumes, and lighting. May be repeated for a total of 6 credit hours by qualified students. Pr.: Consent of the instructor.

281 682. History of the Physical Stage. (3) A survey course in the emergence and development of the theatre

building as a distinct architectural form, with particular emphasis on the effect of the physical environment on the play. Pr.: Spch. 255.

281 730. Repertory Theatre. (3) Concentrated studies in theory and practice of repertory theatre productions. Reading, demonstrations, study of play scripts; play selection and production methods; operation of and assistance in production of plays in repertory. May be repeated for a total of 12 hours credit by qualified students. Pr.: Consent of the instructor.

281 735. Practicum in Theatre. (0-6) Supervised participation in all aspects of theatre, with emphasis on problems of a concentrated production program. May be repeated for a maximum of 12 hours credit. Pr.: Major in Theatre and Interpretation; three of the following: Spch. 253, Spch. 255, Spch. 353, Spch. 433; and consent of the instructor. (For transfer students equivalent background will be required.)

281 760. Film Theory and Criticism. (3) Studies in film criticism based on the writings of Kracauer, Balasz, Eisenstein, Spottiswoode, and others.

GRADUATE CREDIT

281 815. Seminar in Theatre. (3) Special problems in theatre research.

Statistics

HOLLY C. FRYER,* Head of Department

Professors Feyerherm,* Fryer,* Siotani,* Associate Professors Conover,* Dayton,* Kemp,* Nassar,* and Waller;* Assistant Professors Milliken* and Perng;* Instructor Iman.

UNDERGRADUATE STUDY

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.

A person wishing to major in statistics may seek a Bachelor of Arts degree by satisfying the general requirements of that degree (p.

82) and completing Math 240; one of Stat: 320, 330, 340, or 350; one of 341 or 351. Or 520 and 521. Either 410 and 411 or 610 and 611; and one additional statistics course. Comp. Sci. 315. A student may seek a Bachelor of Science degree by satisfying the general requirements of that degree (p. 83) and completing the aforementioned courses in mathematics, statistics and computer science. It also is recommended that the student become able to do computer programming rather well, either by taking extra courses or from experience. The student should consult someone in the Department of Statistics before enrolling.

GRADUATE STUDY

The Department of Statistics 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, enter 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 some colleges and universities, but it is preferable to plan to obtain the doctorate if the student wishes 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.

Courses in Statistics

UNDERGRADUATE CREDIT

285 100. *Fun With Statistics*. (2) Interim Semester. A nonmathematical introduction to the foundations of probability and statistics. Topics discussed include nature of statistics; life and chance; history, limitations and potentials of statistics; fundamentals of collection and presentation of data; misuses of statistics; and insight to problem definition and solutions. Cannot be used to satisfy the A.B. requirement of one course in mathematics, statistics or logic.

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.

285 330. *Elementary Statistics for the Social Sciences*. (3). I, II. A basic first course in probability and statistics with textbook, examples and problems aimed toward the social sciences and humanities. Frequency distributions, averages, measures of variation, probability, confidence intervals; tests of significance appropriate to binomial, multinomial, and normal sampling; simple regression and correlation. Pr.: Math 100. Cannot be taken for credit if credit has been received for Stat. 320, 340, or 350.

285 340. *Biometrics I*. (3) I, II. A basic first course in probability and statistics with textbook, examples and problems aimed toward the biological sciences. Frequency distributions, averages, measures of variation, probability, confidence intervals; tests of significance appropriate to binomial, multinomial, Poisson, and normal sampling; simple regression and correlation. Pr.: Math 100. Cannot be taken for credit if credit has been received for Stat 320, 330, or 350.

285 341. *Biometrics II*. (3). II. Analysis and interpretation of biological data using analysis of variance, analysis of covariance, and multiple regression. Negative binomial distribution and its applications. Pr.: Stat. 320, 330, 340 or 350.

285 350. *Business and Economic Statistics I*. (3) I, II. A basic first course in probability and statistics with textbook, examples, and problems pointed toward business administration and economics. Frequency distributions, averages, measures of variation, probability, confidence intervals, test of significance appropriate to binomial, multinomial, Poisson, and normal sampling; simple regression and correlation. Pr.: Math 100. Cannot be taken for credit if credit has been received for Stat. 320, 330 or 340.

285 351. *Business and Economic Statistics II*. (3) I, II, S. Continuation of Stat. 350 including study of index numbers, time series, business cycles, seasonal variation, multiple regression and correlation, forecasting; some nonparametric methods applicable in business and economic studies. Pr.: Stat. 320, 330, 340, or 350.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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. Law of Large Numbers, Chebycheff's Inequality; continuation of study of continuous variates; uniform, exponential, gamma, and beta distribution; Central Limit

Theorem; distributions from normal sampling; introduction to statistical inference. Pr.: Stat. 410.

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.

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; introduction to non-parametric statistics and discrimination. Pr.: Stat. 610.

285 625. **Digital Statistical Analysis.** (3) II. Programming languages; Efficient programming for analysis of variance and covariance, missing data, least squares, multiple regression, multiple correlation, and chi-square analyses. Emphasis on efficient programming. Pr.: Comp. Sci. 315 and Stat. 521 or concurrent enrollment in Stat. 521.

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, course in matrices.

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. Hypothesis testing when form of population sampled is unknown: rank, sign, chi-square, and slippage tests; Kolmogorov and Smirnov type tests; confidence intervals and bands. Pr.: One previous course in statistics.

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 course in matrices.

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.

285 740. **Theory of Statistics III.** (3) Functional forms and properties of selected distribution functions. Characteristic functions. Limiting distributions. Pr.: Stat. 611.

285 741. **Theory of Statistics IV.** (3) II. Convolutions of distributions. Theory of Runs. Distributions of order statistics. Sequential analysis. Pr.: Stat. 740.

285 745. **Practicum in Statistical Consulting.** (3) Supervised experience in consulting with students and faculty regarding statistical problems associated with their research. One hour of lecture, six hours of lab per week. Pr.: Stat. 625 and 611.

285 750. **Probability and Stochastic Processes I.** (3) II. Random variables; conditioning; independence; laws of large numbers; central limit theorems; generating functions, difference equations. Pr.: Math 240.

285 751. **Probability and Stochastic Processes II.** (3) II. Markov chains; Markov processes; Wiener-Kolmogorov prediction theory; time series. Pr.: Stat. 750.

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.

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, or 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; Course in matrices.

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 I.** (3) I. Matrix formulas, Jacobian of matrix transformations, likelihood estimates; Hotelling's T to the second; generalized F, generalized beta, generalized Cochran's Theorem; distributions of simple, partial, and multiple correlation coefficients; testing multivariate hypothesis; exact and

asymptotic distributions of test statistics. Pr.: Stat 861 and one year of advanced calculus.

285 866. Multivariate Analysis II. (3) II. Classification and discrimination; canonical correlations; distribution of roots of determinantal equations; multivariate analysis of variance; union-intersection principle; simultaneous confidence estimation; multiple comparisons; non-parametric multivariate inference. Pr.: Stat. 865.

285 890. Foundations of Probability I. (3) I, in alternate years. Distribution functions; characteristic functions; sums of independent random variables; Central Limit Theorem. Pr.: Equivalent of two semesters of advanced calculus. Stat. 740.

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, least invariant estimations; asymptotic optimal maximum likelihood procedures. Pr.: Equivalent of two semesters of advanced calculus. Stat. 741.

285 896. Advanced Inference II. (3) II. Testing hypotheses: Neyman-Pearson Lemma; monotone likelihood ratio and exponential families; method of least favorable distribution; uniformly 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.



THE COLLEGE OF BUSINESS ADMINISTRATION

ROBERT A. LYNN,* Dean
EUGENE J. LAUGHLIN,* Associate Dean
MILDRED E. BUZENBERG, Assistant Dean

Professors Clark,* Jones,* Laughlin,* and Lynn;* Associate Professors Allen,* Barton-Dobenin,* Coleman,* Fox,* Gilkison,* Gugler,* Mulanax,* and Richards; Assistant Professors Buzenberg, Finley, Graham, Gudgell, Hubbard,* King,* McManis, Rapp, Riley, Thiessen, Tuxbury and Vaden,* Instructors Hollinger, May and Stockard.



The main objective of the College of Business Administration is to provide a challenging opportunity for liberal education and professional study and development in business administration and accounting. 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 examined as a vital social, economic and political institution. To equip the prospective executive and specialist for future professional responsibilities, the College organizes instructional activities around two themes: one, the businessman as the manager and decision maker of operations in a particular firm; two, the businessman as one who must analyze and adapt to the larger economic, social 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 Business Administration recognizes its responsibilities and opportunities to work closely with the business community. It provides to business, through the director of management services and the general faculty, professional services in accounting, finance, marketing and management. The College of Business Administration also sponsors numerous short courses and conferences for business and management groups.

Undergraduate Study

At the undergraduate level, the College of Business Administration seeks to produce a graduate with: (1) a broad education in the arts, sciences and humanities, (2) a solid knowledge and understanding 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 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 students' 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. The required "core courses" in accounting, economics, business law, finance, management and marketing provide the fundamentals of business administration. Six fields of specialization are available for selection by advanced Business Administration majors.

Honors Program

The College encourages high academic achievement with an honors program for undergraduate students majoring in business administration, accounting or pre-business education. The purpose of the honors program is to add breadth and depth to each

student's curriculum. A special adviser is provided to help the honors student choose challenging and rewarding electives which will contribute to his intellectual development.

Entering freshmen are selected for the honors program by their ACT scores, and upper class transfer students by their grade point average.

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 advisors, will select approximately 12 credit hours in a special area of interest. These fields of specialization include: Finance, General Business, Industrial Relations, Management, Marketing and Secretarial Science.

Effective for all students entering the College after January 1, 1971, and all students graduating after June 1, 1976.

Communications

229	100	English Composition I	3
229	120	English Composition II	3
281	106	Oral Communications Ia	3
		Communication Electives	2-3
			11-12

Social Science

269	325	U.S. Politics	3
273	110	General Psychology	3
277	220	Introduction to Sociology	3
			9

Quantitative

245	100	College Algebra	3
245	400	Introduction to Analytic Processes	3
285	350	Business and Economic Statistics I	3
285	351	Business and Economic Statistics II	3
286	315	Fundamentals of Computer Programming	3
			15

General Electives

Social Science			6
Humanities			6
Natural Science*			6
Social Science, Humanities or Natural Sciences			6
			24

Business and Economics

225	110	Economics I	3
225	110	Economics II	3
305	275	Fundamentals of Accounting	4
305	305	Managerial Accounting	3
305	325	Business Law I	3
305	400	Management Concepts	3
305	405	Business Finance	3
305	440	Marketing	3
305	451	Production Management	3
305	600	Business Policy	3
305	602	Business and Society	3
Economics Electives			6
Field of Specialization			12
(see "Fields of Specialization" Below)			
Business Electives			3
			55

Other

Physical Education (two semesters)			0
Free Electives			11-12
Total credit hours required for graduation			126

*Students must take at least one scientific laboratory.

Fields of Specialization

During the junior year, each student will select one field of specialization in consultation with his faculty adviser.

Finance		
Required		
305 612	Capital Budgeting	3
305 615	Financial Management	3
Plus		
Six Credit Hours Selected from the Following Courses		
305 312	Insurance	3
305 505	Investments	3
305 507	Financial Institutions	3
305 617	Controllship	3
225 410	Intermediate Macroeconomics	3
225 420	Intermediate Microeconomics	3
225 430	Money and Banking	3
225 432	Public Finance	3
225 681	International Trade	3

Management		
Required		
305 601	Advanced Management	3
305 631	Organizational Behavior and Administration	3
Plus		
Six Credit Hours Selected from the Following Courses		
305 431	Personnel Administration	3
305 610	Business Measurements and Forecasting	3
305 630	Industrial Relations	3
225 620	Labor Economics	3
273 435	Social Psychology	3
550 451	Work Measurement	3

General Business

Twelve credit hours may be chosen from among the courses listed under the finance, industrial relations, management and marketing fields of specialization. All 12 credits must be taken in the College of Business Administration, and at least 6 of the 12 credits must be in courses numbered 500 or above.

Labor Relations

Required		
305 421	Personnel	3
305 630	Industrial Relations	3
Plus		
Six Credit Hours Selected from the Following Courses		
305 530	Labor Legislation	3
305 631	Organizational Behavior and Administration	3
305 632	Contemporary Issues in Labor Relations	3
225 620	Labor Economics	3
225 627	Contemporary Manpower Problems	3
550 451	Work Measurement	3

Marketing

Required		
305 545	Consumer Behavior	3
305 640	Marketing Research	3
Plus		
Six Credit Hours Selected from the Following Courses		
305 343	Sales Communication	3
305 540	Retailing	3
305 542	Sales Management	3
273 435	Social Psychology	3
289 320	Principles of Advertising	3
273 510	Psychology of Business & Industry	3

Secretarial Science

Required		
305 236	Transcription I	3
305 237	Office Practice and Technique	3
305 238	Office Machines Lab	0
305 301	Office Management	3
Any course offered by the College of Business Administration numbered 300 or above		
		3
		12

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.

305 230	Intermediate Typing	3
305 231	Production Typing	3
305 234	Intermediate Shorthand	3

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 Uniform 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 Business Administration after January 1, 1971 and for all students graduating after June 1, 1976.

Communications

229 100	English Composition I	3
229 120	English Composition II	3
281 106	Oral Communications Ia	3
Communication Electives		2-3
		11-12

Social Science

269 325	U.S. Politics	3
273 110	General Psychology	3
277 220	Introduction to Sociology	3
		9

Quantitative

245 100	College Algebra	3
245 400	Introduction to Analytic Processes	3
285 350	Business and Economic Statistics I	3
285 351	Business and Economic Statistics II	3
286 315	Fundamentals of Computer Programming	3
		15

General Electives

Social Science		3
Humanities		6
Natural Science*		6
Social Science, Humanities or Natural Science		6
		21

Business and Economics

225 110	Economics I	3
225 120	Economics II	3
305 238	Office Machines Lab	0
305 325	Business Law I	3
305 400	Management Concepts	3
305 405	Business Finance	3
305 440	Marketing	3
305 451	Production Management	3
305 600	Business Policy	3
305 602	Business and Society	3
Economics Electives		6
Business Electives		3
		36

Accounting

305 275	Fundamentals of Accounting	4
305 361	Cost Accounting	3
305 371	Intermediate Accounting I	3
305 461	Advanced Cost Accounting	2
305 472	Intermediate Accounting II	3
305 481	Taxation I	3
Accounting electives**		6
		24

Physical Education (two semesters)		0
Free Electives		9-10
Total Hours required for graduation		126

A suggested freshman year program for the degree, Bachelor of Science in Business Administration:

Fall Semester

English	229 100	English Composition I	3
Mathematics	245 100	College Algebra	3
Psychology	273 110	General Psychology	3
		Natural Sciences and-or Humanities	6-7
Physical Education			0
			15-16

Spring Semester

English	229 120	English Composition II	3
Speech	281 106	Oral Communications Ia	3
Sociology	277 220	Intro. to Sociology	3
		Natural Sciences and-or Humanities	6-7
Physical Education			0
			15-16

*Students must take at least one scientific laboratory.

**Students preparing to take the C.P.A. exam should take Auditing I.

3.0 (B average) in an institution whose requirements for the bachelors degree are substantially equivalent to those of Kansas State University.

Applicants with grade averages below 3.0 but above 2.5 will be considered for probational admission. In such cases evidence of superior capability in business, economics and mathematics or statistics will be considered.

Provisional admission may be granted to applicants who have subject matter deficiencies in undergraduate preparation. Normally these deficiencies will be made up by enrolling in courses for undergraduate credit.

All applicants must take the Admissions Test for Graduate Study in Business (ATGSB). This test is a required part of the application, and the applicant should have the testing service report the test scores to the director of Graduate Program, College of Business Administration. Requests for applications and all questions concerning the test, including time and place, should be addressed to: Educational Testing Service, Box 966, Princeton, New Jersey 08540.

Completed applications should be on file at least 60 days prior to requested enrollment date.

Master Of Business Administration

The program leading to the M.B.A. degree in Business Administration is designed to provide broad education in business management. Depth in a particular area is possible through the use of electives. The M.B.A. program in Accounting is designed to prepare graduate students for careers in public, industrial or governmental accounting.

MBA In Business Administration:

Admission Requirements: In addition to the general admission requirements set forth above, the applicant must have completed at least two courses in economics and one course in accounting, business finance, business law, management, marketing, statistics and calculus.

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. Other programs must be arranged with the advice of the graduate committee.

800	Behavioral Management Theory	3
820	Decision Theory of the Firm	3
830	Legal and Social Environment of Business	3
840	Marketing Systems Analysis	3
850	Research Methods in Business	3
851	Business Operations Analysis	3
860	Accounting Controls for Business	3
861	Financial Controls for Business	3
Total required core		24

Option A:

Required core	24
Elective area*	6
Written comprehensive exams required	0
Hours required for graduation	30

Elective areas include, but are not necessarily limited to, the following: computer science; economics; finance; industrial relations; management; marketing; operations research (industrial engineering); political science; psychology; sociology; statistics.

Option B:

Required core	24
Master's thesis	6
Oral defense of thesis required	0
Hours required for graduation	30

MBA In Accounting:

The Program of Study: Generally, each candidate must complete the following program or its reasonable equivalent. Other programs must be arranged with the advice of the graduate committee.

Required		
800	Behavioral Management Theory	3
820	Decision Theory of the Firm	3
830	Legal and Social Environment	3
861	Financial Controls for Business	3
870	Accounting Theory I	3
		15

Select one

850	Research Methods in Business	(3)	
851	Business Operations Analysis	(3)	3

Select four

670	CPA Problems	(3)	
675	CPA Theory and Law	(3)	
681	Auditing II	(3)	
871	Accounting Theory II	(3)	
872	Tax Planning and Research	(3)	12

Written comprehensive exams required	0
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Hours required for graduation	30
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Courses in Business and Accounting

UNDERGRADUATE CREDIT

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 Business Administration. Pr.: Sophomore standing.

305 230. Intermediate Typing. (3) I, II, S. Emphasis on speed and accuracy in typing straight copy and in production of letters, manuscripts, and tabulated reports. Pr.: One unit of high school typing.

305 231. Production Typing. (3) I, II. Develop increased speed and accuracy in production typing — legal forms, statistical materials and letters — within acceptable time limits. Pr.: 305 230.

305 233. Shorthand I. (4) I, II. Beginning course in fundamentals of Gregg Shorthand. Open only to students with no previous shorthand instruction. Pr.: One unit of high school typing.

305 234. Intermediate Shorthand. (3) I, II. Emphasis on writing speed and the introduction of transcription. Pr.: 305 230 or concurrent enrollment and 305 233 or one unit of high school shorthand.

305 236. Transcription. (3) II. Advanced shorthand with speeds of 100 to 120 or higher. Setting up business letters in various styles — gaining speed in transcription of letters and manuscripts. Pr.: 305 230 and 234.

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.: 305 236 and conc. enrollment in 305 238.

305 238. Office Machines Laboratory. (0) I, II. Instruction and practice covering the various calculators and ten-key adding machines. One hour a week.

305 275. Fundamentals of Accounting. (4) I, II, S. The preparation and use of accounting records for individual, partnership and corporate business organizations. Pr.: Sophomore standing.

305 300. 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 Business Administration. Pr.: Junior standing.

305 301. Office Management. (3) I. 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.

305 305. 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.: 305 275.

305 310. Administrative Communications. (3) II. Preparation of business communications, reports and

correspondence, and analysis of communication systems within an enterprise structure. Pr.: 229 120 and 281 106.

305 312. Insurance. (3) I. A study of life, property, casualty, and health insurance from the purchaser's point of view with additional emphasis on the operation and contributions of the insurance industry. Pr.: 225 110.

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.: Junior standing.

305 341. Black Business Studies. (2-3) Intersession, II. Exposure to operations of black managed enterprises is the focal point. The study of these businesses and their problems is approached in an interdisciplinary fashion.

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.: Junior standing or consent of instructor.

305 350. Small Business Operations. (3) Offered on sufficient demand. Opportunities in business ownership, principles governing the starting of a small enterprise; importance, status, problems, and management of small business. Pr.: 225 110. Not open to students in College of Business Administration.

305 361. Cost Accounting. (3) I, II. Allocation of production costs to determine unit costs of goods manufactured and sold and the utilization of such data by management. Pr.: 305 275.

305 371. Intermediate Accounting I. (3) I, II. Application of accounting theory to the valuation of balance sheet accounts, with emphasis on cash, inventories and fixed assets. Pr.: 305 275.

305 399. Honors Seminar in Business. (1) I, II. Readings and discussions on selected topics. A maximum of four hours credit may be obtained.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

305 400. Management Concepts. (3) I, II, S. Fundamental processes in managing the going concern. Provides a basic understanding of administrative problems through study of organization theory, quantitative, and behavioral aspects of decision making. Pr.: 245 100 and 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.: 225 120, 285 320 and 305 305 or 371.

305 426. Business Law II. (3) I. Study of the social forces which bring about changes in Civil Law as it affects commercial transactions. Coverage includes corporations, commercial paper and contractual rights. Pr.: 305 425.

305 431. Personnel Administration. (3) I. Study of the personnel program and its operational processes of manpower planning, recruiting and developing. Analysis of the role of the personnel function in the organization with emphasis on problem solving. Pr.: Junior standing.

305 440. Marketing. (3) I, II, S. A general study 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.: 225 110 and junior standing.

305 451. Production Management. (3) I. Production management as it relates to capital investment, inventory control, purchasing, plant layout and site location. Pr.: 225 120, 285 320 and 305 275.

305 461. Advanced Cost Accounting. (2) I, II. Budgetary control with standard costs; cost and profit analyses for decision-making purposes. Pr.: 305 305 or 361.

305 471. Advanced Accounting. (3) II. Accounting for partnerships, installment sales, consignments, consolidated statements, and other special topics. Pr.: 305 371.

305 472. Intermediate Accounting II. (3) I, II, S. Statement analysis and special problems peculiar to the corporate form of organization. Pr.: 305 371.

305 475. Accounting Internship. (3) II. Provides eight weeks of practical diversified public accounting experience for accounting majors. The course objective is a broader educational experience for participating students. Pr.: 305 472, 481, 680, and consent of instructor.

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.: 305 275 and junior standing.

305 495. Business Administration Internship. (3) S. Eight weeks of business experience between junior and senior years coordinates the interests of participating students and firms. Pr.: 305 400, 405, 440, completion of junior year and consent of instructor.

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.: 245 340 or 220, 285 320 and 305 405.

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.: 305 405.

305 512. Real Estate. (3) II. Principles and practices including legal, economic and social implications from the viewpoint of the real estate practitioner, investor and society. Pr.: Junior standing.

305 530. Labor Legislation. (3) II. Development of government regulations pertaining to legal rights and duties of employers, unions, and the public. Analysis of labor laws and their effect on labor-management relationships. Pr.: 305 425.

305 540. Retailing. (3) II. 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.: 305 440.

305 542. Sales Management. (3) I. 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.: 305 440.

305 545. Consumer Behavior. (3) I. Behavioral concepts and theories as they relate to marketing: motivation, learning, beliefs, attitudes, habits, taste, custom, fashion, social class, reference, group influences, value and utility theory. Pr.: 305 440.

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; 305 400, 405, 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.: 245 340 or 220, 285 320 and 305 400.

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) II. Methods of analysis of business data, with emphasis on the use of data for executive decisions. Topics include tables, charts, time series analysis, index numbers, current economic indicators, forecasting techniques, quality control, and sampling applications. Pr.: 285 320 or consent of instructor.

305 612. Capital Budgeting. (3). Development of a rational and systematic approach to formulating a firm's strategy for investing in productive facilities within an economy characterized by increasing technological change and uncertainty. Pr.: 245 400, 286 350 and 305 405.

305 615. Financial Management. (3) II. Analysis of problems in advanced financial planning and control. Pr.: 245 340 or 220, 285 320 and 305 405.

305 617. Controllershship. (3) I. Emphasis on control of operation through cost analysis, internal and external reporting, and income determination concepts. Pr.: 305 305 or 361 and 371.

305 630. Industrial Relations. (3) I. Study of strategies and procedures in industrial relations including prenegotiations and negotiations, grievance 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) I. 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.: 305 400 or 431 or consent of instructor.

305 632. Contemporary Issues in Labor Relations. (3) II. Research oriented course concentrating on current critical issues in the labor-management field. Pr.: 305 630 or 225 620.

305 640. Marketing Research. (3) II. Designed to acquaint the students with various marketing research concepts, methods, and techniques; and to develop their ability to evaluate, use, and present research findings. Pr.: 305 440.

305 642. Marketing Strategy. (3) I. Marketing policy formulation and implementation. Emphasis on developing students' ability to analyze and solve marketing problems by integrating knowledge in major marketing areas. Pr.: 305 545 or 640, or concurrent enrollment in 545 or 640.

305 660. International Business. (3) II. Examination of business decision parameters and strategy in foreign environment. Emphasis on aspects differing from the domestic area as they relate to marketing, management and financial decisions. Pr.: Senior standing.

305 670. C.P.A. Problems. (3) I. A study of problems in various C.P.A. examinations. Pr.: 305 472 and consent of instructor.

305 675 C.P.A. Theory and Law. (3) II. Study of theory of accounts and law through a review of current literature and recent C.P.A. examinations. Pr.: 305 325 and 472.

305 680. Auditing I. (3) I. Theory and procedure used in balance sheet audits. Pr.: 305 472.

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.: 305 680 and consent of instructor.

305 798. Problems in Business Administration. Credit arranged. I, II, S. Pr.: Background of courses needed for the problem undertaken.

305 799. Problems in Accounting. Credit arranged. I, II, S. Pr.: Background of courses needed for the problem undertaken.

GRADUATE CREDIT

305 800. Behavioral Management Theory. (3) I. The development of the behavioral bases of individual and group functioning in business, governmental, educational and other organizations. Pr.: 305 400 or consent of instructor.

305 820. Decision Theory of the Firm. (3) I. An integration of economic theory and operations research, with business decisions and application of these tools to management problems. Pr.: 225 120, 285 320 and 305 305.

305 830. Legal and Social Environment of Business. (3) II. 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.: 305 440.

305 841. Seminar in Marketing. (3) On sufficient demand. Study of current literature, marketing theory, and intensive investigation of various problem areas. Pr.: 305 440 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.: 285 320 and 305 400.

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.

305 860. Accounting Controls for Business. (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.: 225 120 and 305 305.

305 861. Financial Controls for Business. (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.: 305 405.

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.

305 872. Tax Planning and Research. (3) I. Intensive examination of specific problems in taxation of partnership and corporate income, gift taxes and death taxes. Emphasis on research and tax planning. Pr.: 12 hrs. in accounting and 305 481.

305 998. Research in Business Administration. Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken.

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

SAMUEL R. KEYS,* Dean

MARGARET C. BLOOMQUIST, Assistant to
the Dean and Director of Student Per-
sonnel Services

ROY A. BARTEL, Coordinator of Student
Teaching

The College of Education is concerned with programs preparing individuals for a wide variety of educational positions in schools, colleges, industry, business, welfare, and governmental agencies.

Primary consideration is given to work and curricula in: 1) preparation of teachers for elementary and secondary schools, 2) preparation of personnel to serve in various levels of school and college administrative positions, 3) training of supervisory personnel for curricular development and instructional improvement, 4) programs to prepare persons for the wide variety of guidance and student personnel positions, 5) preparing teachers for junior colleges and four-year colleges, including professors for colleges of education, 6) providing programs to prepare teachers and other personnel in the area of

special education, 7) providing consultative services for the improvement of various aspects of educational programs including in-service training, and 8) providing graduate programs for positions in education at the graduate level.

The College of Education cooperates with all other colleges and departments at Kansas State University. This cooperation is considered essential for a complete preparation of school personnel who require contact with personnel from all aspects of the academic community.

The Kansas State University Teacher Education Programs are accredited by the Kansas State Board of Education, North Central Association of Colleges and Secondary Schools, and National Council for Accreditation of Teacher Education.

Center for Extended Services and Studies

JORDAN UTSEY, Director

The Center for Extended Services and Studies was established and is operated by the College of Education, Kansas State University, in response to the needs of schools in the State of Kansas and of education generally. The Center provides a structure within which the College of Education and Kansas State University can direct their resources toward working cooperatively with schools to develop and provide services and studies. The services and studies provided relate to the solution of educational problems and general improvement of education.

The Center is staffed and maintained through the assignment of faculty members within the College of Education, contracts with faculty from Kansas State University and other Kansas colleges and universities, and assignment of graduate students. The problem, service or study will, upon definition, determine the resources, human and other, that will be coordinated through agreement.

Undergraduate Study

The curriculum in elementary education or secondary education at Kansas State University is a four-year program.

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 the Teacher Education Program during their first semester of residence.

Programs in Teacher Education

The Teacher Education Programs are designed to develop competencies essential for teaching. The requirements of the Programs must be completed by everyone wishing to teach in elementary or secondary schools.

Students completing a Teacher Education Program which is part of requirements for a degree granted by another college at KSU,

are required to complete all requirements of the Teacher Education Program as outlined below.

The Teacher Education Programs consist of (1) General Education Studies (page 186 or 187), (2) Professional Studies (p. 187), and (3) Major Area.

Programs preparing junior college teachers are available: (1) Students may complete a Secondary Education Teacher Education Program and add to it requirements for junior college certification. (2) Students may have a program designed specifically for junior college certification.

Admission to the Teacher Education Programs

Any student intending to teach in elementary or secondary schools must have the Application for Admission to the Teacher Education Programs filed and approved before the student may enroll in Educational Psychology II or any part of the Professional Semester. The Application for Admission to the Teacher Education Programs must be approved before pre-education majors may have a Change in Curriculum into the College of Education completed. The application forms are available in the Office of Student Personnel Services, College of Education, Holton Hall.

Dates: (1) Students must apply by October 15 or February 15 of the sophomore year, but not later than the semester in which they earn 53 semester hours. The Application for Admission to a Teacher Education Program must be filed two years prior to graduation. If this is not adhered to students may experience difficulties in meeting certification requirements.

(2) Transfer students from another institution should apply at the time of enrollment or pre-enrollment.

Students making a change in Teacher Education Programs should file an application for the new program.

Academic Standards Committee: The Academic Standards Committee of the College of Education must approve the Application for Admission to the Teacher Education Programs.

Requirements for Admission to the Teacher Education Programs: (The same

requirements apply to students applying for admission to the College of Education.)

1. a. Over-all grade-point average of 2.2 in all resident work attempted at Kansas State University.
b. The grade-point average requirements for students transferring to KSU will be based on all work attempted at previously-attended institutions when the application is filed at the time of enrollment.
2. A grade-point average of 2.5 in all resident work attempted at Kansas State University in the Teaching Field (as defined by the Certificate Handbook of the State of Kansas). This requirement does not apply to the Elementary Education majors. Transfer students will have the grade average based on all attempted work in the teaching field at previously-attended institutions when the application is filed at the time of enrollment.
3. Passing English Composition I and II with a grade of "C" or better in one of the courses. A student who fails to meet the requirement may substitute a satisfactory score on the Cooperative English Test — English Expression Form 1 C.
4. Grade of "C" or better in one of the following Speech courses: 105, 106, 109, 200.
5. Clearance by the Dean of Students.

Provisional admission may be granted to an applicant who meets all requirements and whose over-all grade-point average is not below 2.0 and teaching field over-all grade-point average is not below 2.3.

The Professional Semester

Teaching Participation is the culminating clinical experience of the Professional Semester. The Professional Semester is comprised of a series of prescribed courses which are accelerated so that one-half of the semester is allocated to the clinical experience (Teaching Participation). This semester occurs either in the fall or spring semester of the senior year.

Students desiring to be recommended for certification by KSU must earn credit for Teaching Participation in residence. Those students who have had secondary methods courses in another college or university will be required to audit the course at Kansas State University.

The Professional Semester for the various Teacher Education Programs is shown below:

ELEMENTARY PROFESSIONAL SEMESTER

	Hours
Elementary School Reading (415 474)	3
Educational Sociology (405 616)	3
Teaching Participation in Elementary School (415 475)	8
	<hr/> 14

The majority of secondary education majors enroll in the following courses in their Professional Semester.

SECONDARY PROFESSIONAL SEMESTER

	Hours
Teaching Participation in Secondary School (415 477)	8
Principles of Secondary Education (415 451)	3
Educational Sociology (405 616)	3
Methods of Teaching in Secondary School (415 476)	3
	<hr/> 17

The following are exceptions to the Secondary Professional Semester:

AGRICULTURAL EDUCATION PROFESSIONAL SEMESTER

	Hours
*Teaching Participation in Secondary School (410 477)	8
*Vocational Education (410 702)	3
*Methods of Teaching Agriculture (410 500)	2
Courses in Major (506-459 & 506-351)	5
	<hr/> 18

HOME ECONOMICS EDUCATION PROFESSIONAL SEMESTER

	Hours
*Teaching Participation in Secondary School (410 477)	8
*Curriculum in Home Economics (410 750)	3
Courses in Major (630 360, 630 365, 650 300)	5
	<hr/> 16

MUSIC EDUCATION PROFESSIONAL SEMESTER

	Hours
*Teaching Participation in Elementary Music (415 417)	4
*Teaching Participation in Secondary Music (415 418)	4
*Principles of Secondary Education (415 451)	3
*Educational Sociology (405 616)	3
Courses in Major	2
	<hr/> 16

PHYSICAL EDUCATION PROFESSIONAL SEMESTER (MEN AND WOMEN)

	Hours
*Teaching Participation in Secondary Schools (415 477)	8
*Principles of Secondary Education (415 451)	3
*Educational Sociology (405 616)	3
*Methods of Teaching in Secondary School (415 476)	2
Courses in Major (Women, 262 320; Men, 262 450)	2
	<hr/> 18

Application for Admission to the Professional Semester

Applications for the Professional Semester must be filed before December 20th of the preceding year in which the student plans to enroll in the Professional Semester.

Failure to file the application by this date may cause a student to experience difficulties and delays in meeting certification and-or degree requirements.

Students must apply even though all admission requirements are not satisfied at the time of application. The application serves as a formal request from the student that the College of Education provide an opportunity for him to participate in the Professional Semester.

1. The Application. Obtain the form, Application for Admission to the Professional Semester, from the College of Education adviser and return the form to the same adviser.
2. Secondary students need signatures of both the teaching field adviser and the Education adviser.

*Other courses common to the secondary Professional Semester are taken prior to this Professional Semester sequence.

3. Elementary Education majors need only the signature of the Education adviser.
4. Return the form to the Education adviser.

Admission Requirements to the Professional Semester

1. The application properly filed.
2. Full admission to a Teacher Education Program.
3. Educational Psychology I and II completed with a passing grade.
4. A minimum of ninety (90) hours of course work completed.
5. Over-all grade point average of 2.2 in all work attempted in residence at Kansas State University.
6. Students in all Secondary Education Programs must have a 2.5 over-all grade point average in the teaching field courses attempted in residence at Kansas State University.
7. Satisfactory completion of Introduction to Instructional Media course.
8. Elementary Education majors must have completed the following four professional Courses:

	Hours
Science for Elementary Schools, 415 470	3
Language Arts for Elementary Schools, 415 471	3
Social Studies for Elementary Schools, 415 472	3
Mathematics for Elementary Schools, 415 473	3

9. Students with degrees from other colleges and universities who wish to qualify for the Professional Semester at KSU must apply through the Coordinator of Student Teaching. Applicants must meet all requirements of the Teacher Education Program.
10. The Coordinator of Student Teaching will obtain clearance for students from the Dean of Students office.
11. Students will obtain clearance from Student Health through a physical examination the semester prior to the Professional Semester.
12. Courses common to the Secondary Professional Semester which are scheduled in some Teacher Education Programs prior to the Professional Semester must be completed satisfactorily.

The College of Education Adviser will indicate approval to the student's pre-enrollment or enrollment in the Professional Semester. When students pre-enroll in the Professional Semester and find at a later date that requirements for admission to the Professional Semester are not all satisfied, the student may request through his College of Education Adviser that his Application for Admission to the Professional Semester be postponed one semester. One postponement is all that is permitted. Approval for enrollment in the Professional Semester later than one postponement of the original application will require a new application.

Special Requirements Concerning the Professional Semester

1. Students enrolled in the Professional Semester may take no courses which do not conform to the accelerated schedule. This means that during the Professional Semester no assignments or class attendance may be required during the clinical experience.
2. Students will receive credit or no-credit for Teaching Participation.
3. Students must be eligible for Admission to the Professional Semester to enroll in any of the professional education courses which are a part of the Professional Semester.

Curriculum in Elementary Education

Bachelor of Science in Elementary Education. Hours required for graduation, men and women, 126.

Students preparing to teach in the elementary school are 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 pre-education adviser in Room 110 Holton Hall. The adviser is available for advising and counseling students concerning the courses essential for entry into the Teacher Education Program. All sophomores must make application for admission to the Teacher Education Program. When the applications are approved, students are accepted into the Teacher Education Program and into the College of Education. Students are reassigned to advisers in the College of Education.

I. General Education Requirements

(50 hours):

- a. Communications: English Composition I and II, six (6) hours; Oral Communication, two (2) hours.
- b. Social Sciences (must include General Psychology, 3 hours; additional 9 hours selected from economics, geography (except Geog. 150 & 151) political science, history, sociology, anthropology: Twelve (12) hours.
- c. Literature or Language: Five (5) hours. (a combination of the two is not acceptable)
- 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. Physical Education: Two semesters required.
- g. Electives.

II. Professional and Specialized Course Requirements

(48 hours):

a. Professional Education: Thirty-six (36) hours.

	Hours
1. Educational Psychology I, 405 202	3
Educational Psychology II, 405 302	3
Principles of Elementary Education, 415 300	3
Science for Elementary Schools, 415 470	3
Mathematics for Elementary Schools, 415 473	3
Language Arts for Elementary Schools, 415 471	3
Social Studies for Elementary Schools, 415 472	3
Elementary School Reading, 415 474	3
Educational Sociology, 405 616	3
Introduction to Instructional Media, 415 316	1
	28
2. Clinical Experiences:	
Teaching Participation in Elementary School, 415 475	8 hours

b. Additional Requirements: Twelve (12) hours.

	Hours
Music for Elementary Teachers, 257 205	3
Art for Elementary Schools, 209 170	3
Literature for Children, 229 470	3
Personal and Community Health, 261 356	3

III. Area of Concentration

(15 hours):

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
- Home Economics
- Music and Art
- Social Science
- English and Speech
- Modern Foreign Language
- Physical Science and Mathematics
- Special Education:
 - Speech Pathology
 - Mental Retardation

IV. Electives

(14 hours):

Remaining hours in the degree may be taken as additional hours in the major, related courses and free electives.

Curriculum in Secondary Education

Bachelor of Science. Hours required for graduation, men and women, 126.

Students preparing to teach in the secondary school are enrolled in a pre-secondary education curriculum in the College of Arts and Sciences or the College of Business Administration 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 students are advised by a College of Education pre-education adviser in Room 110 Holton Hall or by an adviser in the College of Business Administration. In addition to the

pre-education adviser, students are assigned to advisers in their majors who assist in the selection of courses in their majors and teaching fields.

All sophomores must make application for admission to the Teacher Education Program. When the applications are approved, students are accepted into the Teacher Education Program and into the College of Education. Students are reassigned to advisers in the College of Education, but retain their advisers in their major fields.

There are 22 subject fields applicable to teaching at the secondary level.

I. General Education Requirements:

(50 hours):

- a. Communications: English Composition I and II, six (6) hours; Oral Communication, two (2) hours.
- b. Social Sciences (must include General Psychology, 3 hours; additional 9 hours selected from economics, geography (except Geog. 150 & 151) political science, history, sociology, anthropology: Twelve (12) hours.
- c. Literature or Language (a combination of the two is not acceptable): Five (5) hours.
- d. Natural Science: Sixteen (16) hours; including at least one course in biological science and one course in physical science. Must include one laboratory course. May not include more than four (4) hours of mathematics.
- e. Physical Education: Two semesters required.
- f. Electives.

II. Professional Education Requirements:

(23-24 hours):

	Hours
a. Educational Psychology I, 405 202	3
Educational Psychology II, 405 302	3
Introduction to Instructional Media, 415 316	1
Principles of Secondary Education, 415 451	3
Educational Sociology, 405 616	3
Methods of Teaching in the Secondary School, 415 476	2-3
b. Clinical Experiences:	
Teaching Participation in the Secondary School, 415 477	8 hours

III. Major

(Refer to section "Secondary Education Major Fields" below.)

IV. Electives

Remaining hours in the degree may be taken in additional hours in the major, general education and related courses, and free electives.

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 39.

Art Education (SED 420): Art 095, 096, 100, 190, 195, 196, 200, 205, 210, 222, 224, 230, 235, 246, 265, 270, 290, 496, 600, 787, an additional 6 hours in courses in one of the

specialized art subjects (oil, prints, ceramics, sculpture, art history, metalcrafts & jewelry).

Biological Science (SED 427): Biol. 198, 201, 450, 530, 535, An Husb. 400, 7 hours elected from Biol. 515, 646 or 660, Agric. 211; Physics 112; Geol. 100; Chem. 210, 230, 250, 350 or 110, 190, 191, 200.

Business Education (SED 421): B. A. 230, 231, 237, 238, 275, 301, 305, 315, 400, 425, 426, 440, 234 and 236 or 6 additional marketing hours or 6 additional accounting hours, 6 hours of Business Administration electives; Econ. 430 or B. A. 405; Pol. Sci. 325; Soc. 211; Econ. 110, 120; Math. 100.

Chemistry (SED 427): Chem. 210, 230, 271, 350, 351, 585, five hours of chemistry electives; Biol. 205 and 210 or 198 and 201; Math. 220, 221; Phys. 211 and 212 or 310 and 311; highly recommended are Math. 222, Chem. 799.

Earth Science (SED 427): Biol. 198 and 201 or 205 and 210; Chem. 210, 230, 250; Math. 100, 150; Phys. 131, 135, 211, 212; Geog. 150; Geol. 100, 420, 430, 460.

Economics (SED 428): Econ. 110, 120, 410, 420; Pol. Sci. 110 or 325; Hist. 251, 252; Soc. 211; Soc. Sci. elective (recommended: Geog. 250 or 260); Bus. Admin. 272 or 273; Math. 100; Stat. 320 or 520; 12 hours electives in Economics, numbered 400 above, selected with advice of Economics advisor.

English (SED 422): Three of the following four: Engl. 380, 381, 385, 386; Engl. 350 or 651, 406, 451, 475, 599, 9 hours of literature electives, with 6 hours at 600 level and above.

Geography (SED 428): Geog. 150, 151, 250, 260, 350, 550, 9 hours of additional courses numbered 500 or above in geography; Hist. 101, 102, 251, 252; Pol. Sci. 110 or 325; Soc. 211.

Home Economics Education Majors will be enrolled in and receive their degree from the College of Home Economics. See page 237.

History (SED 428): Hist. 101, 102, 251, 252, 597, 599, 12 hours of courses numbered 400 and above distributed in three of the five fields: (a) Ancient, Medieval and Early Modern Europe, (b) Modern Europe including Britain, (c) Non-Western History, (d) American (including Latin America), and (e) History of Science, History of Technology, Military History; Pol. Sci. 110 or 325 and three hours elective; Soc. 211; three hours elective in economics and Geography 110.

Journalism (SED 422): Journ. 306, 316, 331, 21 hours electives from Journ. 235, 320, 331, 335, 358, 406, 455, 600, 606, 620, 652, 660.

Mathematics (SED 424): Math. 220, 221, 222, 240, 320 or 410, 18 hours of courses numbered 400-799 in the department of mathematics for which the following courses are recommended: 470, 475, 511, 512, 513, 573, 617, 619, 691. It is recommended that a course in physics be included as part of general education and that a course in computer programming be included as an elective.

Modern Languages (SED 425): 30 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 136.

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 144.

Physical Science (SED 427): Chem. 210, 230, 250, 350, 351; Geol. 100, 430; Biol. 205 and 210 or 198 and 201; Phys. 310 and 311 or 211 and 212 and 407, 6 hours selected from Phys. 131, 135, 408, 400; Math 220, 221.

Physics (SED 427): Phys. 310, 311, 400, 432, 472, 502, 503, 740; Chem. 210, 230, 250; Math. 220, 221, 222, 240.

Political Science (SED 428): Pol. Sci. 110, 21 hours in political science; Hist. 101, 102, 251, 252; three hours in economics; Soc. 211; Geog. 110.

Psychology (SED 426): Psych. 110, 350, 560 (or 575 or 580), 420, 435, 6 hours of psychology electives excluding Educational Psychology I and Educational Psychology II; Math. 100; Stat 320 or 330; completion of a second teaching field based on minimum College of Education requirements.

Sociology (SED 428): Soc. 211, 410, 620, 710, two of the following four: 430, 440, 450, 460, 9 hours of courses numbered 500 or above in the department of sociology; Pol. Sci. 110 or 325; Stat. 320; three hours in mathematics, logic or philosophy; three hours in economics; Geography 110; History 251, 252.

Speech (SED 429): Thirty hours in speech including 21 hours in the major area of interest and 9 hours in speech courses outside major area of interest. To satisfy requirements, choices may be made from the following speech courses: I. Public Speaking, Group Discussion & Debate: 176, 200, 608, 616, 618, 655, 765; II. Theatre: 145, 253, 255, 350, 433, 436, 472; III. Oral Interpretation, Speech Correction, Voice & Diction: 210, 213, 455, 526, 632, 637.

Teacher Certification

The College of Education has the responsibility to serve as the recommending agent for ALL Kansas State University graduates who wish to qualify for certification as a pre-school, elementary, secondary, or junior college teacher. The degrees earned in the College of Education will fulfill certification requirements. Students enrolled in and earning degrees in colleges other than the College of Education must complete ALL requirements of the Teacher Education Program.

Students may qualify for the Three-Year Degree Elementary Certificate, the Three-Year Degree Secondary Certificate, or the Three-Year Degree Elementary and Secondary Certificate, as established by the State Board of Education.

Applications for certification are processed by the Office of Student Personnel Services of the College of Education, Room 111, Holton Hall.

Kansas State University may become the recommending agent for recertification or

initial certification of individuals presenting degrees from other accredited institutions.

1. Persons seeking renewal may do so upon completion of a minimum of eight (8) hours in residence, a portion of which must be earned in the College of Education.
2. Persons seeking initial certification must meet all requirements of the Teacher Education Program. (page 184)

Graduate Study

The College of Education offers work leading to the Master of Science degree and the Doctor of Philosophy in Education degree. Admission to the Graduate School is required of all students enrolling for graduate credit. The general requirements for advanced degrees are set forth in the Graduate School section of the catalog.

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

Agricultural Education
Home Economics Education
Education—Specialization in: Adult Education, Educational Administration, Guidance and Counseling, Secondary Education, Elementary Education, Curriculum and Supervision, Special Education

Requirements: Candidates for graduate work shall meet the following requirements:

1. Graduation from an accredited institution whose requirements for the Bachelor's degree are substantially equivalent to those of Kansas State University.
2. Undergraduate grade average of 3.0 or better in the junior and senior years.
3. Graduate Record Examination, Aptitude Test score only.
4. Undergraduate preparation substantially equivalent to that given by Kansas State University in the specific subject-matter field in which the applicant expects to do graduate work.
5. Undergraduate preparation in closely related or supporting subjects adequate to support advanced work in the field of the applicant's choice.
6. Undergraduate professional education necessary to satisfy the requirements of the graduate program the student expects to pursue.

Students lacking preparation in certain areas may be required to do additional work.

All students expecting to work for a Master's Degree shall make available to the Student Personnel Office of the College of Education two copies of the Graduate School Application, two official copies of transcripts

from each and every institution attended, a copy of verbal and quantitative scores of the Aptitude Test of the Graduate Record Examination, three letters of recommendation, a statement of academic objectives for graduate study, and international students whose native language is not English must make available the results of the Test of English as a Foreign Language TOEFL.

Additional requirements for the M.S. degree include:

1. A minimum of 30 semester hours, approximately one-half of which shall be in the major field (one option provides for 12 hours).
2. Included in all programs must be a minimum of two courses selected from the following list: Philosophy of Education, Curriculum Development, Advanced Educational Psychology, Principles and Practices of Guidance, Basic Principles of Measurement, and Research Methods and Treatment of Data. Students should confer with advisers concerning specific departmental course requirements.
3. **Thesis, Report, Non-Report Options:** Departments shall have the option of using one or more of the three plans below:
 - a. A thesis of six to eight semester hours
 - b. A written report of two semester hours either of research or of problem work on a topic in the major field.
 - c. Course work only, but including evidence of scholarly effort such as term papers, production of art, music, designs, etc., as determined by his supervisory committee.
4. A final oral examination or a comprehensive written examination or both shall be required of the student. These may include a defense of the thesis or report, an interpretation of other scholarly products, or a testing of the student's understanding of his fields of study. Choice of examination procedures shall be a departmental option.

A brochure, "Guidelines for Initial Enrollment, Application, and Admission to Graduate Study in Education for Master's Degree and as Special Student," may be obtained on request from the Director of Student Personnel Services of the College of Education. Information on special requirements for an advanced degree may be obtained by writing to the department head.

Doctor of Philosophy Degree in Education. Major work is available in the following broad areas of specialization: (1) Educational Administration, (2) Educational Psychology, (3) Adult Education, (4) Occupational Education, and (5) Curriculum and Instruction. Joint programs involving selected

departments in other Colleges at Kansas State University will prepare individuals for teaching positions in junior and four-year colleges.

Requirements: Applicants for the Ph.D. degree in Education shall make available to the Office of Student Personnel Services two copies of the Graduate School Application, two official copies of undergraduate and graduate transcripts, a copy of verbal and quantitative scores of the aptitude test of the Graduate Record Examination, a report of the Miller Analogies Test score, four letters of recommendation, an autobiography indicating educational experience and aspirations, a statement of health from the applicant's family physician, and evidence of writing ability such as a thesis or any published articles. In addition, the applicant will be asked to present himself for an interview at a designated time and place.

Additional requirements for the Ph.D. degree include a minimum of 90 semester hours of graduate study beyond the bachelor's and must include:

1. A minimum of 24 hours of course work above the Master's degree or equivalent, and 20-30 hours of research at Kansas State University after admission to the doctoral program.
2. A minimum of 20 hours in the area of specialization, 12 hours in an integrated supporting area, and 9 hours in the prescribed research core. The prescribed research core consists of the following: (a) a first course in statistics, (b) Administration & Foundations (A&F) 800, and (c) A&F 904. A foreign language is not required.
3. A minimum of two regular semesters of full-time residency after admission to the doctoral program. Full time residency means the student may be employed up to half time and must be enrolled for at least nine hours credit each semester.
4. Written preliminary and oral examinations that meet the requirements of the Graduate School and the College of Education.

Beyond the courses specified in the research core, adaptations can be made in the light of the student's particular interests. These adaptations will be approved by the adviser and the student's committee. Each student's pattern of studies is individualized. All doctoral candidates are expected to reflect an interest in and a concomitant aptitude for research.

The degree may be earned by students who show evidence of unusual competency in

scholarly study. It is not conferred for mere conformity to matriculation, residence, or course requirements. The degree also requires power of independent, original, and scientific investigation, evidence of which the candidate is expected to show in a dissertation.

Information on special requirements for an advanced degree may be obtained by writing to a department head.

Administration and Foundations

Professors Danskin*, DeMand*, Flanagan*, Hoyt*, McCain*, Moggie*; Associate Professors Harlow*, Kaiser*, Kasper*, Laughery*, Nordin, and Sarthory*; Assistant Professors Holen, Kittleson*, Litz*, McIlvaine*, Steffen, and Van Meter; Instructors Gillund, Hudson, Schroeder and Turk; Emeritus Professors Baker, Green, and Olson.

The focus of the department is threefold: (1) Foundations of Education at both the undergraduate and graduate levels, (2) Graduate studies in Educational Administration, and (3) Graduate studies in Educational Psychology, Guidance and Counseling.

The Foundations of Education include such topics as educational psychology, educational sociology, plus history and philosophy of education. The intent is to bring to bear upon the problems of contemporary education the contributions of the humanities and the behavioral sciences at both the undergraduate and graduate levels.

Studies in Special Education are within the framework of Educational Psychology and are intended to accommodate students who wish to specialize in teaching children and youth with certain exceptionalities. Students must complete an undergraduate teacher education program leading to certification for either elementary or secondary school teaching. Early planning will permit completion of coursework required for provisional certification in Special Education at the undergraduate level. Permanent certification requires the completion of additional work at the graduate level. The focus of the program is on the preparation of teachers of the mentally retarded at both the elementary and secondary levels with the major emphasis upon the former. In addition, a close working relationship is maintained with the Department of Speech in the preparation of sup-

porting personnel in the area of Speech Pathology and Hearing Conservation.

Graduate studies in Educational Psychology, Guidance and Counseling prepare teachers, researchers, counselors and guidance personnel for schools, colleges and universities. Students may choose coursework emphasizing such dimensions as learning and human development, statistics and measurement, guidance and counseling, student personnel work, and the education of the mentally and emotionally handicapped.

The program in the Educational Administration Area is designed to prepare individuals for positions of leadership at all levels of education and in professional organization and educational agencies. The program provides sufficient breadth and depth to give candidates for advanced degrees ample opportunity to develop essential competencies. A close working relationship is maintained with the Environmental Laboratory, the Center for Community Planning Services, the Computer Center and the College of Architecture in the development of joint programs. Explorations are being made in other areas in which cooperative activities may occur.

UNDERGRADUATE CREDIT

405 110. Group Life Seminar. (1) I. Introduction to organized group experience through participation in weekly small group meetings. Study of such questions as effective communication, the function of groups, and human growth through social interaction. Open to selected freshmen and other new students, with consent of instructor.

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.

405 210. Leadership Training Seminar. (2) I. General principles of leadership as applied to small groups. Study of the role of the leader, group processes and interaction, defining group goals, and techniques of observation. Workshop and supervision in small group leadership. Pr.: Sophomore standing and consent of instructor.

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.: A & F 202, junior standing, and admission to Teacher Education.

405 400. Independent Study in Education. (1-3). Selected topics in professional education. Maximum of 3 hrs. applicable toward degree requirements. Pr.: Consent of Department Head.

405 415. Art for Exceptional Children. (Same as Art 415).

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.: C & I 475 or 477, or consent of instructor.

405 603. Junior High School. (2 or 3) I, alternate S. Origin, objectives, program, and administration of the junior high school, and relations with lower and higher education units. Pr.: Teaching experience.

405 607. Mental Hygiene in the School Community. (3) On sufficient demand. Dynamics creating different personalities and deviant behavior. The educative process as it affects personality integrity. Pr.: Psych. 415 or A & F 202.

405 608. Education of Exceptional Children. (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.: A & F 202 and C & I 300 or 450.

405 609. Psychology of Exceptional Children. (3) (See Psych. 425.) 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 A & F 202.

405 610. Practicum in Education of Exceptional Children. (3-5) On sufficient demand. Observation and participation in teaching exceptional children under the supervision of selected teachers in special education programs. Pr.: Admission to student teaching and senior standing.

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.

405 616. 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. This course is designed to give the student an overview of one of the most rapidly growing units in the American educational system. Emphasis on philosophy, purposes, curriculum, organization, professional staff, student-personnel programs, and the role of the comprehensive community junior college in higher education. Pr.: A & F 302 and consent of instructor.

405 625. Principles of Measurement. (3) I, II, S. Principles of constructing, administering and evaluating tests used in schools. Pr.: Teaching certificate or senior standing.

405 627. Curriculum Development for the Mentally Retarded. (3) On sufficient demand. Curriculum content,

methods, and organization of work in the education of mentally retarded children using experience units. Pr.: A&F 608.

405 628. Education of the Emotionally Disturbed. (3) I. A survey and exploration of approaches to the educational needs of the socially and emotionally disturbed child. Development of curricula and learning environment will be emphasized. Pr.: 405 608 or 405 609 and / or consent of instructor.

405 630. Education of the Disadvantaged. (3) On sufficient demand. Consideration of the life-space of the disadvantaged learner and its relationship to curriculum organization and inter-personal relationships in the schools. The development of realistic, relevant goals for the teacher of the disadvantaged. Pr.: A&F 616 or consent of instructor. (See A. & O. 630, and C. & I. 630.)

405 681. Field Experiences in Special Education. (1-3) On sufficient demand. Observation and supervised activities in schools, camps, clinics, or institutions as related to student's area of special interest or preparation. Pr.: A&F 608 or A&F 609.

405 712. Individual Appraisal. (3) I, S. Intensive study of standardized tests and their use. Emphasis given to values and problems of testing, selection and evaluation of measuring instruments, testing programs and interpretation of test results. Pr.: A&F 601 and A&F 625.

405 795. Problems in Administration and Foundations. Credit arranged. I, II, S. Selected students are permitted to secure specialized training appropriate to the needs of the individual. The student's project may involve intensive library investigation in a special field or the collection and analysis of data pertinent to a given problem. All work is done independently under the direction of a faculty member. As many conferences are held as necessary to assure successful completion of a project. Pr.: Background of courses necessary for the problem undertaken and consent of instructor.

GRADUATE CREDIT

405 800. Statistical Methods in Education. (3) I, S. An introductory yet comprehensive survey of common statistical analyses encountered in educational research. Computer oriented. Pr.: A first course in college mathematics plus either Stat. 520 or A&F 625.

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.

405 806. Philosophy of Education. (3) I, II, S. A critical analysis of major educational philosophies with discussion of their impact on the problem of education for democracy. Pr.: Twelve hours of education and consent of instructor.

405 807. General School Administration. (3) I, S. A panoramic view of the problems and tasks of school-system administration centered on the administrative process and substantive problems of leadership, personnel, business and finance, curriculum, facilities, and school-community relations. Pr.: One year of teaching experience.

405 808. School Business and Finance. (3) II, alternate 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.

405 812. The School Plant. (3) I, alternate 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. Interrelationships that exist between the school and the community and the role of the teacher and administrator in such relationships. Pr.: A & F 807 for graduate students in educational administration. One year of teaching experience for all others.

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 Education 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.: A & F 302 or its equivalent.

405 820. Public School Law. (1 or 3) II. 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.: A & F 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.: C & I 475, A & F 601, and consent of instructor.

405 826. Educational Personnel Administration. (3) II. Personnel practices in education are considered along with the implications of collective negotiations and professional accountability for personnel policies. Pr.: 405 807.

405 827. Individual Intelligence Testing. (3) On sufficient demand. Theory of the appraisal of individual intelligence with an emphasis on techniques of administration, interpretation, and application in the school setting; supervised practice and developed proficiency in the use of WAIS, WISC and Binet. Pr.: A & F 601, Psych. 420, and consent of instructor.

405 831. Learning Disabilities. (3) II. An explanation of important concepts and practices in the area of learning disabilities. Emphasis will be placed upon diagnosis of

underlying present causes and development of instructional strategies. Pr.: 405 608 or 405 609.

405 832. **Counseling Theory.** (3) II, S. Theories, methods, and problems in counseling, relating the counseling process to dynamics of human behavior. Pr.: A & F 712 or Psych 420 or equivalent and conc. enrollment.

405 833. **Group Guidance.** (3) II. Designed to acquaint students with group procedures as basic tools in counseling, guidance, and other education services. Pr.: A & F 832 and Psych. 550.

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.: A & F 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.

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 students. Pr.: Consent of instructor.

405 853. **Educational Administration.**

405 855. **Guidance Services.**

405 857. **Social Foundations.**

405 858. **Special Education.**

405 863. **Practicum in Counseling.** (3) I, II. Supervised practical experience in counseling. Pr.: A&F 832 and consent of instructor. (Same as Psych. 860 and FCD 860).

405 864. **Seminar in Student Personnel Work.** (1-4) On sufficient demand. Credit arranged. Intensive discussion of a problem of current professional interest based on study of pertinent original literature. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

405 866. **History and Philosophy of Higher Education.** (3) I. History and development of higher education with a study of the philosophy, objectives and functions of various types of institutions. Pr.: Consent of instructor.

405 868. **International Education.** (3) On sufficient demand. Developing, administering, conducting, and evaluating educational programs from a world perspective. Pr.: Teaching experience or consent of instructor.

405 870. **Mental Retardation.** (3) On sufficient demand. Etiological, psychological, sociological, and educational aspects of mental retardation. Pr.: A & F 608.

405 877. **Social Psychology of Education.** (3) II. Consideration of the literature and applications of social-psychological studies of the student, student cultures, characteristics of educational institutions, and organizational change. Pr.: 405 616 or 405 866 or consent of instructor.

405 880. **Theory of Measurement.** (3) II. A course especially useful for graduate students in education planning to use or develop mental measuring instruments in their thesis. Students will learn to design reliable and valid instruments. Pr.: A & F 625.

405 881. **Theory in Educational Administration.** (3) II. Organizational and administrative theory are applied to the school and the functions of the school administrator. The process of theory development in educational administration is also considered. Pr.: A & F 807.

405 882. **Strategies for Educational Change.** (3) I. This course is designed to provide educators with conceptual knowledge concerning the problems and processes of educational change. Case studies of change are analyzed in the attempt to develop models of educational change. Pr.: A & F 807 or 817, or C & I 809.

405 883. **Educational Systems Analysis.** (3) I. A study of systems analysis techniques applicable to education including PERT, CPM and PPBS. Intended for administrators, business managers and educational researchers. Pr.: A&F 807 or consent of instructor.

405 886. **Advanced Educational Psychology: Development.** (3) II. Advanced studies in physical, intellectual, emotional, social and personality development with the focus on the importance of these factors to the educational process. Pr.: A&F 302.

405 887. **The Principalsip.** (3) I, alternate summers. Analysis of the principal's role as he interacts with his various referent groups. Applicable to both elementary and secondary administration. Pr.: One year of teaching experience.

405 888. **Systems and Theories of Vocational Counseling.** (3) II. A historical and contemporary analysis of systems and theories of vocational psychology and their implications for use in the counseling setting. Pr.: 405 611 and 405 832.

405 898. **Higher Education Administration.** (3) On sufficient demand. Administration theory applied to the organization and administration of colleges and universities; special reference to structure, governing boards, administrative roles, decision making, and analysis of selected problems. Pr.: A&F 866.

405 904. **Experimental Design in Educational Research.** (3) II. Philosophy, planning and evaluation or research in education. Experimental designs appropriate for educational research with special emphasis on multivariable procedures. Computer oriented. Pr.: A & F 800.

405 910. **Counseling Supervision Practicum.** (3) On sufficient demand. An advanced course in the theory, techniques and problems of supervising persons being trained as counselors. Course emphasis is on actual supervisory experiences with beginning counselors. Open to advanced doctoral students only with consent of instructor.

405 911. **Advanced Counseling Theory and Practice.** (3-6) I, II. Designed to help the student integrate advanced theory, research and practice in counseling and student personnel work. Pr.: Knowledge of personality theory, theories of learning and motivation, A & F 832 and consent of instructor.

405 924. Educational Governance. (3) II. An analysis of educational decision-making at the local, state and national levels. The internal decision-making practices of professional educational organizations is also considered. Pr.: 405 807 and 6 additional hours in Educational Administration.

Internship in Education. Credit arranged. On sufficient demand. Studies of and field experiences in the development of programs in cooperating schools and educational or related agencies under the supervision of College of Education graduate faculty members. A maximum of six credit hours may be chosen from the areas listed. Pr.: Consent of instructor.

405 950. Education Administration.

405 951. Student Personnel Services.

Advanced Seminars in Education. (2-3) On sufficient demand. These seminars will critically consider recent research in the designated fields. The emphasis will be upon individual studies and small group interaction. Enrollment is restricted to those students who have been admitted to the doctoral program in education and who have completed substantial amounts of graduate study in the designated fields. Pr.: Consent of instructor.

405 960. Educational Administration

405 961. Educational Psychology

405 999. Research in Administration and Foundations. Credit arranged. I, II, S. Individual investigation in the field of a student's specialization. Pr.: Sufficient training to carry on the line of research undertaken.

Adult and Occupational Education

ROBERT MEISNER,* Head of Department

Professors Apel,* Johnson,* Jorns, and Prawl;* Associate Professors Albracht,* Bradley,* Field, Griffith, Meisner,* and Scott;* Assistant Professors Campbell,* Julian; Instructor Wissman; Emeritus: Professor Rust;* Associate Professor Hall.*

The undergraduate and graduate programs in the Adult and Occupational area are designed for selected individuals seeking to prepare themselves for roles as professional educators in public and private institutions and agencies.

Undergraduate teacher education programs are designed to prepare prospective teachers for teaching and allied positions in Adult Education, Vocational Education in Agriculture and Home Economics, Business Education, Career Education and related fields of Adult and Occupational Education.

The Agricultural Education curriculum, described on page 39, is offered in

cooperation with the College of Agriculture. Students completing the curriculum requirements are awarded a B.S. in Agriculture and may be certificated to teach Vocational Agriculture in Kansas.

The Home Economics Education curriculum offered in cooperation with the College of Home Economics, is described on page 237. Students completing the curriculum requirements are awarded a B.S. in Home Economics and may be certificated to teach Vocational Home Economics in Kansas.

To provide opportunities for professional development and/or meeting state certification requirements for persons already employed in public and private Adult and Occupational Education programs, in-service courses are offered at both the undergraduate and graduate levels.

Graduate programs supervised by the Adult and Occupational Education faculty include the Master of Science Degree in Agricultural Education and in Home Economics Education, the Master of Science degree in Education with a specialization in Adult Education, and the Doctor of Philosophy Degree in Education in the comprehensive areas of Adult and Occupational Education. Refer to Graduate Study section page 189 for College of Education general requirements.

Courses in Adult and Occupational Education

UNDERGRADUATE CREDIT

410 319. Agricultural Education Colloquium. Credit arranged. On sufficient demand. Discussion, assigned readings, and lectures over the selected trends, developments, and problems which are peculiar to the overall 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

410 401. Independent Study in Education. (1-3). Selected topics in professional education. Maximum of 3 hrs. applicable toward degree requirements. Pr.: Consent of Department Head.

410 477. 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. (See 415 477).

410 500. Methods of Teaching Agriculture. (2) I, II. Lesson plans; organization of materials and direction 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.: A & F 302.

410 550. 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; C & I 450 or conc. enrollment; taken semester prior to C & I 477.

410 551. 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.

UNDERGRADUATE AND GRADUATE CREDIT

410 605. Extension Organization and Programs. (3) I, S. Development and objectives of Cooperative Extension and other University Adult Education programs; with emphasis on programs and procedures. Pr.: Senior standing or consent of instructor.

410 630. Education of the Disadvantaged. On sufficient demand. Consideration of the life-space of the disadvantaged learner and its relationship to curriculum, organization and inter-personal relationships in schools. The development of realistic, relevant goals for the teacher of the disadvantaged. Pr.: 405 616 or consent of instructor. (See A. & F. 630, and C. & I. 630).

Practica in Adult and Occupational Education. (1-6) On sufficient demand. Related occupational or professional experiences in approved industry, school, Cooperative Extension Service or similar agency setting under faculty supervision. Pr.: Consent of instructor.

410 633. Adult Education.

410 634. Agriculture Related Occupations.

410 635. Business and Office Occupations.

410 636. Extension Education.

410 637. Home Economics Related Occupations.

410 638. Industrial Occupations.

410 700. Seminar in Agricultural Education. Credit arranged. On sufficient demand. Seminars will consist of problems in the several fields of agricultural education represented in terms of special interests of the students. Designed to serve undergraduate as well as graduate needs. Pr.: Consent of instructor.

410 701. Administration and Supervision of Vocational Education. (2-3) Offered on sufficient demand. I, S. Emphasis on the duties and responsibilities of administrative and supervisory personnel responsible for the promotion, development and coordination of comprehensive vocational-technical education programs at the local level. Pr.: Teaching experience or consent of instructor.

410 702. 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.: A & F 302.

410 703. Teaching Adult Classes in Agriculture. (2 or 3) Offered 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.: A & O 702.

410 705. Organization Problems in Teaching Farm Mechanics. (2) Offered 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.: C & I 477.

410 706. Field Experience in Agricultural Education. (1 or 2) Offered 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.: A & O 702 and consent of instructor.

410 707. Introduction to Community Educational Development. (3). A comprehensive review of factors related to community change and the role of educational programs in dealing with them. Emphasis is on problem-solving approaches and change-implementing programs.

410 711. Consumer Education. (2 or 3) S. Evaluate syllabi and approaches to teaching consumer education. Relate consumer education to consumer economics and consumer affairs. Pr.: A & O 550 or A & O 752 and F. Ec. 300 or consent of instructor. (See F. Ec. 711).

410 750. 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.: C & I 450.

410 751. Advanced Methods in Adult Teaching. (3) On sufficient demand. Emphasis on teaching strategies, techniques and media appropriate to various adult education programs. Pr.: Teaching experience or consent of instructor.

410 752. Principles of Teaching Adults in Extension. (3) II, S. Methods and principles of adult teaching, with emphasis on Cooperative Extension Service; application to various adult education programs. Pr.: Senior standing, juniors by consent of instructor.

410 753. Introduction to Occupational Education. (3) I, II, S. Overview of occupational education at all levels and its role in society. Designed for administrators, counselors, and vocational educators who perform a leadership function involving occupational education programs. Pr.: Teaching experience or consent of instructor.

410 754. Adult Basic Education. (3) I, II, S. Evolving adult basic and high school equivalency education concepts will be examined. Program implementation, supervision, methods and materials are emphasized. Pr.: Adult teaching experience or consent of instructor.

410 791. Career Education. (2-4) I, II, S. Emphasis on providing for prevocational experiences including orientation and exploratory and applied experiences in school and nonschool situations. Pr.: Teaching experience or consent of instructor.

410 792. Hospital and Industry Adult Education. (3) Offered on sufficient demand. An introduction to principles, roles, organization, procedures and problems of adult education in hospitals, industry and related agencies. Pr.: Consent of instructor.

410 795. Problems in Adult and Occupational Education. Credit arranged. I, II, S. Independent study of specific problems in the areas of adult or occupational education. Pr.: Consent of instructor.

GRADUATE CREDIT

410 805. Program Planning in Adult Education. (2-3) II, S. An examination of the basic situations in which adult education occurs and fundamental steps by which learning is made more effective in those situations. Pr.: Graduate standing.

410 816. Foundations of Adult Education. (2-3). Offered on sufficient demand. A study of Adult Education Historical perspectives, contemporary institutions and programs, teaching-learning process, administrative practices, and conceptual roles. Pr.: One year of field experience or approval of instructor.

410 822. Young Farmer and Adult Farmer Education in Agriculture. (2 or 3) I, II, S. Organization, objectives, and procedures of conducting Young Farmer and Adult Farmer classes. Designed for teachers in service. Pr.: Experience in teaching vocational agriculture.

410 823. 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.

410 824. 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.

410 825. Curriculum in Agriculture II. (2 or 3) S. Cont. of A & O 824. Pr.: A & O 824 or consent of instructor.

410 829. Supervision in Occupational Education. (2-3). I, S. Philosophy and principles of effective supervision related to occupational education programs; application of principles to problems met by student teacher supervisors. Pr.: Teaching experience or consent of instructor.

410 830. 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.: A & O 750 and teaching experience.

410 836. 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.

410 837. 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.

410 838. 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.

410 840. 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.

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 students. Pr.: Consent of instructor.

410 851. Agricultural Education.

410 859. Adult Education.

410 871. Occupational Experience Supervision. (3) II, S. Analysis of objectives and scope of occupational experience programs. Emphasis is placed on the organization, administration, related instructional procedures, coordination techniques, and evaluation of occupational experience programs. Pr.: Teaching experience, or consent of instructor.

410 878. Technical Education. (3) I, S. An analysis of the evolving role of technical education and other post-secondary occupational education with emphasis upon principles underlying organization and practice unique to technical education. Pr.: Graduate standing.

410 879. Manpower Surveys. (3) II, S. A critical study of methods and procedures involved in planning, organizing, conducting, and analyzing community and regional manpower surveys. Application to particular fields of occupational education will be stressed. Pr.: Graduate standing.

410 890. Organization and Administration of Adult Education. (2-3) I, S. A critical study of organizational procedures and administrative practices as related to the implementation and maintenance of an effective program in adult education. Pr.: Graduate standing.

410 891. Organization and Administration of Occupational Education. (2-3) I, S. An overview of the organization of occupational education programs in agriculture, business, distributive education, health, home economics, trade and industry, technical and related fields and their administration. Emphasis on federal-state-local relationships. Pr.: A & O 753 or consent of instructor.

Internship in Education. Credit arranged. On sufficient demand. Studies of and field experiences in the development of programs in cooperating schools and educational or related agencies under the supervision of College of Education graduate faculty members. A maximum of six credit hours may be chosen from the areas listed. Pr.: Consent of instructor.

410 952. Adult Education.

410 953. Occupational Education.

Advanced Seminars in Education. (2-3). On sufficient demand. These seminars will critically consider recent research in the designated fields. The emphasis will be upon individual studies and small group interaction. Enrollment is restricted to those students who have been admitted to the doctoral program in education and who have completed substantial amounts of graduate study in the designated fields. Pr.: Consent of instructor.

410 962. **Adult Education**

410 963. **Occupational Education**

410 999. **Research in Adult and Occupational Education.** Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken and consent of instructor.

Curriculum and Instruction

ARNOLD J. MOORE,* Head of Department

Professors Dixon,* Keys,* Littrell,* and Moore;* Associate Professors Bartel,* Boyer,* Hause,* Kurtz,* McAnarney,* Owens,* Price,* Schell,* Trennepohl,* and Utsey;* Assistant Professors Byars,* Caine,* Craig, Dickinson, James,* King,* Loeb,* Paul, Rudolph, and Smethers; Instructors Clore, Driss, Hazlett, Kaupp, Rankin, Replogle, and Sullivan; Emeritus: Professor Strickland.

An important responsibility of this department is the undergraduate teacher education programs at Kansas State. The course offerings in the professional studies components of both the elementary and secondary teacher preparation programs are under the jurisdiction of the Curriculum and Instruction Department. However, the educational psychology and social foundation courses are listed in the Administration and Foundations Department. The specific dimensions of these curricula are delineated under the section, Programs in Teacher Education.

Graduate study in this department includes courses designed to improve the instructional competence of teachers in elementary and secondary schools and in colleges. Generally, students working on a Master's Degree concentrate on courses designed to increase their effectiveness as classroom teachers. Doctoral programs in this area are aimed at the preparation of instructional leaders, supervisory personnel, curriculum specialists, generalists for elementary and

secondary schools, and teacher education personnel in colleges and universities. Another important function of this area will be to provide joint programs involving selected departments in other colleges at Kansas State University. These joint programs will prepare individuals for teaching positions in junior and four-year colleges. Examples of cooperative programs are those currently being offered with the chemistry, biology, mathematics and physics departments.

UNDERGRADUATE CREDIT

415 050. **Developmental Reading Laboratory.** (3) I, II. Designed to improve the college student's reading skills, rates of comprehension, vocabulary, and study skills. Pr.: Consent of instructor.

415 300. **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.

415 316. **Introduction to Instructional Media.** (1) I, II, S. Experiences in the choice, production, evaluation, and utilization of instructional materials. Operation and simple maintenance of basic types of instructional equipment. Pr.: Admission to teacher education or consent of instructor.

415 325. **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.

415 326. **Problem in Safety Education.** (1) Pr.: Consent of instructor.

415 328. **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.: Psychology 110, A & F 202, C & I 325, a valid driver's license, and good driving record.

415 329. **Problem in Driver Education.** (1) Pr.: Consent of instructor.

415 330. **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 transforming knowledge and skills, as well as inspiring satisfactory attitude in students. Two hours rec. and three hours lab. a week. Pr.: C & I 328, 21 years of age, and senior standing.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

415 402. **Independent Study in Education.** (1-3). Selected topics in professional education. Maximum of 3 hrs. applicable toward degree requirements. Pr.: Consent of Department Head.

- 415 415. **Art for Exceptional Children.** (Same as Art 415).
- 415 417. **Teaching Participation in Elementary Music.** (4) I, II. Observation in teaching under the direction of selected teachers in elementary music school programs. Pr.: Music 412 and admission to Student Teaching.
- 415 418. **Teaching Participation in Secondary Music.** (4) I, II. Observation in teaching under the direction of selected music teachers in junior and senior high schools. Pr.: Music 413 and admission to Student Teaching.
- 415 450. **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 legal status and practices. Pr.: A & F 302.
- 415 451. **Principles of Secondary Education.** (3) I, II (Professional Semester). For description see C & I 405.
- 415 461. **School Music I.** (3) I, II, S. (See Music 412).
- 415 462. **School Music II.** (3) I, II, S. (See Music 413).
- 415 470. **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.
- 415 471. **Language Arts for Elementary Schools.** (3) I, II, S. Modern trends in the teaching of reading, oral language, composition, and spelling. Pr.: Admission in Teacher Education or consent of instructor.
- 415 472. **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.
- 415 473. **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.
- 415 474. **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.
- 415 475. **Teaching Participation in the Elementary School.** Credit arranged. I, II. Observation and teaching participation under the direction of selected elementary teachers. Pr.: C & I 300, 470, 471, 472, 473, and admission to Student Teaching.
- 415 476. **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. (See 261 476A & 476B)
- 415 477. **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. (See 410 477)

UNDERGRADUATE AND GRADUATE CREDIT

- 415 602. **Audio-Visual Instruction.** (2 or 3) I, II, S. Principles and techniques in the use of visual and audio-visual materials; operation and maintenance of equipment and sources of supply. Pr.: Completion of student teaching or graduate standing.
- 415 604. **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 schools. Pr.: C & I 450, senior standing, or consent of instructor.
- 415 615. **Reading in the Secondary School Subjects.** Information concerning the reading process. Techniques for helping students develop reading and study skills needed for studying materials used in the secondary school subjects. Course is designed for classroom teachers. Pr.: Senior standing and consent of instructor.
- 415 619. **Economic Education Workshop.** (3) S. Basic economic concepts and how to integrate them into elementary and secondary curriculum and an examination of recent economic education materials. Pr.: Consent of instructor.
- 415 621. **Junior College Curriculum.** (3) I, II, S. Evaluation of Junior College curricula, reasons for revision, aims and objectives. Designed to familiarize students with the entire curricular offerings of the comprehensive community junior college. Pr.: 405 620 and-or consent of instructor.
- 415 622. **Primary School Education.** (3) I, II. A course for those interested in the kindergarten and primary school child. Emphasis will be placed on curriculum development, pertinent research and innovative practices in early education. Pr.: 405 302 and/or consent of instructor.
- 415 630. **Education of the Disadvantaged.** On sufficient demand. Consideration of the life-space of the disadvantaged learner and its relationship to curriculum, organization and inter-personal relationships in schools. The development of realistic, relevant goals for the teacher of the disadvantaged. Pr.: 405 616 or consent of instructor. (See A. & F. 630, and A. & O. 630.)
- 415 662. **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 Speech 662).
- 415 680. **Kindergarten Education.** (3) 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.: A & F 202, C & I 300 and junior standing.
- 415 735. **Improving Elementary Science Teaching.** (3) I, II. Evaluation and implementation of psychological and philosophical foundations will be stressed in improving elementary science teaching. Recent materials will be compared and their unique and common elements examined. Pr.: Teaching experience and-or consent of instructor.
- 415 795. **Problems in Curriculum and Instruction.** Credit arranged. I, II, S. Independent study of a specific problem in curriculum or instruction. Pr.: Consent of instructor.

GRADUATE CREDIT

- 415 803. Curriculum Development.** (3) I, II, S. An overall 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.
- 415 804. 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.: C & I 803 and teaching experience.
- 415 809. Supervision and Improvement of Instruction.** (3) S. A course designed for administrators, supervisors, and classroom teachers who wish to help themselves and others isolate and analyze teaching problems. Pr.: One year of teaching experience.
- 415 811. Curriculum Construction for Elementary Schools.** (2 or 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 on individual curricular problems. Pr.: C & I 803 and teaching experience.
- 415 815. 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.: C & I 602 or consent of instructor.
- 415 828. Curriculum in the Inner City.** (3) I, II. Exploration of research and innovations in curriculum and instruction for inner city schools. Emphasis placed on curricular and instructional difficulties in low-income communities and on productive compensatory educational practices. Pr.: 415 803 and/or consent of instructor.
- 415 835. 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.
- 415 842. 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.
- 415 843. Principles of College Teaching.** (2) I, II. Overview of principles of learning, learning theory, educational objectives, methods and techniques, college students and evaluation in the classroom. Emphasis upon pre-service and in-service help in improving instruction at the college level. Pr.: Consent of instructor.
- 415 844. Current Issues in College Teaching.** (2) II. Attention given to objectives, problems and evaluation of

college instruction, purpose of the university, creative teaching, student involvement and unrest, and current issues. Individual study of special interest topics. Pr.: 415 843 and consent of instructor.

415 845. Advanced Elementary School Reading. (3) On sufficient demand. A study and evaluation of selected theories, programs, practices, and materials, K-6, emphasizing current trends, issues, and problems. Pr.: C & I 474 or consent of instructor.

415 846. Diagnosis and Treatment of Reading Disabilities. (3 or 4) I, S. A systematic study of the causes of reading problems, the use and interpretation of diagnostic instruments and procedures, and special materials and methods of remedial instruction. Includes diagnosis of a child with a reading problem. Pr.: C & I 615 or 856 and teaching experience or consent of instructor.

415 847. Clinical Practices in Reading. (3) II, S. Supervised experience in diagnosing and teaching children with reading problems. Pr.: C & I 846 (Diagnosis and Correction of Reading Disabilities).

415 848. 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.: C & I 615 or 845 or consent of instructor.

415 850. 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 non-graded, multi-graded, and multi-tracked 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 students. Pr.: Consent of instructor.

415 852. Curriculum and Improvement of Instruction.

415 854. Elementary Education.

415 856. Secondary Education.

415 860. 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.

415 861. 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.

415 862. Creativity in Education. (3) II, S. Clarification of creativity in education, discovery of creative talent, methods of encouraging creative talent; emphasis on learning models and research in creativity as compared with or contrasted with conformity; emphasis on divergent and convergent thinking and its role in creative teaching with major consideration given to the student's

involvement in creative study and-or teaching. Pr.: Teaching experience or consent of instructor.

415 865. 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.: C & I 602 or consent of instructor.

415 867. Trends in Elementary School Social Studies. (3) On sufficient demand. Current methods, materials, issues, and trends in developing social consciousness among elementary school children. Social science strategies usable by children. Pr.: Teaching experience or consent of instructor.

415 869. Internship in College Teaching. (2-6). On sufficient demand. An experiential course for graduate students devoted to improving instruction. Supervised teaching of college classes and seminars in conjunction with cooperating departments. Pr.: Master's degree, C & I 844, and consent of department head.

415 872. Advanced Study of the Reading Process. (3) Survey of selected theories of the reading process. Investigation of the interrelationships of the reading act: cognitive processes; language; social-emotional factors and experience. Emphasis upon recent developments in the field. Pr.: C & I 845, C & I 615, or consent of instructor.

415 873. The Science Curriculum. (3) On sufficient demand. National curriculum programs and projects at both elementary and secondary levels. Evaluation of appropriateness of content as it relates to a philosophy of science education. Modes for investigating scientific phenomena and their subsequent use in teaching the processes of the scientists. Pr.: C & I 803 and consent of instructor.

415 874. The Mathematics Curriculum. (3) On sufficient demand. Trends in the teaching and supervision of mathematics. Analysis of literature and research relating to content, methods, and materials of mathematics education. Pr.: C & I 803, experience teaching mathematics, and consent of instructor.

415 875. The English Curriculum. (3) On sufficient demand. The changing scene in the teaching of English: trends, materials, and ideas in literature, composition and grammar that have emerged from recent research

and discovery. Pr.: C & I 803 and consent of instructor.

415 876. The Social Studies Curriculum in the Secondary School. (3) On sufficient demand. New trends, materials, and ideas in teaching the social sciences, based on recent research and experimental programs. Pr.: C & I 803 and-or consent of the instructor.

415 884. Computer Applications in Education. (3) On sufficient demand. The effects of information retrieval systems, data processing, and computer assisted instruction on the curriculum, instruction, and administration of educational institutions. Pr.: Educational experience and the consent of the instructor.

415 907. Curriculum Theory. (3) On sufficient demand. Theoretical concepts underlying significant curriculum developments. A systematic critique of current curricular theory. Consideration of model generation. Pr.: C & I 804 or 811 and consent of instructor.

415 908. Instructional Theory. (3) On sufficient demand. Comprehensive analysis of research on the teaching process. Theoretical models for understanding teacher-pupil interaction. The design of studies on factors affecting teacher behavior and classroom learning. Pr.: C & I 809, A & F 819, and consent of instructor.

415 919. Seminar in Curriculum Development. Credit arranged. On sufficient demand. Designed for curriculum specialists. Current research and curricular innovations. Evaluation of instructional materials and curricular organization for classroom implementation. Experiences in using selected materials and the development of teaching strategies. Pr.: C & I 804 and 811 and consent of instructor.

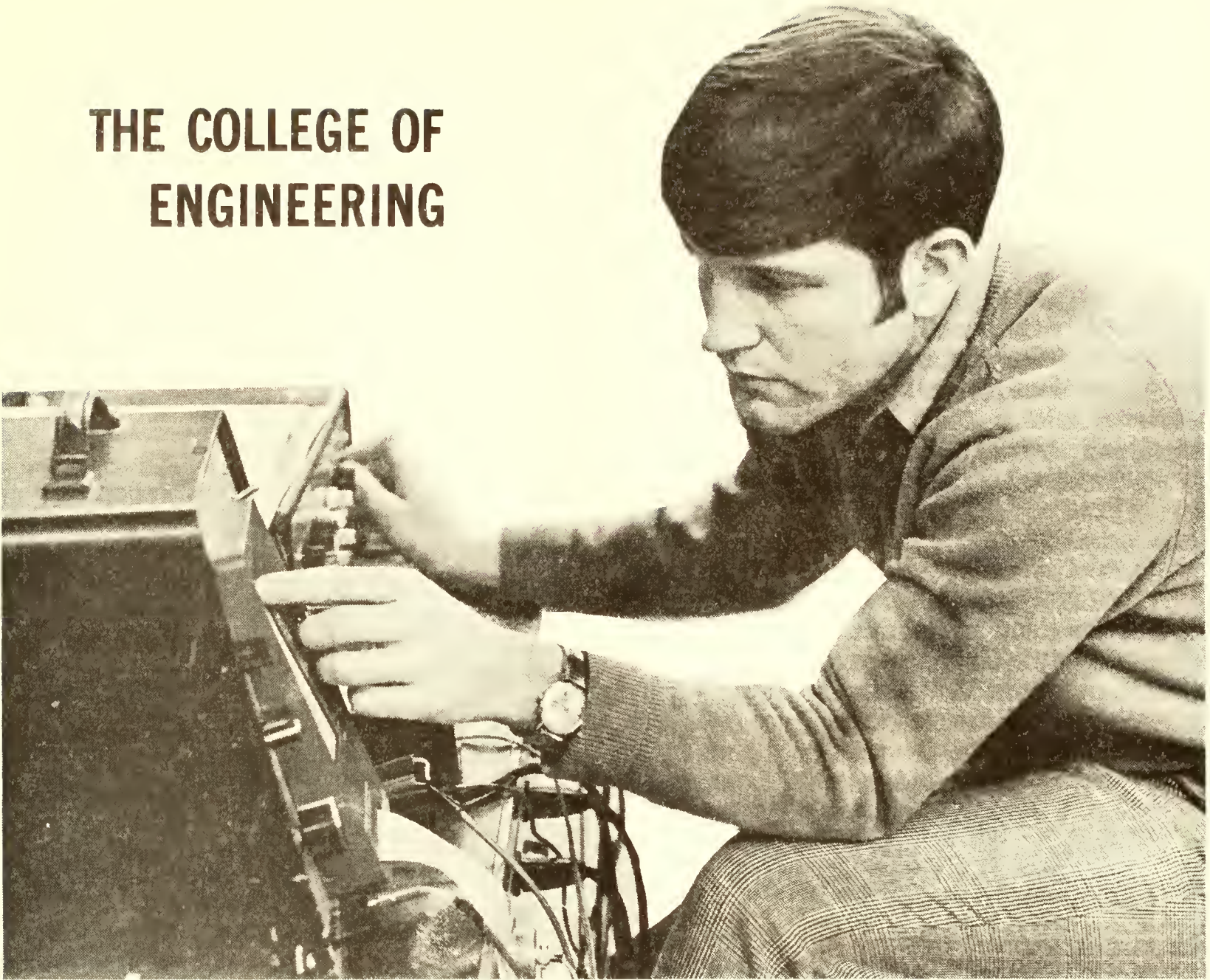
Internship in Education. Credit arranged. On sufficient demand. Studies of and field experiences in the development of programs in cooperating schools and educational or related agencies under the supervision of College of Education graduate faculty members. A maximum of six credit hours may be chosen from the areas listed. Pr.: Consent of instructor.

415 954. Curriculum Development.

415 955. Improvement of Instruction.

415 999. Research in Curriculum and Instruction. Credit arranged. I, II, S. Pr.: A & F 800 and-or consent of instructor.

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 broad 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 high school students should select careers in this challenging profession.

In the College of Engineering at KSU 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:

Agricultural Engineering — curriculum on page 203.
 Chemical Engineering — curriculum on page 204.
 Civil Engineering — curriculum on page 204.
 Electrical Engineering — curriculum on page 205.
 Industrial Engineering — curriculum on page 205.
 Mechanical Engineering — curriculum on page 206.
 Nuclear Engineering — curriculum on page 206.

A general description of each of these curriculums, including a list of the faculty and departmental course offerings, is

presented on pages 208 through 230. 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 preceding 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 263.

Undesignated Major

Entering freshmen who are undecided as to a major in engineering may enroll in General Engineering for one year. They will take the following program of study which is completely applicable to all engineering programs.

Fall Semester			Course	Sem. Hrs.
English	229	100	English Composition I	3
Chemistry	221	210	Chemistry I	5
Mathematics	245	220	Anal. Geometry & Calculus I	4
General Engineering	500	160	Engineering Concepts	2
			Hum. or Soc. Sci. Elect.	3
Physical Education			Physical Education	0
General Engineering	500	110	Engineering Lectures	0
				17
Spring Semester			Course	Sem. Hrs.
English	229	120	English Composition II	3
Chemistry	221	230	Chemistry II	3
Mathematics	245	221	Anal. Geometry & Calculus II	4
Economics	225	110	Economics I	3
			Hum. or Soc. Sci. Elect.	3
Physical Education			Physical Education	0
General Engineering	500	115	Engineering Assembly	0
				16

Engineering Honors Program

The Honors Program in the College of Engineering offers the interested student an intellectual challenge consistent with his ability and interests. Entering engineering freshmen with high school averages or entrance examination scores within the top five percent will be invited to join the program. Transfer students with superior academic records also are eligible and will be invited to join the Honors Program. Sophomores and other upperclassmen enrolled in engineering who have not previously qualified for the Honors Program may, with the endorsement of a member of the engineering faculty and

the approval of the Engineering College Honors Committee, join the program.

The Engineering College has approved the implementation of an experimental program encouraging the development of individual programs for students qualifying for the Honors Program. Such programs will be developed between an individual student and a faculty member of that student's department. Engineering faculty will be encouraged to seek out honor students and with them develop programs of study that will meet the student's academic and professional interests. The academic programs developed must be approved only by the student's department chairman and the Engineering Dean's Office.

Participation in the Honors Program will not shorten the time required for graduation for most students, but should be a stimulating experience. In addition to enrolling in Honors sections in much of his coursework, the student may enroll in a variety of seminars, colloquia and research problems designed to enrich and challenge the interested student. The Honors Program in Engineering is closely integrated with the Honors Program of the other Colleges at KSU and provides an excellent opportunity for interdisciplinary study. A student in the Honors Program may elect to withdraw from the program at anytime at his option.

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 one semester in their chosen curriculum.

Center for Effective Teaching

The College of Engineering Center for Effective Teaching is organized to further the college's goal of excellence in teaching. The

center sponsors several programs to enhance teaching, including specialized training for young engineering educators, seminars in educational methods and techniques for all engineering faculty, student evaluation of undergraduate teaching and monetary awards for excellence in teaching. The center is funded by private endowment and also helps in the financing of specialized teaching aids, teaching reference materials and educational research.

The center's activities are coordinated by an advisory committee of students and faculty from the College of Engineering.

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 sessions 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. The Summer Catalog is published each February for the coming summer.

Curriculum in Agricultural Engineering

B.S. in Agricultural Engineering

FRESHMAN

Fall Semester

English	229	100
Chemistry	221	210
Mathematics	245	220
Mech. Engg.	560	212
Agr. Engg.	505	160
Physical Education		
Gen. Engg.	500	110

Course	Semester Hours
English Composition I	3
Chemistry I	5
Anal. Geometry & Calculus I	4
Graph. Comm., Anal. & Des. I	2
Ag. Engg. Concepts	2
Physical Education	0
Engineering Lecture	0
	<hr/> 16

Spring Semester

English	229	120
Chemistry	221	230
Mathematics	245	221
Economics	225	110
Physical Education		

Course	Semester Hours
English Composition II	3
Chemistry II	3
Anal. Geometry & Calculus II	4
Economics I	3
Humanities or Soc. Sci. Elect.*	3
Physical Education	0
	<hr/> 16

SOPHOMORE

Fall Semester

Mathematics	245	222
Physics	265	310
Biology	215	198
Appl. Mech.	510	305

Course	Semester Hours
Anal. Geometry & Calculus III	4
Engineering Physics I	5
Principles of Biology	4
Statics	3
	<hr/> 16

Spring Semester

Mathematics	245	240
Physics	265	311
Agr. Engg.	505	312
Ind. Engg.	550	372
Appl. Mech.	510	412

Course	Semester Hours
Series & Diff. Equations	4
Engineering Physics II	5
Biol. Materials & Machine Functions in Ag.	3
Comp. and Data Processing	2
Dynamics	3
	<hr/> 17

JUNIOR

Fall Semester

Agr. Engg.	505	410
Mech. Engg.	560	413
Elec. Engg.	530	401
Speech	281	105
Appl. Mech.	510	415

Course	Semester Hours
Environmental Analysis for Plant and Animal Systems	3
Thermodynamics I	3
Circuit Theory I	3
Oral Communications I	2
Mechanics of Materials	3
Humanities or Soc. Sci. Elect.*	3
	<hr/> 17

Spring Semester

Appl. Mech.	510	418
Agr. Engg.	505	466
Agr. Engg.	505	420
Appl. Mech.	510	471
Civil Engg.	525	422
Agronomy	015	660

Course	Semester Hours
Mech. of Materials Lab.	1
Anal. of Ag. Structures	3
Energy Use & Control in Ag. Systems I	3
Fluid Mechanics	3
Humanities or Soc. Sci. Elect.*	3
Soil Mechanics or Soil Physics	3
	<hr/> 16

SENIOR

Fall Semester

Agr. Engg.	505	430
Agr. Engg.	505	436

Course	Semester Hours
Soil and Water Engg.	3
Design of Ag. Machines	3
Humanities or Soc. Sci. Elect.*	3
Technical Elective**	7
	<hr/> 16

Spring Semester

Agr. Engg.	505	505
Agr. Engg.	505	581

Course	Semester Hours
Energy Use and Control in Ag. Systems II	3
Professional Practice in Ag. E.	1
Humanities or Soc. Sci. Elect.*	3
Technical Elective**	9
	<hr/> 16

Number of hours required for graduation 130***

*Humanities and Social Science Electives are to be selected from the list on page 207 and need not be taken in the order listed in the curriculum.

**To be chosen with the advice and approval of the faculty adviser and department head.

***The engineering science requirements on page 207 will be satisfied by the required courses in this curriculum. 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

Fall Semester

		Course	Sem. Hrs.
English	229 100	English Composition I	3
Chemistry	221 210	Chemistry I	5
Mathematics	245 220	Anal. Geometry & Calculus I	4
Economics	225 110	Economics I	3
Speech	281 105	Oral Communication I	2
Physical Education		Physical Education	0
General Engineering	500 110	Engineering Lectures	0
			17

Spring Semester

		Course	Sem. Hrs.
English	229 120	English Composition II	3
Chemistry	221 230	Chemistry II	3
Chemistry	221 271	Chemical Analysis	4
Mathematics	245 221	Anal. Geometry & Calculus II	4
		Elective*	3
Physical Education		Physical Education	0
Chem. Engg.	520 115	Engineering Lectures	0
			17

SOPHOMORE

Fall Semester

		Course	Sem. Hrs.
Mathematics	245 222	Anal. Geometry & Calculus III	4
Physics	265 310	Engineering Physics I	5
Chemistry	221 431	Organic Chemistry I	3
Chemistry	221 432	Organic Chemistry I Lab.	2
		Elective*	3
Chem. Engg.	520 115	Engineering Assembly	0
			17

Spring Semester

		Course	Sem. Hrs.
Mathematics	245 240	Series & Diff. Equations	4
Physics	265 311	Engineering Physics II	5
Chemistry	221 450	Organic Chemistry II	3
Chem. Engg.	520 214	Intro. to Proc. Anal.	3
Chem. Engg.	520 216	Chem. Engg. Comp. Tech.	1
Chem. Engg.	520 115	Engineering Assembly	0
			16

JUNIOR

Fall Semester

		Course	Sem. Hrs.
Chemistry	221 585	Physical Chemistry I	3
Chemistry	221 586	Physical Chem. I Lab.	2
Chem. Engg.	520 415	Ch. E. Thermo.	5
		Elective*	6
Chem. Engg.	520 115	Engineering Assembly	0
			16

Spring Semester

		Course	Sem. Hrs.
Chemistry	221 595	Physical Chemistry II	3
Chem. Engg.	520 430	Transport Phenomena	5
Chem. Engg.	520 422	Chem. Engg. Lab. I	2
		Elective*	6
Chem. Engg.	520 115	Engineering Assembly	0
			16

SENIOR

Fall Semester

		Course	Sem. Hrs.
Chem. Engg.	520 432	Chem. Engg. Lab. II	2
Chem. Engg.	520 520	Process Anal. & Design	5
Chem. Engg.	520 530	Process Optimization	3
		Elective*	6
Chem. Engg.	520 115	Engineering Assembly	0
			16

Spring Semester

		Course	Sem. Hrs.
Chem. Engg.	520 442	Chem. Engg. Lab. III	2
Chem. Engg.	520 540	Ch. E. Systems Design	5
		Elective*	9
Chem. Engg.	520 115	Engineering Assembly	0
			16

Number of hours required for graduation 131**

*Fifteen hours of electives must be selected from the list of Humanities and Social Science electives on page 207. The remaining 18 hours are technical electives, a tentative selection of which must be made in consultation with the faculty adviser prior to the junior year. All electives must have the approval of the department head and technical electives must meet the requirements on page 207.

**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

Fall Semester

		Course	Semester Hours
Mathematics	245 220	Anal. Geometry & Calculus I	4
Chemistry	221 210	Chemistry I	5
English	229 100	English Composition I	3
		Engineering Science Elective**	2
Mech. Engg.	560 212	Graph. Comm. Anal. & Des. I	2
Physical Education		Physical Education	0
Gen. Engg.	500 110	Engineering Lecture	0
			16

Spring Semester

		Course	Semester Hours
Mathematics	245 221	Anal. Geometry & Calculus II	4
Chemistry	221 230	Chemistry II	3
English	229 120	English Composition II	3
		Engineering Science Elective**	2
Economics	225 110	Economics I	3
Physical Education		Physical Education	0
Civil Engg.	525 110	Civil Engineering Lecture	0
			15

SOPHOMORE

Fall Semester

		Course	Semester Hours
Mathematics	245 222	Anal. Geometry & Calculus III	4
Physics	265 310	Engineering Physics I	5
Appl. Mech.	510 305	Statics	3
Speech	281 105	Oral Communications I	2
Civil Engg.	525 212	Elementary Surveying Engg.	3
Civil Engg.	525 115	Engineering Assembly	0
			17

Spring Semester

		Course	Semester Hours
Mathematics	245 240	Series & Diff. Equations	4
Physics	265 311	Engineering Physics II	5
Appl. Mech.	510 415	Mechanics of Materials	3
Chemistry	221 250	Chemistry II Laboratory	2
Civil Engg.	525 214	Route Surveying	3
Civil Engg.	525 115	Engineering Assembly	0
			17

JUNIOR

Fall Semester

		Course	Semester Hours
Civil Engg.	525 431	Analysis of Statically Determinate Structures	3
Appl. Mech.	510 412	Dynamics	3
Mech. Engg.	560 413	Thermodynamics I	3
Geology	234 100	Physical Geology	4
		Humanities or Soc. Sci. Elect.*	3
Appl. Mech.	510 418	Mech. of Materials Lab.	1
Civil Engg.	525 115	Engineering Assembly	0
			17

Spring Semester

		Course	Semester Hours
Civil Engg.	525 432	Analysis of Statically Indeterminate Structures	3
Appl. Mech.	510 471	Fluid Mechanics	3
Civil Engg.	525 463	Sanitary Engg. Fund.	3
Civil Engg.	525 422	Soil Mechanics I	3
		Engineering Science Elective**	4
Civil Engg.	525 115	Engineering Assembly	0
			16

SENIOR

Fall Semester

		Course	Semester Hours
Civil Engg.	525 442	Structural Engg. in Steel	3
Civil Engg.	525 465	Sanitary Engg. Design	3
		Senior Design Elective	3
Civil Engg.	525 451	Hydrology	2
		Humanities or Soc. Sci. Elect.*	6
Civil Engg.	525 115	Engineering Assembly	0
			17

Spring Semester

		Course	Semester Hours
Civil Engg.	525 444	Structural Engg. in Concrete	3
Civil Engg.	525 452	Hydraulic Engineering	3
Civil Engg.	525 471	Transportation Engineering	3
Civil Engg.	525 428	Foundation Engineering	3
		Humanities or Soc. Sci. Elect.*	5
Civil Engg.	525 115	Engineering Assembly	0
			17

Number of hours required for graduation 132***

*Humanities and Social Science Electives are to be selected from list on page 207 and need not be taken in the order listed in the curriculum.

**Eight credit hours of engineering science electives are required. One course in computer programming or equivalent programming experience is required. The remaining hours of engineering science 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 a recommendation of the faculty advisor and approval of the department head and the dean. Note should be taken of the engineering science requirements on page 207.

***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

Fall Semester

			Course	Semester Hours
English	229	100	English Composition I	3
Chemistry	221	210	Chemistry I	5
Mathematics	245	220	Anal. Geometry & Calculus I	4
Speech	281	105	Oral Communications I	2
Mech. Engg.	560	212	Graph. Comm., Anal. & Des. I**	2
Physical Education			Physical Education	0
				16

Spring Semester

			Course	Semester Hours
English	229	120	English Composition II	3
Chemistry	221	230	Chemistry II	3
Mathematics	245	221	Anal. Geometry & Calculus II	4
Gen. Engg.	500	160	Engineering Concepts	2
Computer Science	286	315	Fund. of Comp. Programming	3
Physical Education			Physical Education	0
				15

SOPHOMORE

Fall Semester

			Course	Semester Hours
Physics	265	310	Engineering Physics I	5
Mathematics	245	222	Anal. Geometry & Calculus III	4
Appl. Mech.	510	305	Statics	3
Elec. Engg.	530	355	Intro. to Computer Engg.	3
Economics	225	110	Economics I	3
				18

Spring Semester

			Course	Semester Hours
Physics	265	311	Engineering Physics II	5
Mathematics	245	240	Series & Diff. Equations	4
Appl. Mech.	510	412	Dynamics	3
Elec. Engg.	530	401	Circuit Theory I	3
			Humanities or Soc. Sci. Elect.*	3
				18

JUNIOR

Fall Semester

			Course	Semester Hours
Elec. Engg.	530	404	Circuit Theory II	4
Elec. Engg.	530	497	Electromagnetic Theory I	3
Elec. Engg.	530	415	Electronics I	3
Elec. Engg.	530	431	E. E. Laboratory I	2
			Complementary Elective**	3
			Humanities or Soc. Sci. Elect.*	3
				18

Spring Semester

			Course	Semester Hours
Elec. Engg.	530	416	Electronics II	3
Elec. Engg.	530	501	Energy Conversion I	3
Elec. Engg.	530	432	E. E. Laboratory II	2
			Option Elective+	3
			Complementary Elective**	3
			Humanities or Soc. Sci. Elect.*	3
				17

SENIOR

Fall Semester

			Course	Semester Hours
Mech. Engg.	560	413	Thermodynamics I	3
Elec. Engg.	530	510	Control Systems Design	3
			Option Elective+	3
			Complementary Elective**	3
			Humanities or Soc. Sci. Elect.*	3
				15

Spring Semester

			Course	Semester Hours
Elec. Engg.	530	530	E. E. Seminar	1
			Option Elective+	6
			Complementary Elective**	5
			Humanities or Soc. Sci. Elect.*	3
				15

Number of hours required for graduation 132++

*Humanities and Social Science Electives are to be selected from the list on page 207 and need not be taken in the order listed in the curriculum.

**14 semester hours of Complementary Electives and M.E. 212 or 16 semester hours of Complementary Electives and a minimum of one semester of high school drafting. Complementary Electives must be selected from an approved list of science and engineering courses upon consultation with the student's faculty adviser. Note should be taken of the engineering science requirements on page 207.

+12 semester hours of Option Electives must be selected from Electrical Engineering courses upon consultation with adviser.

++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

Fall Semester

			Course	Semester Hours
English	229	100	English Composition I	3
Mathematics	245	220	Anal. Geometry & Calculus I	4
Chemistry	221	210	Chemistry I	5
Economics	225	110	Economics I	3
Gen. Engg.	500	160	Engineering Concepts	2
Physical Education			Physical Education	0
Gen. Engg.	500	110	Engineering Lectures	0
				17

Spring Semester

			Course	Semester Hours
English	229	120	English Composition II	3
Mathematics	245	221	Anal. Geometry & Calculus II	4
Chemistry	221	230	Chemistry II	3
Mech. Engg.	560	212	Graph. Comm., Anal. & Design I	2
Ind. Engg.	550	220	Intro. to Ind. E.	2
			Humanities or Soc. Sci. Elect.	3
			Physical Education	0
			Engineering Assembly	0
				17

SOPHOMORE

Fall Semester

			Course	Semester Hours
Physics	265	310	Engineering Physics I	5
Mathematics	245	222	Anal. Geometry & Calculus III	4
Bus. Ad.	305	275	Fund. of Accounting	4
Ind. Engg.	550	341	Production Processes	3
Ind. Engg.	550	372	Computers & Data Processing	2
Ind. Engg.	550	115	Engineering Assembly	0
				18

Spring Semester

			Course	Semester Hours
Physics	265	311	Engineering Physics II	5
Mathematics	245	240	Series & Diff. Equations	4
Appl. Mech.	510	305	Statics	3
Ind. Engg.	550	352	Tool Engineering	3
			Humanities or Soc. Sci. Elect.	3
			Engineering Assembly	0
				18

JUNIOR

Fall Semester

			Course	Semester Hours
Mech. Engg.	560	413	Thermodynamics I	3
Statistics	285	410	Intro. Prob. & Stat. I	3
Ind. Engg.	550	350	Engineering Materials	2
Ind. Engg.	550	351	Engineering Materials Lab.	1
Ind. Engg.	550	452	Work Design	3
Appl. Mech.	510	412	Dynamics	3
Ind. Engg.	550	115	Engineering Assembly	0
				15

Spring Semester

			Course	Semester Hours
Appl. Mech.	510	415	Mechanics of Materials	3
Elec. Engg.	530	403	Elect. Circuits and Control	4
Ind. Engg.	550	441	E. Reliability & Qual. Assur. I	3
Ind. Engg.	550	481	Industrial Plant Studies	0
Ind. Engg.	550	530	Ind. Project Eval	3
Ind. Engg.	550	401	Industrial Management	3
Ind. Engg.	550	115	Engineering Assembly	0
				16

SENIOR

Fall Semester

			Course	Semester Hours
Ind. Engg.	550	553	Prod. Plan. & Invent. Control	3
Ind. Engg.	550	575	Quant. Tech. in Ind. Engg.	3
Ind. Engg.	550	571	Intro. to Operations Research I	3
Ind. Engg.	550	502	Ind. Management II	2
			Soc. Sci. or Humanities Elect.*	6
			Engineering Assembly	0
				17

Spring Semester

			Course	Semester Hours
Ind. Engg.	550	625	Man-Environment Systems	3
Ind. Engg.	550	554	Ind. Facilities Layout & Des.	3
Ind. Engg.	550	572	Intro. to Oper. Research II	3
Ind. Engg.	550	573	Industrial Simulation	3
			Soc. Sci. or Humanities Elect.*	3
Ind. Engg.	550	115	Engineering Assembly	0
				15

Number of hours required for graduation 133**

*Humanities and Social Science Electives are to be selected from the list on page 207 and need not be taken in the order listed in the curriculum.

**The engineering science requirements on page 207 will be satisfied by the required courses in this curriculum. 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

Fall Semester

		Course	Sem. Hrs.
English	229 100	English Composition I	3
Chemistry	221 210	Chemistry I	5
Speech	281 105	Oral Communication I	2
Mathematics	245 220	Anal. Geometry & Calculus I	4
Gen. Engg.	500 160	Engineering Concepts	2
Physical Education		Physical Education	0
Gen. Engg.	500 110	Engineering Lectures	0
			16

Spring Semester

		Course	Sem. Hrs.
English	229 120	English Composition II	3
Chemistry	221 230	Chemistry II	3
Mech. Engg.	560 212	Graph. Comm. Anal. & Des. I	2
Mathematics	245 221	Anal. Geometry & Calculus II	4
		Hum. or Soc. Sci. El.*	3
Physical Education		Physical Education	0
Mech. Engg.	560 115	Engineering Assembly	0
			15

SOPHOMORE

Fall Semester

		Course	Sem. Hrs.
Physics	265 310	Engineering Physics I	5
Mathematics	245 222	Anal. Geometry & Calculus III	4
Economics	225 110	Economics I	3
Mech. Engg.	560 217	Graph. Comm. Anal. & Des. II	3
Ind. Engg.	550 341	Production Processes	3
Mech. Engg.	560 115	Engineering Assembly	0
			18

Spring Semester

		Course	Sem. Hrs.
Physics	265 311	Engineering Physics II	5
Mathematics	245 240	Series & Diff. Equations	4
Appl. Mech.	510 305	Statics	3
Ind. Engg.	550 350	Engg. Materials	2
		Hum. or Soc. Sci. El.*	3
Mech. Engg.	560 115	Engineering Assembly	0
			17

JUNIOR

Fall Semester

		Course	Sem. Hrs.
Mech. Engg.	560 413	Thermodynamics I	3
Elec. Engg.	530 401	Circuit Theory I	3
Ind. Engg.	550 351	Engg. Materials Lab.	1
Appl. Mech.	510 412	Dynamics	3
Appl. Mech.	510 415	Mech. of Materials	3
		Hum. or Soc. Sci. El.*	3
Mech. Engg.	560 115	Engineering Assembly	0
			16

Spring Semester

		Course	Sem. Hrs.
Mech. Engg.	560 513	Thermodynamics II	3
Elec. Engg.	530 415	Electronics I	3
Ind. Engg.	550 372	Comp. and Data Proc.	2
Appl. Mech.	510 471	Fluid Mechanics	3
Physics	265 400	Atomic Physics or	
Nucl. Engg.	580 410	Intro. To Nuclear Engg.	3
		Hum. or Soc. Sci. El.*	3
Mech. Engg.	560 115	Engineering Assembly	0
			17

SENIOR

Fall Semester

		Course	Sem. Hrs.
Mech. Engg.	560 452	Machine Design I	3
Mech. Engg.	560 521	Heat Transfer	3
Mech. Engg.	560 535	Mech. Engg. Lab. I	3
Mech. Engg.	560 560	Engg. Economics	3
		Technical Elective**	5
Mech. Engg.	560 115	Engineering Assembly	0
			17

Spring Semester

		Course	Sem. Hrs.
Mech. Engg.	560 453	Mech. Engg. Des. Lab.	2
Mech. Engg.	560 551	Machine Design II	3
Mech. Engg.	560 583	Mech. Engg. Lab. II	2
Mech. Engg.	560 656	Mach. Vibration I or	
Mech. Engg.	560 622	Environmental Engg. I	3
		Hum. or Soc. Sci. El.*	3
		Technical Elective**	3
Mech. Engg.	560 115	Engineering Assembly	0
			16

Number of hours required for graduation 132***

*Humanities and Social Science Electives are to be selected from the list on page 207 and need not be taken in the order listed in the curriculum.

**To be chosen with the advice and approval of the faculty adviser and department head.

***The engineering science requirements on page 207 will be satisfied by the required courses in this curriculum. 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

Fall Semester

		Course	Sem. Hrs.
Nucl. Engg.	580 110	N. E. Concepts	2
English	229 110	English Composition I	3
Economics	225 110	Economics I	3
Chemistry	221 210	Chemistry I	5
Mathematics	245 220	Anal. Geometry & Calculus I	4
Physical Education		Physical Education	0
			17

Spring Semester

		Course	Sem. Hrs.
Nucl. Engg.	580 116	N. E. Seminar	1
English	229 120	English Composition II	3
Chemistry	221 230	Chemistry II	3
Chemistry	221 250	Chemistry II Lab.	2
Physics	265 310	Engineering Physics I	5
Mathematics	245 221	Anal. Geometry & Calculus II	4
Physical Education		Physical Education	0
			18

SOPHOMORE

Fall Semester

		Course	Sem. Hrs.
Physics	265 311	Engineering Physics II	5
Mathematics	245 222	Anal. Geometry & Calculus III	4
Appl. Mech.	510 305	Statics	3
		Soc. Sci. or Hum. El.*	3
			15

Spring Semester

		Course	Sem. Hrs.
Nucl. Engg.	580 390	Intro. N. E. Anal.	3
Nucl. Engg.	580 450	Elem. N. E.	3
Appl. Mech.	510 412	Dynamics	3
Elec. Engg.	530 401	Circuit Theory I	3
Chem. Engg.	520 214	Intro. to Proc. Anal.	3
			15

JUNIOR

Fall Semester

		Course	Sem. Hrs.
Nucl. Engg.	580 500	Ap. N. E. Anal.	3
Nucl. Engg.	580 611	Rad. Appl. Engg.	2
Mech. Engg.	560 413	Thermodynamics I	3
Elec. Engg.	530 415	Electronics I	3
		Technical Elective***	3
		Soc. Sci. or Hum. El.*	3
			17

Spring Semester

		Course	Sem. Hrs.
Nucl. Engg.	580 606	Nuc. Engg. Materials	3
Nucl. Engg.	580 555	Nuc. React. Fund.	3
Appl. Mech.	510 471	Fluid Mechanics	3
		Technical Elective**	6
		Soc. Sci. or Hum. El.*	3
			18

SENIOR

Fall Semester

		Course	Sem. Hrs.
Nucl. Engg.	580 671	App. React. Theory	3
Nucl. Engg.	580 680	Neut. & Part. Inter.	3
Nucl. Engg.	580 710	Nuc. Fuel Proc.	3
		Technical Elective**	3
		Soc. Sci. or Hum. El.*	3
			15

Spring Semester

		Course	Sem. Hrs.
Nucl. Engg.	580 692	Nuc. React. Tech.	3
Nucl. Engg.	580 695	Nuc. React. Tech. Lab.	2
		Technical Elective**	7
		Soc. Sci. or Hum. El.*	3
			15

Number of Hours Required for Graduation is 130***

*Humanities and Social Science Electives are to be selected from the list on page 207 and need not be taken in the order listed in the curriculum.

**A Technical Elective program of study is chosen in consultation with the student's adviser and presented for approval to the departmental faculty no later than the second semester of the sophomore year.

***The engineering science requirements on page 207 will be satisfied by the required courses in this curriculum. 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.

Engineering Sciences

Engineering sciences have their roots in mathematics and basic sciences, but carry knowledge further toward applicability. A B.S. degree candidate in the College of Engineering must satisfy the following requirements:

1. A minimum of 30 semester hours of engineering science courses.
2. At least 12 semester hours of engineering science courses outside the student's major department.
3. At least four of the five subject areas in the following list must be represented in the 30 semester hours.

Engineering Materials

- a. IE 350 Engineering Materials (2)
- b. NE 606 Nuclear Engineering Materials (3)
- c. EE 690 Solid State Engineering (3)

Analytical Mechanics

- a. ApM 305 Statics (3)
- ApM 412 Dynamics (3)
- b. ApM 413 Statics and Dynamics (4)

Circuits, Fields, & Electronics

- a. EE 401 Circuit Theory I (3)
- EE 403 Elect. Circuits & Controls (4)
- c. EE 497 Electromagnetic Theory (3)

Thermodynamics

- a. ChE 415 Chem. Engg. Thermo. (5)
- b. ME 413 Thermodynamics I (3)

Flow & Rate Processes

- a. ApM 471 Fluid Mechanics (3)
- b. ChE 520 Transport Phenomena (5)

Note — It should be recognized that there are other courses in these subject areas which may properly be considered engineering sciences. In addition, there are areas of engineering science which are not listed.

Humanities and Social Science Electives for College of Engineering Students

To add breadth to his education and to help prepare him for a more effective role in society each engineering student is required to take several courses in the social sciences and humanities. The following list of electives has been approved by the faculty.

Art — Any course

Economics — Any course above Economics 110

English — Any course above those required

Geography — Any course

History — Any course

Journalism — 289 235 Survey of the Mass Media (3)

Modern Languages — At least eight hours

Music — Any course

Philosophy — Any course except Philosophy 171

Political Science — Any course

Psychology — Any course

Sociology and Anthropology — Any course

Speech — Any course in "Theater and Interpretation"

Architecture and Design — Any course in history or appreciation of architecture

Engineering — 500 250 Impact of Engineering Technology on Society (3)

Home Economics — 630 605 Consumers and the Market (3)

From the areas listed above at least two courses must be taken at the 400 level or above; however, not more than three credit hours may be taken in applied music and / or applied art.

Dual Degree Programs

An engineering student may earn two B.S. degrees by pursuing a dual degree program. There are many interesting possibilities for a second major including business administration, mathematics, chemistry, geology, political science, etc. In general, the second degree can be obtained with an additional year of study (a minimum of 150 credit hours is required). Three programs of interest are listed below:

Engineering and Business Administration. Ordinarily the program must be commenced during the student's junior year and the following courses are required for the B.S. in Business Administration.

			Course	Sem. Hrs.
Bus. Admin.	305	275	Fund. of Accounting	4
Bus. Admin.	305	305	Managerial Accounting	3
Economics	225	110	Economics I	3
Economics	225	120	Economics II	3
Bus. Admin.	305	425	Business Law I	3
Com. Science	286	315	Fund. of Comp. Prog.	3
Bus. Admin.	305	400	Management Concepts	3
Bus. Admin.	305	405	Business Finance	3
Bus. Admin.	305	440	Marketing	3
Bus. Admin.	305	600	Business Policy	3
Bus. Admin.	305	602	Business and Society	3
			Field of Bus. Specialization ..	12
			Business electives	3
				49

Civil Engineering and Geology. Students interested in a career in Foundation Engineering are advised to complete the B.S. degree requirements in Civil Engineering plus the requirements listed below to qualify for the the B.S. degree in Geology.

1. General requirements for B.S. degree in Arts and Sciences (see page 83).

2. Complete the following courses in Geology.

		Course	Sem. Hrs.
234	430	Historical Geology	4
234	460	Mineralogy I	4
234	461	Mineralogy II	4
234	420	Geomorphology	4
234	530	Structural Geology	4
234	603	Stratigraphic Geology	4
234	640	Field Geology	6
			30

Chemistry and Chemical Engineering. In addition to the required courses in Chemical Engineering, interested students should take:

	Course	Sem. Hrs.
221 451	Organic Chemistry II Lab	2
221 597	Inorganic Chemistry	3
221 445	Chemical Separations	2
221 660	Instrumental Analysis	4
221 599	Undergraduate Research	3
253 121	German I	4
253 126	German II	4

Electives should be chosen to satisfy the humanities and social sciences requirement on page 207 and the engineering science requirements on page 207. Number of hours required for both degrees — 150.

Information for Pre-Engineering Students Transferring to Kansas State University

Many of the fundamental courses required for a degree in engineering may be obtained through pre-engineering programs at other four-year institutions or junior colleges. In general, two years of coursework will be transferrable. However, there are small differences among the curricula so students electing this route should work closely with their advisers and KSU to ensure a proper selection of courses. Questions should be referred to The Dean's Office, College of Engineering.

BASIC SUBJECTS COMMON TO ALL CURRICULA

Subject	Credit Hours at KSU
Chemistry	8
Mathematics — (Anal. Geom. & Calc., Diff. Equa.)	16
Physics	10
Statics	3
English Composition	6
Economics	3
Social Science & Humanities Electives (courses in economics, psychology, history, literature, etc.)	15
	61

OTHER PRE-ENGINEERING SUBJECTS WHICH VARY WITH THE CURRICULUM

	AgE	ChE	CE	EE	IE	ME	NE
Speech	2	2	2	2		2	
Graphics	2	*	2	2	2	5	
Qualitative Analysis		4	2				2
Computer Programming	2	*	2	3	2	2	
Organic Chemistry		8		*			
Geology	*		4				
Biology	4						
Accounting	*				4		

Summer Session—Students transferring at the junior level may find it advantageous to attend the summer session preceding their fall enrollment. Engineering subjects that normally are offered include:

Applied Mechanics — Statics, Dynamics
Chemical Engineering — Introduction to Process Analysis
Electrical Engineering — Circuit Theory I
Industrial Engineering — Computers & Data Processing, Industrial Management I
Mechanical Engineering — Thermodynamics I

*Technical Elective in the curriculum.

Agricultural Engineering

WILLIAM H. JOHNSON,* Head of Department

Professors Fairbanks,* Hodges,* Larson,* and Johnson;* Associate Professors Chung,* Clark,* Lipper,* Manges,* and Stevenson;* Assistant Professors Baugher and Spillman;* Instructors Anderson, McMillan, Murphy, and TenEyck; Emeritus: Professor Fenton.

Agricultural Engineering is the profession that applies the science of engineering principles to the agricultural industry. Basic training enables the student to develop new ideas and methods as well as to further the application of engineering fundamentals in such areas as production mechanization; soil, water, and air resources; power and energy sources; plant and animal environment; feed and waste handling, processing, and storage.

The curriculum includes all basic courses such as mathematics, physics, chemistry, and mechanics common to engineering curriculums, as well as specific courses in the field of agricultural engineering, some of which permit specialization in a particular area through technical electives available in the department.

Students completing this curriculum are prepared to do design, research, testing, sales promotion, teaching and extension work as applied to agriculture.

Federal and state agencies, colleges and universities, equipment manufacturers, rural electric power suppliers and many enterprises involving agriculture desire and need the services of the agricultural engineer.

GRADUATE STUDY

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.

Courses in Agricultural Engineering

UNDERGRADUATE CREDIT

505 160. Agricultural Engineering Concepts. (2) I. An introduction to agricultural engineering and engineering design. Problems involving the basic concepts of engineering science are considered. One lecture and two hours of lab a week.

505 312. Biological Materials and Machine Functions in Agriculture. (3) II. Physical properties of biological materials. Functional requirements of agricultural machines. Two hours rec. and three hours lab. a week. Pr.: Phys. 310.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

505 410. Environmental Analysis for Plant and Animal Systems. (3) I. The fundamental concepts and practical considerations required for the synthesis and design of open and enclosed environmental systems for agricultural production. Pr.: Phys. 311, Pr. or conc.: M.E. 413.

505 420. Energy Use and Control in Agricultural Systems I. (3) II. Theory and application of energy conversion devices; measurement methods and instrumentation; fundamental concepts of hydraulic, electronic, and pneumatic control systems. Two hours of recitation and three hours lab. a week. Pr.: M.E. 413, E.E. 401.

505 430. Soil and Water Engineering. (3) I. Rainfall-Runoff relationships, principles of soil erosion control, design of water handling structures for land drainage, flood protection and irrigation, agricultural surveying. Two hours recitation and three hours lab. a week. Pr.: Ap. M. 471, Ag. E. 410, C. E. 422 or Agro. 660.

505 436. Design of Agricultural Machinery. (3) I. Analysis and design of agricultural machines. Two hours rec. and three hours lab. a week. Pr.: Phys. 311; Pr. or conc.: Ap. M. 415, Ag. E. 312.

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.

505 505. Energy Use and Control in Agricultural Systems II. (3) II. Application of energy to condition and process biological materials important to agriculture; to modify their environments; and to measure, modify, or induce certain characteristics. 2 hrs. rec., 3 hr. lab. per week. Pr.: Phys. 311 and Ag. E. 420.

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. 436, 466.

505 580. Measurement Systems. (3) I. Theory and application of measurement systems with emphasis on environments and processes related to soils, plants and animals. Two hours rec. and three hours lab. a week. Pr.: E. E. 401.

505 581. Professional Practice in Agricultural Engineering. (1) II. Professional attitudes and ethics.

Post-degree career planning and social responsibilities. One hours rec. a week. Pr.: Senior standing.

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. 410.

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 design techniques in processing agricultural products. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 471, M. E. 413.

505 710. Advanced Farm Power and Machinery. (3) I, II. Analytical study of design, construction and operating characteristics of tractors and selected farm machines. Two hours rec. and three hours lab. a week. Pr.: Ag. E. 436.

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.

505 815. Graduate Seminar in Agricultural Engineering. (1) I, II. Presentation and discussion of research philosophies, procedures and results. One hour rec. a week. Required of all graduate students in Agricultural Engineering. Pr.: Graduate standing.

Courses for Students in Agriculture

UNDERGRADUATE CREDIT

506 151. Agricultural Mechanics Practices. (2) I, II. Introduction to mechanics practices and techniques basic to the repair, maintenance and construction of agricultural facilities and equipment, including oxyacetylene and arc welding, tool conditioning, soldering, power tool operation such as 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; ignition, injection, carburetion, fuels, lubricants, power transmission, control systems, and tune-up maintenance. 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.

506 310. Farm Electrification and Soil Conservation. (2) I, II. For students pursuing the curriculum in Agricultural Education. Introduction to methods of planning for efficient utilization of electric energy for farm production and to farm surveying including

checking of conservation practices applied to soil and water. Six hours lab. a week.

506 330. Agricultural Machinery Management. (3) I. Selection, adjustment, operation, servicing, economics, and application of agricultural machines. Two hours rec. and three hours lab. a week. Pr.: Phys. 211.

506 351. Agricultural Machinery Operation and Maintenance. (2) I, II. Emphasis upon shop skills as applied to machine operation, adjustment, and maintenance; principles of power transmission, draft, alignment, timing and calibration of tillage, harvesting, planting, and spraying equipment. 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 agricultural machinery; advanced welding, hardsurfacing and metallurgy; selection of materials of construction. Six hours lab. a week. Pr.: Ag. E. 151 or equiv. and junior standing.

506 353. Farmstead Utilities. (3) I. Utilization of energy for light, heat, and power on the farmstead; planning for distribution of electric power and water; motors and controls. Two hours rec. and three hours lab. a week. Pr.: Math. 100, 150; Phys. 212.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

506 451. Planning and Management of Agricultural Buildings. (3) II. Farmstead planning; requirements of livestock production systems; environment control; waste management. Three hours rec. Pr.: Phys. 112 or 211 and Math. 100.

506 452. Farm Building Construction. (2) I, II. Construction practices related to buildings and materials used in agriculture; application of procedures for design of concrete mixtures, framing and fastener requirements, material selection; and cost estimation. Six hours lab. a week. Pr.: Math. 100.

506 455. Dairy Mechanics. (3) Upon sufficient demand. 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.

506 458. Conservation Surveying and Planning. (3) II. Agricultural surveying; layout and checking waterways, terraces and farm ponds; conservation planning from aerial photograph. One hour rec. and five 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 instruction sheets, organization and presentation of demonstrations. One hour rec. and six hours lab. a week. Pr.: Conc. enrollment in student teaching.

UNDERGRADUATE AND GRADUATE CREDIT

506 600. Advanced Farm Mechanics. (3) S. For teachers of vocational agriculture and those concerned with teaching agricultural mechanics in high school; advanced shop techniques, with special emphasis on welding, machine tool, mechanical drawing, 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 agricultural mechanics in high school; 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. Pr.: Approval of instructor.

506 651. Mechanized Feed Handling and Storage. (3) I. Planning mechanical systems for preparation and handling of feeds on farms; conditioning and preservation of grains, forages, and feeds. Two hours rec. and three hours lab. a week. Pr.: Ag. E. 451 and 353.

506 652. Soil and Water Conservation Practices. (3) II. The hydrological 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. 300 or 458.

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. 100 and Ag. E. 651.

Applied Mechanics

PHILIP G. KIRMSER,* Head of Department

Professors Best,* Calcote,* Haft,* Kirmsers,* and McCormick,* Associate Professors Huang,* Kipp,* and Lindly,* Assistant Professors Crary, Hu,* and Knostman,* Instructor McDonald; Emeritus: Professor Taylor 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 STUDY

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.

Courses in Applied Mechanics

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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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.

510 413. Statics and Dynamics. (4) I, II, S. A shortened combined course in (1) Statics, including a study of force systems, free-body diagrams, and problems in equilibrium, friction, centroids, and moments of inertia; and (2) Dynamics, including a study of the kinematics and kinetics of particles and rigid bodies using the methods of force-mass-acceleration, work-energy, and impulse-momentum. Four hours rec. a week. Pr.: 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.

510 471. 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; Pr. or conc.: M. E. 413.

510 495. Elementary Engineering Acoustics. (3) I, II. A study of elementary engineering acoustics and its application to the measurement and control of sound and noise, including laboratory exercises. Three hours rec. a week. Pr.: Ap. M. 412 or 413, or consent of instructor.

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.

510 610. 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. 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, gyro dynamics 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.

510 701. 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.

510 720. Finite Element and Other Approximate Methods in Mechanics. (3) II. The theory and application of finite element and other techniques and computer programs to continuum mechanics, stress and strain of elastic bodies, plates, shells, heat conduction, flow, and vibration problems of mechanics. Three hours rec. a week. Pr.: Ap. M. 714 or 716 or equiv.

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 construction, Poincare's classification of singular points, stability and instability. Three hours rec. a week. Pr.: Math. 240 or equiv.

510 750. Engineering Acoustics. (3) II. A study of the generation, propagation, and reproduction of sound, with applications to the transmission and reduction of sound in materials and structures, and the design of acoustic enclosures and filters. Three hours rec. a week. Pr.: M. E. 756; or Ap. M. 618, 714, or 716; or consent of instructor.

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 in-

vestigations 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

DR. L. T. FAN,* Head of Department

Professors Bates,* Honstead,* and Kyle;* Associate Professors Akins,* Erickson,* and Matthews;* Assistant Professors Hall,* Heymach, Kao, Retzliff,* and Walawender.*

Chemical engineers have 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. Chemical engineers must know how chemical reactors are designed, how automatic controls are used to operate processes, how materials can be separated and purified by distillation, extraction, or other diffusional operations. They 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 non-technical electives are provided to allow for broad educational desires.

The Chemical Engineering Curriculum is best suited to highly motivated, intelligent students with strong interests in chemistry, physics, and mathematics. Graduates are well trained for responsible positions in industry or for continuing their education through M.S. or Ph.D. degrees.

GRADUATE STUDY

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 graduate students.

INTEGRATED MASTERS DEGREE PROGRAM

A five year integrated program leading to a B.S. in Chemical Engineering at the end of four years and a Master of Science in Chemical Engineering at the end of five years is available for promising undergraduate students. Students who have completed the sophomore year and have outstanding

scholastic records are invited to join the program. Each student in consultation with a faculty adviser will plan an individualized program of study which meets requirements for the B.S. and M.S. degrees. Features of the program include integrated planning, participation in research as an undergraduate and enrollment in graduate level courses in the senior year. Students participating in the program will be considered for financial assistance in the form of scholarships, fellowships, research assistantships, and part-time work.

Courses in Chemical Engineering

UNDERGRADUATE CREDIT

520 115. Engineering Assembly.

520 214. Introduction to Process Analysis. (3) I, II, S. An introduction to the basic concepts of Chemical Engineering. Three hours rec. a week. Pr.: Chem. 230; Pr. or conc. Math. 222 and Phys. 311.

520 216. Chemical Engineering Computational Techniques. (1) I, II, S. Application of digital and analog computers, graphical methods, and statistics to chemical engineering problems. Three hours lab. a week. Pr. or conc.: Ch. E. 214 and Math. 240.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

520 415. Chemical Engineering Thermodynamics. (5) I, II, S. 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. 214.

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. 214.

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 separation systems.

Four hours rec. and three hours lab. a week. Pr.: Ch. E. 415, 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.

UNDERGRADUATE AND GRADUATE CREDIT

520 615. Biochemical Engineering. (3) I. The analysis and design of biochemical processing systems with emphasis on fermentation kinetics, continuous fermentations, aeration, agitation, scale up, sterilization, and control. Three hours rec. a week. Pr. or conc.: Ch. E. 520.

520 625. Biotransport Phenomena. (3) I, II. Principles of transport phenomena applied to biological and physiological processes. Membrane transport processes, circulatory system transport phenomena, transport and distribution of drugs. Pr.: Biology 425 or equivalent and Ch. E. 430.

520 635. Chemical Engineering Analysis I. (3) I, II, S. The mathematical formulation of problems in chemical engineering using partial differential equations, vector and tensor notation. Solution of these problems by graphical, numerical, and transform methods. Three hours rec. a week. Pr.: Ch. E. 430.

520 645. Analysis of Physiological Processes. (3) II. Principles of process and systems analysis applied to problems in biology and medicine. Analysis of mixing in flow systems, principles and applications of tracer analysis, analysis of kinetic and adsorption processes. Pr.: Biology 425 or equivalent and Ch. E. 520.

520 715. Selected Topics in Biochemical Engineering. (3) II, S. Subjects of current interest in the broadest sense of biochemical engineering. These involve not only chemical engineering problems which contain biochemical, biological or medical elements but also applications of chemical engineering principles and methodologies to biochemical, biological, medical and ecological problems. Pr.: Ch. E. 615.

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 I. (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, S. 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 Lyapunov 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 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 Funk,* Schmid,* Swartz,* Wallace,* and Zovne,* Emeritus: Professors Crawford, Frazier, and Morse.

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 STUDY

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: Laboratory facilities for advanced study and research are available in the areas of Structures, Soil Mechanics, Hydraulics, Sanitary Engineering, Transportation, and Photogrammetry.

Courses in Civil Engineering

UNDERGRADUATE CREDIT

525 115. **Engineering Assembly.** (0) I, II.

525 212. **Elementary Surveying Engineering.** (3) I, II. Coordinates, directions, distances and elevation. Traverses. Boundary Surveys. Leveling. National rectangular coordinate systems. Property descriptions: public land subdivision and metes and bounds. Topographic surveys. Surveying planning and estimating. One hour lec. 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. 212.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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. 212; Pr. or conc.: C. E. 214.

525 422. **Soil Mechanics.** (3) I, II. Identification, classification, and engineering properties of soils; theory and application of consolidation, compressibility, and strength of soils; ground water retention and movement; slope stability and lateral earth pressures; stress distribution in soil. Two hours rec. and 3 hours lab. a week. Pr.: Ap. M. 415.

525 428. **Foundation Engineering.** (3) I, II. Prediction of soil variation; soil investigations; stress distribution and bearing capacity; dewatering analysis and procedures; retaining structures and lateral earth pressure; shallow foundations, pile foundations; underpinning and grouting. Two hours rec. and three hours lab. a week. Pr.: C. E. 422. Pr. or Conc.: C. E. 444.

525 431. **Analysis of Statically Determinate Structures.** (3) I, II. Analysis of statically determinate beams, frames, and trusses; calculation of influence lines and deflections. Two hours rec. and three hours lab. a week. Pr.: Ap. M. 415.

525 432. **Analysis of Statically Indeterminate Structures.** (3) I, II, S. Elastic analysis of statically indeterminate beams, frames, trusses; introduction to force and displacement methods using matrix algebra. Two hours rec. and three hours lab. a week. Pr.: C. E. 431.

525 442. **Structural Engineering in Steel.** (3) I, II, S. Introduction to design of steel structures. Theoretical, experimental and practical bases for proportioning members and their connections. Two hours rec. and three hours lab. a week. Pr.: C.E. 431.

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. 432.

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. or Conc.: C.E. 432.

525 451. **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.

525 452. **Hydraulic Engineering.** (3) I, II. Applications of the principles of fluid mechanics to control and utilization of water; reservoir, dam, and spillway design; enclosed conduit and open channel design; hydraulic machinery and hydro-power development; principles of fluid measurement; laboratory — flow and velocity metering, hydraulic models, pipe losses, open channel flow. Two hours rec. and three hours lab. a week. Pr.: C. E. 451.

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 and 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.

525 485. **Civil Engg. Project.** (1-3) I, II. A laboratory design or research 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 cr. hrs.: 3. May be substituted for a required senior design course on recommendation of instructor and approval of the department head.

UNDERGRADUATE AND GRADUATE CREDIT

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 soils; stress distribution in the soil; advanced study of strength and compressibility of soil, and of soil moisture and ground water movement. Three hours rec. a week. Pr.: C. E. 422.

525 624. **Advanced Soil Testing for Engineering Purposes.** (3) II. Physical characteristics and classification of soil materials; consolidation and compressibility tests; unconfined, direct, and triaxial shear tests. One hour rec. and six hours lab. a week. Pr.: C. E. 422.

525 628. **Advanced Foundation Engineering.** (3) II. Advanced studies of soil investigations; analysis and design of retaining structures, shallow foundations, pile foundations and dewatering systems; analysis and repair of failed structures; legal aspects of foundation engineering. Two hours rec. and three hours lab. a week. Pr.: C. E. 444 and C. E. 428.

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. 432.

525 633. **Experimental Structural Analysis.** (3) II. Application of Muller-Breslau's Principles and Betti's Law to structural models; principles of similitude. One hour rec. and six hours lab. a week. Pr.: C. E. 432.

525 641. **Behavior of Structural Materials.** (3) I. Studies of mechanical properties of structural engineering materials and their application to structural design. Effects of static and cyclic loadings and time-temperature variations. Aspects of statistical analysis of brittle fractures. Three hours rec. a week. Pr.: Ap. M. 418.

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.

525 751. **Hydraulics of Open Channels I.** (3) I. Properties of open-channel flow; types of open channels; conservation of mass, momentum, and energy; critical, uniform, and gradually varied flow; design of erodible channels; rapidly varied flow. Three hours rec. a week. Pr.: C. E. 452.

525 761. **Sanitary Engineering Chemistry.** (3) I. Application of basic concepts of chemical equilibria, physical chemistry, organic chemistry and biochemistry to the field of sanitary engineering. Senior standing or consent of instructor. Three hours rec. a week. Pr.: C.E. 463 or equiv.

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 hours 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.

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.

525 822. Soil Mechanics of Embankments. (3) I. Application of soil mechanics to cutting and filling operations for the construction of embankments; soil investigations; slope stability; stability and settlement of embankments; structures in embankments. Water control in and through embankments. Two hours rec. and three hours lab. a week. Pr. or conc.: C. E. 622.

525 823. Engineering Properties of Cohesive Soils. (3) I. Mineralogy and structures of clay minerals; fabric and bonding of the clay particles; compressibility and strength characteristics of clays; moisture effects, retention and movement through clay. Two hours rec. and three hours lab. a week. Pr. or conc.: C. E. 622.

525 826. Engineering Properties of Cohesionless and Mixed Soils. (3) II. Mineralogy and physical characteristics; fabric and bonding in mixed soils; compressibility and strength characteristics; moisture effects, retention, and movement. Two hours rec. and three hours lab. a week. Pr. or conc.: C. E. 624.

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 eigen-values; 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) I. Analysis of structures subjected to dynamic loading. Three hours rec. a week. Pr.: C. E. 632, 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. 442.

525 845. Analysis and Design of Folded Plate Structures. (3) II. 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 concrete shells of single and double curvature. Three hours rec. a week. Pr.: C. E. 832.

525 851. Hydraulics of Open Channels II. (3) II. Spatially varied flow; flow in channels of non-prismatic cross-section and nonlinear alignment (transitions); unsteady free-surface flow; flood routing; numerical simulation of unsteady open-channel flow. Three hours rec. a week. Pr.: C. E. 751.

525 854. Analysis of Groundwater Flow. (3) II. Darcy's law; general hydrodynamic equations of porous media flow; confined and unconfined flow, Dupuit's theory; conformal mapping techniques; flow under and through dams; seepage from canals and ditches; seepage toward wells and well hydraulics; problems of unsaturated or turbulent flow through porous media. 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.

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.

525 875. 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. KOEPEL,* Head of Department

Professors Koepsel,* Ward, Jr.,* and Lucas;* Associate Professors Ahmed,* Lenhert,* Casey,* and Harris,* Assistant Professors Bernotski,* Calhoun, Cottom,* Gallagher,* Hummels,* Johnson,* and Kaufman;* Instructors Alnema, Dollar, Hearn, Rosenkranz, Wakabayashi, and Walker; Emeritus: Professors Hunt, Jorgenson, Kerchner, Kloeffer, and Sitz.

The program of study in electrical engineering prepares a student for a career in research, development, design, operation and plant engineering, manufacturing, technical sales and application engineering in the profession of electrical engineering. Fields of employment are in such areas as microelectronics and integrated circuits, communication systems, automatic control, analog and digital computers, power systems, lasers, microwave devices and systems, bioengineering, and solid state devices. An individual upon completing his program of study will find employment opportunities with industrial organizations, the government, utilities, consulting firms and educational institutions. Opportunities also exist for baccalaureate degree holders to enter such fields as medicine, law and business administration.

The first two years of the curriculum are mathematics and physical sciences oriented while the third year emphasizes analysis and the fundamental concepts of electrical engineering. The fourth and final year broadens the student's understanding of engineering and introduces him to various aspects of electrical engineering design. Humanities and social science electives are available for the student as well as technical electives. The latter are usually chosen from such fields as communication systems, solid state engineering, integrated circuits, control systems, radar, power systems, energy conversion, computer systems, and microwaves.

GRADUATE STUDY

The Department of Electrical Engineering offers programs of study leading to the Master of Science and Doctor of Philosophy degrees with areas of specialization in circuit theory, electromagnetic theory,

bioengineering, information and communication systems, solid state engineering and integrated circuit technology, control systems and computer technology. Well-equipped laboratory facilities are available for conducting original research in all of these areas.

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.

Special facilities available for graduate research include a 600 KeV Cockcroft-Walton Accelerator which the Department operates for research in ion implantation and ion beam technology, an Electromagnetics Research Laboratory for research in scattering in the frequency range of 8.2 GHz to 18.0 GHz, and a Solid State and Thin Film Technology Laboratory. The latter is equipped with a clean room, vacuum equipment, photographic reduction equipment, clean air benches, diffusion furnaces, and other specialized equipment for use in microelectronics. An analog and small digital computing facility is also available in the Department. The University Computing Center, housing a digital computer, is available generally for graduate instruction and research.

Courses in Electrical Engineering

UNDERGRADUATE CREDIT

530 355. **Introduction to Computer Engineering.** (3) I, II. Simple coding schemes, Boolean algebra fundamentals, elements of digital building blocks such as gates, flip-flops, shift-registers, memories, etc., basic engineering aspects of computer architecture and elements of machine language. Three hours rec. a week. Pr.: Comp. Sci. 315 or equivalent.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

530 401. **Circuit Theory I.** (3) I, II, S. An introduction to linear circuit theory; analysis of linear circuits containing resistance, inductance and capacitance. Three hours rec. a week. Pr. or conc.: Math. 240 or equivalent, Phys. 311.

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 Laplace transforms. Three hours rec. a week and a three-hour calculation period each week. Pr.: Math. 240, E. E. 401.

530 405. **Circuit Theory III.** (3) I, II, S. One and two port network theory. Three hours rec. a week. Pr.: E. E. 404.

530 415. **Electronics I.** (3) I, II, S. Fundamentals of electronic devices. Three hours rec. a week. Pr.: E. E. 401.

530 416. **Electronics II.** (3) I, II, S. Analysis and design of electronic circuits. Three hours rec. a week. Pr.: E. E. 404, 415.

530 417. **Electronics III.** (3) I, II. Cont. of Electronics II. Three hours rec. a week. Pr.: E. E. 416.

530 431. **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. 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. 510.

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.

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. 401.

530 498. **Electromagnetic Theory II.** (3) I, II. Cont. of Electromagnetic Theory I. Three hours rec. a week. Pr.: E. E. 497.

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 and 497.

530 502. **Energy Conversion II.** (3) I, II, S. Cont. of Energy Conversion I. Three hours rec. a week. Pr.: E. E. 501.

530 510. **Control Systems Design.** (3) I, II. Modeling, analysis, and design of control systems. Three hours rec. a week. Pr.: Senior standing or consent of instructor.

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.

530 540. **Computer Logic Design.** (3) I. Simplification of logical algebra statements, study of digital logic hardware, basic design considerations of combinatorial, sequential and pulsed circuits, symmetric circuits, decoders, counters, adders and registers. Three hours rec. a week. Pr.: E. E. 355, Pr. or conc.: E. E. 416.

530 544. **Digital Circuits Laboratory.** (2) I, II. Practical aspects of digital system design including threshold voltage levels, propagation delay, clock requirements, interfacing problems associated with other logic systems and analog devices. Three hours lab. a week. Pr.: E. E. 540 and E. E. 432.

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. 498.

530 610. **Problems in Electrical Engineering.** Credit arranged. I, II, S.

530 620. **Analog Computation.** (3) II. Analog computer solution and simulation of engineering problems. 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) I, II. Analysis and design of circuits using integrated and discrete circuit components. Three hours rec. a week. Pr.: E. E. 416.

530 645. **Introduction to Communication Theory.** (3) I, II. An introduction to communication systems including modulation, transmission, demodulation, random noise and information. Three hours rec. a week. Pr.: E. E. 416.

530 650. **Operational Circuit Analysis.** (3) I. Transformation methods applied to the solution of linear lumped and distributed parameter systems. Three hours rec. a week. Pr.: E. E. 404.

530 651. **Design of Digital Systems I.** (3) I. Design considerations of special purpose counters and registers, computer input-output devices, A-D and D-A conversion, magnetic memory devices and systems, digital arithmetic devices, clocks and clock control. Three hours rec. a week. Pr.: E. E. 540.

530 652. **Design of Digital Systems II.** (3) II. Hardware aspects pertaining to computer organization, data representation, data flow circuits, storage organization and searching, input-output processes. Three hours rec. a week. Pr.: E. E. 651.

530 660. **Digital Network Theory.** (3) I. Difference equation characterization of digital networks, transient and steady-state analysis of digital networks using the Z-transform, transfer function representation of digital filters, implementation of digital filters. Three hours rec. a week. Pr.: E. E. 404 or permission of instructor.

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 analysis of power systems under transient and steady-state conditions. Three hours rec. a week. Pr.: E. E. 502.

530 685. **Integrated Circuits Engineering.** (3) I, II. An introduction to the major processes used in the design and fabrication of integrated circuits. Two hours rec. and three hours lab. a week. Pr.: Consent of instructor.

530 690. **Solid-State Engineering.** (3) I, II. Elastic, thermal, electric and magnetic properties of crystals and metals; conduction in metals and semiconductors; solid state devices. Three hours rec. a week. Pr.: E. E. 498; Phys. 400 or N. E. 410 or 450.

530 705. **Control Theory Applied to Bioengineering.** (3) I. Development of mathematical models used in the study and analysis of physiological control systems providing techniques for varying pertinent biological parameters. Three hours rec. a week. Pr. or conc.: E. E. 510 or M. E. 612 or equivalent basic physiology and analog computer courses.

530 710. **Theory and Techniques of Bioinstrumentation.** (3) II. Theoretical aspects of biological signals, electrodes, transducers and processing equipment with special emphasis on the acquisition and recording of the

responses to electrical potentials, pressure and flow measurements. Laboratory work illustrating specific instrumentation and surgical procedures is included. Three hours rec. a week with time allowance for four or five laboratories during the semester. Pr.: E. E. 705 or consent of instructor.

GRADUATE CREDIT

530 805. Advanced Feedback Control Systems. (3) II. A second course in the analysis and design of feedback control systems using both classical and modern control theory. Both linear and nonlinear systems are considered. 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 principles and Belman's functional analysis. Three hours rec. a week. Pr.: E. E. 805.

530 810. Research in Electrical Engineering. Credit arranged. I, II, S. Special research problems in electrical engineering. Pr.: E. E. 417.

530 815. Information Theory. (3) II. Information as a measure of uncertainty, zero-memory and Markov sources, coding of information sources, channels and mutual information, reliable transmission via unreliable channels, error correcting codes. Three hours rec. a week. Pr.: E. E. 645.

530 821. Noise Theory. (3) I. 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.

530 826. Signal Processing and Classification. (3) I, II. Theoretical considerations and applications of Fast Fourier Transform, Fast Hadamard Transform, Spectral analysis using Binary Fourier representation, digital filtering and fundamentals of pattern classification using learning machines. Three hours rec. a week. Pr.: E. E. 860 or equivalent and Stat. 610 or equivalent, or consent of instructor.

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. Basic properties of network functions. Passive synthesis of driving point impedances, transfer functions and transfer impedances. Three hours rec. a week. Pr.: E. E. 405 or consent of instructor.

530 837. Network Synthesis II. (3) II. Active synthesis of driving point impedances, transfer functions and transfer impedances using operational amplifiers, gyrators and negative immittance converters. 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. 608.

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 and 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. Applications of matrices and linear vector spaces to electrical systems. Three hours rec. a week. Pr.: E. E. 405.

530 865. Advanced Information Theory Seminar. (3) II. Further theory of error correcting codes, study of recent developments in information theory as applied to analog and digital communication techniques, introduction to communication via satellite. 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

UNDERGRADUATE CREDIT

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.

500 160. Engineering Concepts. (2) I, II. An introduction to engineering and engineering design. Problems involving the basic concepts of engineering science are considered. Two class periods per 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.

500 202. Introduction to Environmental Technology. (3). An introductory course designed primarily for nonengineering students. An introduction to the technology employed in analyzing environmental and ecological processes, the technology of pollution control and materials recycle, and the technology of energy and power generation. Two hours lecture and one hour recitation per week.

500 250. Impact of Engineering Technology on Society. (3) I, II. A study of social, economic and environmental

problems as a function of technology. Study of various significant technological developments on present society and parallels with present developments. Study of current problems, detection of causes, and analysis of solutions. Implications for the future; governmental, industrial, and individual responsibility in detection of potential problems and methods of control or solution. Three hours rec. a week.

500 325. 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.

500 399. Honors Seminar in Engineering. (1) I, II. Selected topics of general interest. Open to sophomores in the Engineering Honors Program for two semesters.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

500 401. Seminar in Engineering. (1) I, II, S. Selected topics of general interest. Open to undergraduate students from all colleges.

500 402. Research in Engineering. Variable credit. I, II, S. Individual or group research problem selected with approval of faculty advisor.

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 advisor. 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 Bennett,* Konz,* Lee,* Smaltz,* and Tillman,* Associate Professors Bussey,* L. Grosh,* Hwang,* and Woodard,* Assistant Professors Byers, D. Grosh,* Hansen, and Roth,* Emeritus: Professors Clifton, Darby, Dietrich, Hostetter, and Nelson.

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 designed 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 STUDY

The Department of Industrial Engineering offers advanced work leading to the degrees Master of Science and Doctor of Philosophy with special emphasis on modern quantitative solution of industrial problems. Course work and research may be conducted in varied industrial areas including processing and control systems, and human factors engineering. Several strong minors are available in the College of Engineering and College of Liberal Arts.

Prerequisite to graduate work in these fields is the completion of an undergraduate curriculum in engineering or science which satisfies the major areas required in the undergraduate industrial engineering curriculum at Kansas State University.

Facilities and equipment for advanced study and research are extensive and majors in the department have essential access to the University Computing Center.

Courses in Industrial Engineering

UNDERGRADUATE CREDIT

550 115. 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.

550 220. **Introduction to Industrial Engineering.** (2) I. Basic functions in industrial organization and their interrelationships; management consideration involving product, process, plant and personnel. Two hours rec. a week.

550 341. **Production Processes.** (3) I, II. The study of modern industrial processes for production. Basic mechanics of metal machining and forming; flow and solidification of molten alloys; welding and heat treatment. Emphasis will be placed on actual production operations. One hour rec. and six hours lab. a week.

550 350. **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.

550 351. **Engineering Materials Laboratory.** (1) I, II. Laboratory experiments supplementing I. E. 350. Pr. or conc.: I. E. 350.

550 352. **Tool Engineering.** (3) II. Study of basic metal working processes and the new developments in metal cutting and forming. Design of jigs, fixtures, dies and other tooling for effective production. Two hours rec. and three hours lab. a week.

550 371. **Computer Applications in Engineering.** (1) I, II. Brief introduction to Fortran IV using the WATFIV Compiler. Examples using application programs such as APT, ECAP, ISIS, and MPS/360. 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.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

550 401. **Industrial Management.** (3) I, II. 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.

550 409. **Occupational Safety and Health.** (3) I, II. Hazards in occupational environments and their elimination or mitigation through quantitative analyses and engineering design. Two hours rec. and three hours lab. a week. Pr.: Junior standing.

550 425. **Design Ergonomics.** (2) II. Factors influencing the human use of architectural spaces especially work spaces. Objectives of design include health, performance, comfort and pleasantness, analysis of activities, workspace layout and environmental effects. Two hours rec. a week. Pr.: Junior standing and consent of instructor.

550 441. **Engineering Reliability and Quality Assurance I.** (3) I, II. Quantitative and qualitative controls required by manufacturing industries, with special emphasis on controlling process quality and costs. Three hours rec. a week.

550 451. **Work Design** (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. 341.

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.

550 530. **Industrial Project Evaluation.** (3) II. The evaluation of industrial project alternatives by the construction and analysis of mathematical models. Basic concepts, with an emphasis on constrained and unconstrained deterministic and probabilistic evaluation methodology, data analysis and replacement theory. Three hours lec. and rec. a week. Pr.: Math. 222. Conc.: Stat. 410 or equivalent.

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.

550 553. **Production Planning and Inventory Control.** (3) I. Principles, techniques and applications of production planning and control, and inventory control. Two hours rec. a week. Pr.: I. E. 372 and Math 222.

550 554. **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. 553.

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 equivalent.

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, I. E. 575, and Stat. 410.

550 573. **Industrial Simulation.** (3) II. Introduction to modeling of industrial processes using digital simulations. The effect of simulation languages on modeling concepts will be stressed. Three hours rec. a week. Pr.: I.E. 372, 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.

UNDERGRADUATE AND GRADUATE CREDIT

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. 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. Three hours rec. a week. (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.

550 655. Metal Casting. (3) II. An advanced course in the materials and metals used in modern metals casting processes. Application of metallurgical principles in the study of cast metals. Two hours rec. and three hours lab. a week. Pr.: I.E. 341 and I.E. 350.

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., three hours lab. a week. Pr.: Phys. 311, I. 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. 341, I.E. 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.: I. E. 351.

550 664. Electrochemical Behavior of Metals. (3) I. The electro-chemical processes involved in corrosion of metals and the basic factors determining the nature and rate of attack; consideration of corrosion problems and methods of combatting corrosion. Two hours rec. and three hours lab. a week. Pr.: Chem 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.: I. E. 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, S. 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 of making

decisions on production, inventories, human resources, and shipping in modern industrial plants. Three hours rec. a week. Pr.: I.E. 553, or consent of instructor.

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. 352 372.

550 730. Industrial Project Selection. (3) I. The determination of policy that optimally allocates resources to industrial alternatives. Deterministic and probabilistic model formulation with and without constraints. Applications of linear, nonlinear and branch-and-bound zero-one optimization methods. Rational selection criteria. Three hours lec. and rec. a week. Pr.: I.E. 530.

550 751. Applied Decision Theory. (3) II. Bayes theorem, Bayesian estimators utility, loss function and risk, minimax strategies, elementary game theory and linear programming. Pr.: Stat. 411 or 610.

550 762. Advanced Metallurgy. Credit arranged. II. Studies in specialized phases and current concepts of metallurgy. Pr.: I. E. 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.

550 775. Scheduling Theory. (3) I, II. Project scheduling, assembly line balancing, shop scheduling, basic structure, measures of performance, combinatorial and statistical aspects. Various approaches to the analysis of shop scheduling. Three hours rec. a week. Pr.: Consent of instructor.

GRADUATE CREDIT

550 801. Problems in Industrial Engineering. Cr. Arr. Pr.: Graduate standing in industrial engineering.

550 830. Industrial Resource Management. (3) II. Applications of mathematical optimization methods and simulation techniques to the problems of industrial resource acquisition, retention and management. Associated individual student minor research topic. Three hours lec. and rec. a week. Pr.: I.E. 573 and 730.

550 842. Engineering Reliability and Quality Assurance II. (3). 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.

550 850. 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 or consent of instructor.

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 or consent of instructor.

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 Queueing Processes. (3) I or II. Introduction to the queueing process and theory of queues; analysis of single and multi-station queues; application to production, materials handling, inventory and maintenance systems. Three hours rec. a week. Pr.: Stat. 610 or equiv.

550 872. Industrial Forecasting Techniques and Applications. (3). The problems of model construction for industrial forecasting. The application of least squares, regression, exponential smoothing and adaptive fitting will be studied in solving industrial engineering problems. Three hours rec. a week. Pr.: Consent of instructor.

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) II. 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 dynamic programming. Three hours rec. a week. Pr. or conc.: I. E. 572 or equiv.

550 875. Operations Research II. (3) I. A continuation of I. E. 874. Introduction to stochastic models and techniques including queueing theory, simulation, nonlinear 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 rec. a week. Pr.: I. E. 575 or equiv.

550 882. Nonlinear Programming. (3) I or II. Study of nonlinear models and their solution. Topics covered are nonlinear programming including Kuhn-Tucker theory, quadratic programming, separable programming, geometric programming, gradient and search methods, quasi-linearization and invariant imbedding. Three hours rec. a week. Pr.: I. E. 875.

550 883. Dynamic Programming. (3) I or 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. Applications 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. (Var.) I, II, S. (6 hrs. maximum). Study of topics related to operations research not covered in other courses. Selected according to the interests and needs of graduate students. May be repeated. 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

Professors Appl*, Crank*, Duncan*, Flinner*, Hobson*, McNall*, Nevins*, Rohles*, Tripp*, and Wood; Associate Professors Azer*, Gorton*, Gowdy*, Lindholm*, Miller*, Sprague*, Swearingen*, Thompson*, Turnquist*, and Walker*, Assistant Professors Annis*, Ball, and Pauli; Emeritus: Dean Durland; Professors Brainard, Helander, Messenheimer, and Smutz.

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, machine design, automatic controls, environmental engineering, vibrations, thermodynamics, heat transfer, etc.

GRADUATE STUDY

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.

Courses in Mechanical Engineering

UNDERGRADUATE CREDIT

- 560 115. **Mechanical Engineering Assembly.** (0) I, II. The professional aspects of Mechanical Engineering. One hour rec. a month.
- 560 212. **Graphical Communications, Analysis and Design I.** (2) I, II, S. Technical sketching; study of basic principles of projective geometry; multi-view drawings; pictorials; reading and interpreting drawings; and creative or conceptual design. Three hours lab. and one hour rec. a week. Pr.: Plane Geometry.
- 560 217. **Graphical Communications, Analysis and Design II.** (3) I, II, S. Advanced study and application of projective geometry principles; functional design; detail and assembly layouts; design of charts and graphs; and

conceptual design. Five hours lab. and one hour rec. a week. Pr.: M. E. 212.

560 390. **Topics in Mechanical Engineering.** Credit Arranged. I, II, S. Topics selected in consultation with instructor. Intended for interdisciplinary studies or innovative studies in mechanical engineering. Pr.: Consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

560 413. **Thermodynamics I.** (3) I, II, S. Properties of the pure substance. The first and second laws of thermodynamics. Three hours rec. a week. Pr.: Phys. 310; Math. 222.

560 440. **Engineering Systems Analysis.** (3) I, II. Application of physical laws, mathematical methods and computers to the development and interpretation of models for physical systems of engineering interest. Emphasis is on the methods of modeling rather than the systems modeled. Examples will be taken from all areas of engineering. Three hours rec. a week. Pr.: Phys. 311; Math. 240.

560 452. **Machine Design I.** (3) I, II. Displacement, velocity and acceleration analysis of machine elements—cams, gears, and other mechanisms. A brief introduction to dynamics of machines. Three hours rec. a week. Pr.: Ap. M. 412.

560 453. **Mechanical Engineering Design Laboratory.** (2) I, II. Application of the principles of the design process in the solution of engineering industrial-type problems with direct involvement of industry. Six hours lab. a week. Pr. or conc.: M. E. 452, 521.

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.

560 513. **Thermodynamics II.** (3) I, II, S. Continuation of Thermodynamics I. Gas mixtures, psychrometry, generalized thermodynamic relations and reactive systems. Three hours rec. a week. Pr.: M. E. 413.

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.

560 535. **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. 413, E. E. 401.

560 551. **Machine Design II.** (3) I, II. 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. 452.

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. 413.

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.

560 583. 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.

560 593. Thermodynamics III. (3) I, II, S. Direct energy conversion, compressible fluid flow, rotating and reciprocating machinery, thrust systems, cycle analysis and topics of current and continuing interest with emphasis on application of thermodynamic principles. Three hours rec. a week. Pr.: M. E. 513.

UNDERGRADUATE AND GRADUATE CREDIT

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. 401; Pr. or conc.: Ap. M. 471.

560 620. Internal Combustion Engines. (3) II. Analysis of cycles, design and performance characteristics. Three hours rec. a week. Pr.: M. E. 513.

560 622. Environmental Engineering I. (3) I, II. Psychrometry; heat transmission; air-conditioning equipment and systems; design problems. Three hours rec. 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. 513, Ap. M. 471, Math. 240 or equiv.

560 642. Fine Particle Technology. (3) II. Definition, theory and measurement of particle properties, particle dynamics, size distribution 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. 452.

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.

560 700. Random Vibration. (3) I. Theory of random processes and application to random vibration of mechanical systems. Three hours rec. a week. Pr.: M. E. 656.

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 mass, energy, available energy, and entropy. Three hours rec. a week. Pr.: M. E. 513, 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. 513, 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.: Four hours biological science or consent of instructor; Pr.: 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 or consent of instructor.

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. 452.

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.

GRADUATE CREDIT

560 813. Laboratory Investigations in Mechanical Engineering. Credit arranged. I, II, S. Pr.: 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. Particular subject areas which may be included are: air conditioning, automatic controls, biomedical engineering, energy conversion, engineering design, environmental engineering, fluid and gas dynamics, heat transfer, kinematics, thermodynamics and vibrations. Topics announced when offered. Pr.: Consent of instructor.

560 818. Advanced Thermodynamics II. (3) II. Kinetic theory and statistical thermodynamics, with emphasis on transport properties and engineering applications. Selected topics from classical thermodynamics. Pr.: M. E. 513, 521 or consent of instructor.

560 822. Advanced Air Conditioning. (3) I. Advanced psychrometric analysis; physiological factors; biotechnology and heat transfer. Three 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.

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 II. (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 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.

560 842. 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.

560 850. Advanced Power Plant Engineering. Credit arranged. I. An advanced course in the economic problems in the design of power plants and in the generation of power, selection of equipment, choice of station heat balance, generation of by-product power in industries, and interconnections between utilities and industrial plants for the economical interchange of power. Pr.: M. E. 651.

560 865. 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.

560 899. Thesis or Report Research in Mechanical Engineering. M.S. level. Credit arranged. I, II, S. Pr.: Approval of dept. head and major professor.

560 999. Dissertation Research in Mechanical Engineering. Ph.D. level. Credit arranged. I, II, S. Pr.: Approval of dept. head and major professor.

Nuclear Engineering

CURTIS G. CHEZEM, Head of Department

Professors Chezem, Donnert, Faw, Meyer, and Mingle; Adjunct Professors Smith and Swanson; Associate Professors Robinson and Merklin; Assistant Professors Clack, Eckhoff, Hightower, Krick, and Shultis; Instructor Verser.

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 environmental science and aerospace studies. Through technical electives, the student may organize a program of study suited to his particular needs and interests.

As a profession, nuclear engineering requires understanding and competence in many and diverse disciplines. Hence, undergraduate nuclear engineering students at Kansas State University take courses in advanced mathematics, physical chemistry, chemical process principles, thermodynamics, fluid mechanics, electronics, heat transfer, analog and digital computer technology, and economics. With background established in these courses, able students 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 application, reactor instrumentation, reactor heat transfer, thermodynamics, radiation safety, and such topics as nuclear energy systems for both terrestrial and extraterrestrial applications, the latter involving both primary and auxiliary power systems.

GRADUATE STUDY

The Department offers graduate programs leading to the degrees Master of Science and Doctor of Philosophy.

Applicants for graduate status are expected to hold the Bachelor's Degree with adequate preparation in mathematics and physical sciences. However, students without this preparation will be considered for admission. Programs of study will be modified or structured with a proper balance of subject matter from other fields to meet the needs of individual students.

Laboratory facilities include a 250 kilowatt TRIGA Mark II reactor with a pulsing capability to 250,000 kilowatts, the Kansas State University Nuclear Engineering Shielding Facility located on a 180-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 graphite subcritical reactor, a low-level liquid scintillation counting system, NaI(Tl), Ge(Li), Si(Li) gamma-ray spectrometer system, a neutron spectrometer system, a multiparameter pulse-height analysis system and four multi-channel analyzers with pulse-height, time-of-flight, pulse-neutron and multiscaler logics, a 4,000-curie cobalt-60 gamma irradiation facility, three analog computers, a pressurized water heat transfer loop, a recording spectrophotometer, and a thermoluminescence-dosimeter system.

Courses in Nuclear Engineering

UNDERGRADUATE CREDIT

580 110. **Nuclear Engineering Concepts.** (2) I, II. This first course in the Nuclear Engineering curriculum acquaints freshmen students with the professional ac-

tivities and responsibilities of nuclear engineers. It presents this information through lectures, recitations, and laboratory demonstrations.

580 116. **Nuclear Engineering Seminar.** (1) II. Introduction to professional nuclear engineering. Student career planning. One hour rec. a week.

580 390. **Introduction to Nuclear Engineering Analysis.** (3) II. Introduction to analytical, statistical, and numerical analysis to nuclear engineering, including computer programming. Three hours rec. a week.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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 safety and dynamics, shielding, fuels, waste disposal, electric power generation and radioisotopes applications engineering. Three hours rec. a week. Pr.: Phys. 311, Math. 240 or equiv.

580 450. **Elements of Nuclear Engineering.** (3) I, II. Nuclear reactions, nuclear energy releases, ionizing radiation, radiation attenuation; introduction to nuclear reactor concepts of criticality, multiplication factor, period reactivity, 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, nonreactor neutron sources, radio-chemical 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 N. E. 450.

580 555. **Nuclear Reactor Fundamentals.** (3) II. Introduction to reactor cooling. Analysis of power cycles. Basic reactor thermal design. Three hours rec. a week. Pr.: N. E. 450, or conc.: Ap. M. 471, M. E. 413.

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 N. E. 410.

580 615. Nuclear Materials Control and Safeguards. (3) I, II. The management, control, measurement, accounting, and protection of nuclear fuel and strategic materials in the nuclear fuel cycle. Pr.: Senior or graduate standing in engineering, physical science, or business administration.

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. 671.

580 671. Applied Reactor Theory. (3) I. Diffusion and slowing down of neutrons. Theory of critical and subcritical reactors. Reactor dynamics. Three hours rec. a week. Pr.: N. E. 450, 500.

580 680. Neutron and Particle Interactions. (3) I. 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, N. E. 500.

580 692. Nuclear Reactor Technology. (3) II. Thermal and neutronic design analysis of power reactors. Engineering economic analysis of reactor power systems. Nuclear ecology. Three hours rec. a week. Pr.: N. E. 555, 671.

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. 692.

580 699. Constructive Uses of Nuclear Explosives. (3) II, S. Characteristics and effects of nuclear explosives; Plowshare tests; industrial uses of nuclear explosives; scientific applications of nuclear explosions. Pr.: N. E. 671, N. E. 680 or consent of instructor.

580 705. Principles of Nuclear Reactor Analysis. (3) I. Theories of neutron diffusion, slowing down, time dependency, multigroup methods, heterogeneous assemblies, kinetics, perturbation and application of computers to reactor physics calculation. Three hours rec. a week. Pr.: N. E. 692.

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. 671.

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. per week. Pr.: N. E. 671.

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. 555, Chem. 595.

580 761. Radiation Detection and Measurement. (3) I. Theory of detection of nuclear radiation. Measurement devices and systems. Applications to radiation dosimetry and spectroscopy, and instrumentation systems for nuclear reactors. Three hours rec. per 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. per week. Pr.: E. E. 404 and 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. per 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. Applications to nuclear reactor design. Three hours rec. per 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.

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 head of department.

580 815. Advanced Nuclear Reactor Heat Transfer. (3) II. Temperature distribution 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. 692.

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. per 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. 774 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, N. E. 680. Pr. or conc.: N. E. 705.

580 851. **Nuclear Engineering Laboratory.** (2) I, S. Reactor kinetics, reactor noise analysis determinations of b-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 laboratory a week. Pr.: consent of instructor.

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.** (Var.) 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) II. Classical and quantum theories of the interaction of radiation with matter. Energy and charge transfer processes. Applications to nuclear reactor theory, radiation shielding, and nuclear instrumentation. Three hours rec. per 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. Continuation 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

DWIGHT A. NESMITH, 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 includes:

Life support in altered environments, including confined spaces and very hot spaces.

The effect of shifting light-dark cycles on performance.
The physiological effects of shelter environments.

Positive aspects of nuclear energy including studies of radiation effects of materials, the production of new materials and analysis.

A study of concrete pavement surface failures and methods of preventing them.

Properties of structural steel.

Protein production from petroleum.

Application of integrated circuits to agricultural machinery.

Air and Water Pollution control.

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

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 carry out projects and research using the facilities of the Institute and with the assistance of its staff. The Institute is attached, administratively, to the Department of Mechanical Engineering, and its research is administered through the Engineering Experiment Station.

The Institute is composed of a director, an associate director, 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

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, chemical and industrial engineering, psychology, physiological sciences, architecture, family and child development, clothing, textiles and interior design, foods and nutrition, grain science and industries, infectious diseases, pathology, statistics, and education are participating members of the Institute staff. The Institute is organized so faculty members or students from any department can carry out research in the Institute within its stated objectives.

Institute for Systems Design and Optimization

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 in 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.

Institute for Computational Research in Engineering

J. O. MINGLE, Director

H. S. WALKER, Associate Director

The Institute for Computational Research in Engineering promotes engineering

research, development, and service for computer-oriented activities. The interdisciplinary aspects of these activities are stressed with emphasis upon the role of the small computer in modern technology.

The Institute is administered through the College of Engineering and provides a college-wide center for information concerning computational engineering. Other functions of the Institute include the preparation of research proposals; the encouragement of creative uses of computers; the dissemination of information through conferences, workshops, and publications about computational engineering; and the development of software engineering concepts. The members of the Institute encourage students and faculty to be more cognizant of the challenges in the computational engineering field.

Engineering Computing Facility

J. J. SMALTZ, Director

An extension of the University Computing Center, the Engineering Computing Facility, is located in the Engineering Shops Building. This facility houses three typewriter terminals which may be connected by public telephone to any computer in the country. This laboratory is available to all university students on an open shop, hands-on basis, 24 hours a day, seven days a week. While the majority of engineering students use the WATFIV compiler and the University's IBM 360 / 50 system for teleprocessing, remote job entry to any job on the University system is possible.

The programs available and of special interest to the engineer are APT, ECAP, FORTRAN IV, GPSS, ISIS, and MPS 360. Formal course work is offered in the application and use of these facilities. Basic information is disseminated at the departmental level for the operating capabilities required to solve the many problems in each particular engineering discipline.

The University Computing Center provides the College of Engineering with the staff, hardware, and software to maintain up-to-date computer systems applicable to engineering. A plotter at the University Computing Center can be used to graph engineering data.

Nuclear Engineering Shielding Facility

CURTIS G. CHEZEM, Head, Nuclear Engineering
RICHARD E. FAW, Director

Through the Department of Nuclear Engineering, Kansas State University operates a 180-acre radiation shielding test site for large-scale experimental work in radiation shielding and related areas. Research facilities at the test site include full-scale as well as scale-model buildings for experimental studies in structure shielding. A wide variety of nuclear instrumentation and calibration installations are available. In addition to its use in research, the test site is used during Nuclear Engineering Department Summer Institutes in such areas as industrial radiography and nuclear defense design.

Nuclear Reactor Center

CURTIS G. CHEZEM, Head, Nuclear Engineering
ROBERT W. CLACK, Director, Nuclear Reactor Facility
N. DEAN ECKHOFF, Director, Neutron Activation Analysis

Kansas State University has, within its Department of Nuclear Engineering, a nuclear reactor and a well-equipped Neutron Activation Analysis Laboratory. The reactor is capable of steady-state operation at 250 kilowatts and pulsed operation to 250,000 kilowatts and is used for teaching and research by many departments. The reactor can be used as a controllable source of ionizing radiation including neutrons. The latter is the basis for neutron activation analysis, an analytical technique which is essentially non-destructive and offers sensitivities better than one part per billion. Activation analysis finds application in diverse fields such as diagnostic medicine, plant improvement studies, nutrition studies, age dating of geological specimens, forensics, toxicology and metabolic studies.

Office of Civil Defense

Professional Advisory Service Center

C. G. CHEZEM, Head, Nuclear Engineering
F. A. VERSER, Director

Kansas State University maintains a Professional Advisory Service Center which administers and operates the Direct Mail

Shelter Development System of the Office of Civil Defense.

The Center is operated by the Department of Nuclear Engineering and consists of a full-time adviser and a part-time assistant. These individuals are highly qualified fall-out shelter instructors and analysts. Advisers are available to all Nebraska and Kansas architects and engineers to explain how radiation protection can be maximized in the design of buildings. They also are available to conduct seminars, workshops, and lectures on fallout shelter analysis and design. The Center does not engage in actual design of buildings.

Kansas Industrial Extension Service

WILLIAM H. HONSTEAD, Director

The Kansas Industrial Extension Service (KIES) provides information, technical assistance and continuing education for technical persons in Kansas industries.

Operating through the Division of Engineering and Industrial Services of the Engineering Experiment Station, KIES answers questions about materials,

manufacturing processes, management techniques, new product development, patents, and similar matters for manufacturing industries in Kansas.

Short courses, seminars, workshops, conferences and other continuing education functions for technical people are arranged on the campus, or in off-campus locations. Suggestions and inquiries about such offerings are welcome.

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 for Kansas industries. Particular emphasis is being placed on the development of manufacturing industries for rural areas.

By virtue of its location at Kansas State University, a quick response to information inquiries is assured since the K-State faculty is immediately available. Business and industry in the State are invited to participate in the Kansas Industrial Extension Service programs. Requests should be submitted to the Director, Kansas Industrial Extension Service, 131-A Seaton Hall, Kansas State University, Manhattan, Kansas 66502.



THE COLLEGE OF HOME ECONOMICS

DORETTA HOFFMAN,* Dean

RUTH HOEFLIN,* Associate Dean

JEAN REEHLING, Assistant Dean

JEAN SEGO, Assistant to the Dean

Home economics majors study creative approaches to the understanding and solution of challenges facing families today. The whole world is within the realm of activity of home economists, whose primary goal is to serve families.

Students in home economics learn to recognize the variety of ways in which people react to each other and to their physical and social environments, whether in this country or abroad. They learn to work with the poor and the affluent, the old and the very young, the healthy and the handicapped, the homemaker and the professional.

A degree in home economics, based on the application of scientific principles, provides a broad, liberal education along with a specialty that prepares young adults to enter today's careers and to explore the unknown.

Honors Program and Master's Degree Project

Students with a potential for outstanding scholastic achievement are invited to participate in the Home Economics Honors Program. Eligible students have excellent high school records and rank at the top of their entering university class. Transfer students with superior academic records also are eligible, as are upperclassmen in the College of Home Economics who demonstrate outstanding abilities and are recommended by the faculty. Advisers to honors students help plan individual programs of study that include honors courses, seminars, and independent study.

The Home Economics Master's Degree Project identifies potential graduate students

early in their college careers. Each year, students with a minimum of a "B" average are invited to join the project. Selected members of the graduate faculty advise those students who participate in the Master's Degree Project. Together they plan the students' academic program to include educational experiences in preparation for graduate study.

A Degree in Home Economics

Programs of study leading to the Bachelor of Science degree are offered within the four curriculums in the College of Home Economics. These curriculums are designed to interest students with varying academic and professional objectives. The curriculums and the options within are listed and described on 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 Science
 - Dietetics and Institutional Management
2. Curriculum in Home Economics and Journalism
3. Curriculum in Home Economics with Liberal Arts
4. Curriculum in Restaurant Management

Entering students who are undecided about a specific major may enroll in General Home Economics. Students in this area may take courses from all fields of general education and home economics. The program allows time for students to consider the many possibilities available before they make the final decision of a college major. Special advisers work with these students to select courses that will later apply to almost any curriculum at Kansas State University.

Each student has a faculty adviser under whose guidance a program is planned that will prepare the student for such professional positions as teacher, home economics agent, interior designer, home economist in business or 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 similar for all majors, so the student has time to study possibilities in all areas in home economics before choosing the one best suited to his 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 at Kansas State University. Home economics courses are offered by five departments in the College of Home Economics: Clothing, Textiles and Interior Design; Family and Child Development; Family Economics; Foods and Nutrition; 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 of Science degree. Graduate 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. The following courses can be transferred to the College of Home Economics

and be applied toward the Bachelor of Science degree although not all courses are required for every major. A potential transfer student should write for a list of required courses as soon as he selects his major. Any student who plans to transfer for the junior year should write for suggestions or preferably come to the K-State campus for a conference before beginning the sophomore year. A degree may be earned in two years from Kansas State University by capable transfer students of junior standing with good academic records.

Two-Year Program With Home Economics Courses

FRESHMAN YEAR	
Courses	Credit Hours*
English Composition	6
Speech	2
General & Elementary Organic Chemistry**	10
General Psychology	3
American Government or Political Science	3-6
Design I (with lab)	2
Foods	3
Nutrition***	3
Clothing Selection, or Socio-economics of Clothing	3
Art Appreciation	3

SOPHOMORE YEAR

General Zoology or Biology with a lab	4
Literature or Modern Language (if in education)	6
College Algebra	3
Economics	3
Sociology	3-6
Clothing Construction (if education or clothing and textiles major)	3
Human Growth and Development or Child and Adolescent Psychology (if in education)	3
Human or Family Relations	2-3

Electives to bring two-year total to 62 hours.

Two-Year Program Without Home Economics Courses

FRESHMAN YEAR	
Courses	Credit Hours*
English Composition	6
Speech	2
General Psychology	3
General & Elementary Organic Chemistry**	10
American Government or Political Science	3-6
Sociology	3-6
Civilization or World History	3-6
Design I (with lab)	2

SOPHOMORE YEAR

General Zoology or Biology with a lab	4
Economics	3
Literature or Modern Language (if in education)	6
College Algebra	3
Human Growth and Development or Child and Adolescent Psychology (if in education)	3
Art Appreciation	3

Electives to bring two-year total to 62 hours

*Credit hours given above apply to courses at KSU. Some transfer courses have more or fewer hours; substitutions or readjustments usually can be made for the difference in credit hours. Up to 62 hours may be transferred from a two-year college; 124 hours are required for graduation from the KSU College of Home Economics.

**Many home economics majors do not specifically require chemistry to fulfill the physical science requirement. Write for a list of required courses for major area of interest.

***Students planning to major in foods and nutrition, dietetics, or home economics education should take Principles of Nutrition after transferring to KSU.

Curriculum in Home Economics with Options

B.S. in Home Economics

This curriculum is designed primarily for 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 specific areas, are listed on following pages.

Sufficient flexibility is provided to suit individual needs. Electives may be used to build strong combinations with other fields of interest.

Liberal-General Education Courses, 34 Hours

Communications, 8 Hours

English	229	100	English Composition I	3
English	229	120	English Composition II	3
Speech	281	105	Oral Communication I	2

Social Science, 6 Hours

Economics	225	110	Economics I	3
Psychology	273	110	General Psychology	3

Additional Requirements, 20 Hours

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 additional course.)

Home Economics Core, 13 Hours

I. Des.	611	101	Design for Cont. Living	3
F. C. Dev.	620	250	Human Relations	2
F. Ec.	630	300	Family Economics	3
F. & N.	640	133	Food for Man	3
			OR	
F. & N.	640	300	Meal Management	3
			OR	
F. & N.	640	132	Basic Nutrition	3
Gn. H. E.	650	110	Intro. to Home Economics	1
Gn. H. E.	650	300	Home Economics Seminar	1

Professional and Supporting Courses, 52 to 81 Hours

(See specific option)

Unrestricted Electives, 9 to 25 Hours

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 women, especially homemakers. This option provides opportunities for a specialty in home economics and courses in radio and television.

Professional and Supporting Courses

R. TV.	290	152	Radio-TV Speech Procedures	3
R. TV.	290	607	History of Broadcasting	2
R. TV.	290	225	Radio-TV Continuity	3
R. TV.	290	326	Intro. to Television	2
R. TV.	290	661	TV Production	3
R. TV.	290	670	Radio TV Prog.	3
			OR	
R. TV.	290	685	Radio-TV Writing	

Home Economics Courses, 22-26 Hours

Area of Concentration	(14-16)
Courses selected from two areas other than Concentration	(8-10)

Basic Disciplines, 9-10 Hours

Courses selected to support home economics areas

Speech and/or Social Sciences, 11-13 Hours

Option Requirements	59-66
Unrestricted Electives	11-18
Curriculum Requirements	47

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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 with the approval to teach in a vocational homemaking department.

Refer to pages 184-185 for admission requirements to teacher education and the Professional Semester.

Professional and Supporting Courses

Biology	215	198	Principles of Biology	4
			OR	
Biology	215	205	General Zoology	4
Biology	215	200	Public Health Biology	3
Chemistry	221	110	General Chemistry	5
Chemistry	221	190	El. Org. Chemistry WITH	3
Chemistry	221	191	El. Org. Chem. Lab.	2
			OR	
Biochemistry	020	120	Intro. Org. & Biochem.	5
A. & F.	405	202	Educational Psychology I	3
A. & F.	405	302	Educational Psychology II	3
A. & O.	410	550	Meth. of Tchg. H. E.	2
A. & O.	410	750	Curriculum in H. E.	3
C. & I.	415	450	Intro. Instruct. Tech.	1
C. & I.	415	450	Prin. of Sec. Educ.	3
C. & I.	415	477	Tchg. Part in Sec. Sch.	8
C. & T.	610	210	Pattern Study and Garment Construction	3
			Textiles	3
C. & T.	610	260	Intro. Interior Design	2
I. Des.	611	215	Human Relations	2
F. C. Dev.	620	250	OR	
F. C. Dev.	620	350	Family Relations	2
F. C. Dev.	620	325	Preschool Child	3
F. C. Dev.	620	326	Preschool Child Lab.	1
F. C. Dev.	620	475	The Adolescent	2
F. C. Dev.	620	476	The Adolescent Lab	1
F. Ec.	630	300	Family Economics	3
F. Ec.	630	320	The House	3
F. Ec.	630	340	Household Equipment	3
			OR	
F. Ec.	630	630	Household Equipment Theory	3
F. Ec.	630	360	Home Management	2
F. Ec.	630	365	Home Management Lab.	2
			OR	
F. Ec.	630	305	Family Finance	3
			OR	
F. Ec.	630	600	Families in Amer. Economy	3
			OR	
F. Ec.	630	605	Consumers and the Mkt.	3
F. & N.	640	300	Meal Management	3
F. & N.	640	303	Food Preparation	3
			OR	
F. & N.	640	601	Food Science	4
F. & N.	640	602	Principles of Nutrition	3
Option Requirements				79-81
Unrestricted Electives				9-12
Curriculum Requirements*				33-34

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*Under Liberal-General Education Additional Requirements, take Political Science 110, Soc. 211 and 3 hours additional social science at 400 level or above; six hours of literature or language; and Art 100. Home Economics Core not Required.

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			
Art	209 100	Design I	2
Bus. Ad.	305 275	Fund. of Accounting	4
Bus. Ad.	305 400	Management Concepts	3
Bus. Ad.	305 440	Marketing	3
Bus. Ad.	305 545	Consumer Behavior	3
		Communications Elective	3
C. & T.	610 131	Socio-Econ. of Clothing	3
C. & T.	610 210	Pattern Study and Garment Construction	3
C. & T.	610 230	Fashion Merchandising I	3
C. & T.	610 260	Textiles	3
C. & T.	610 395	Window Display	3
C. & T.	610 525	Fashion Store Ser. Lab.	5
C. & T.	610 630	Clothing Economics	3
C. & T.	610 635	Fashion Merchandising II	3
C. & T.	610 650	Intermediate Textiles	3
C. & T.	610 730	History of Costume	3
I. Des.	611 215	Intro. Interior Design	2
		OR	
C. & T.	610 220	Costume Design I	2
Option Requirements			52
Unrestricted Electives			25
Curriculum Requirements*			47
			124

*Under Liberal-General Education Additional Requirements, take Hist. 101 and 202 or 615; Soc. 211; Chem. 110 and 190, or Phys. 101-104; and at least three hours of biological science.

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			
Art	209 100	Design I	2
Chemistry	221 210	Chemistry I	5
Chemistry	221 230	Chemistry II	3
Chemistry	221 250	Chemistry II Lab.	2
Chemistry	221 350	Gen. Org. Chemistry	3
Chemistry	221 351	Gen. Org. Chem. Lab.	2
Chemistry	221 300	Gen. Quant. Anal.	4
		OR	
Biochemistry	020 421	General Biochemistry	3
Mathematics	245 100	College Algebra	3
Physics	265 112	Des. Physics	4
Statistics	285 320	Elements of Statistics	3
C. & T.	610 131	Socio-Econ. of Clothing	3
C. & T.	610 210	Pattern Study and Garment Construction	3
C. & T.	610 220	Costume Design I OR	2
I. Des.	611 215	Intro. Interior Design	2
C. & T.	610 260	Textiles	3
C. & T.	610 630	Clothing Economics	3
C. & T.	610 650	Intermediate Textiles	3
C. & T.	610 655	Advanced Textiles	3
F. Ec.	630 320	The House OR	3
F. Ec.	630 605	Consumers and the Mkt.	4
F. & N.	640 601	Food Science	4
Option Requirements			57-58
Unrestricted Electives			19-20
Curriculum Requirements*			47
			124

*Under Liberal-General Education Additional Requirements, take two Modern Language courses in sequence.

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			
Art	209 100	Design I	2
Art	209 190	Drawing I	2
Art	209 195	Survey of Art Hist. I	3
Art	209 196	Survey of Art Hist. II	3
Art	209 200	Design II	2
Art	209 210	Drawing II	2
Art	209 222	Water Color I	2
Art	209 224	Figure Drawing I	2
Modern Lang.	253 131	French I	4
C. & T.	610 131	Socio-Econ. of Clothing	3
C. & T.	610 210	Pattern Study and Garment Construction	3
C. & T.	610 220	Costume Design I	2
C. & T.	610 260	Textiles	3
C. & T.	610 310	Tailoring	3
C. & T.	610 315	Costume Illustration	2
C. & T.	610 320	Costume Design II	3
C. & T.	610 325	Fashion Life Sketch	2
C. & T.	610 395	Window Display	3
C. & T.	610 610	Pattern Dev. Theory I	3
C. & T.	610 615	Design by Draping	3
C. & T.	610 620	Costume Design III	3
C. & T.	610 730	History of Costume	3
I. Des.	611 740	History of Fabric Design	3
Option Requirements			61
Unrestricted Electives			16
Curriculum Requirements*			47
			124

*Under Liberal-General Education Additional Requirements, take Hist. 101, Math. 100, and Chem. 110 and 190 or Physics 101-104.

Option in Interior Design (I. Des.)

Two areas of specialization are open to students majoring in Interior Design. **Interior Retailing** prepares students for professional careers in business and interior designing. **Designing Living Environments** allows for study in all aspects of the planning and designing for interior space.

Professional and Supporting Courses*			
Architecture	104 207	Arch. Graphics I	2
Architecture	104 208	Arch. Graphics II	2
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 History II	3
Art	209 200	Design II	2
C. & T.	610 260	Textiles	3
I. Des.	611 240	Interior Design I	3
I. Des.	611 245	Contemporary Homes	3
I. Des.	611 340	Interior Design II	3
I. Des.	611 345	Interior Design Practicum	3
I. Des.	611 640	Interior Design III	3
I. Des.	611 645	Historic Furn. Design	3
I. Des.	611 740	Historic Fabric Design	3

CHOOSE ONE AREA OF SPECIALIZATION

Area I — Designing Living Environments			
Architecture	104 211	Fund. of Design I	2
Architecture	104 212	Fund. of Design II	2
Art	209 210	Drawing II	2
		OR	
Art	209 222	Water Color I	2
Art	209 290	Lettering	2
		OR	
Art	209 205	Commercial Techniques	2
Art	209 230	Sculpture I	2
Art	209 265	Ceramics I	2
Art	209 260	Design in the Crafts	2
		OR	
Art	209 270	Metalcrafts and Jewelry	2
C. & T.	610 365	Weaving	2

Under Liberal-General Education take two Modern Languages courses in sequence and a minimum of four hours in Physical Science.

(I. Des. option continued next column)

Area II — Retailing

Art	209	230	Sculpture I	2
			OR	
Art	209	265	Ceramics I	2
Bus. Ad.	305	275	Fund. of Accounting	4
Bus. Ad.	305	343	Sales Communication	3
Bus. Ad.	305	400	Managements Concepts	3
Bus. Ad.	305	440	Marketing	3
Bus. Ad.	305	545	Consumer Behavior	3
I. Des.	611	500	Interior Des. Store Serv. Lab.	5

Under Liberal-General Education take a minimum of seven hours in Physical Science including Math. 100.

Option Requirements	56-63
Unrestricted Electives	14-21
Curriculum Requirements	47
	124

*See Area of Specialization for Additional Requirements.

Option in Early Childhood Education (F. C. Dev.)

This option is for the student who wishes to work in pre-kindergarten education programs in an administrative or teaching position.

Professional and Supporting Courses

Physical Education	261	356	Pers. and Comm. Health	3
Political Sci.	269	110	Prin. Pol. Sci.	3
Sociology	277	211	Intro. to Sociology	3
Speech	281	632	Speech and Lang. Dev.	3
			Social Science electives at 400 level or above**	9
			Communications elective***	3
C. & T.	610	131	Socio-Econ. of Clothing	3
			OR	
C. & T.	610	440	Socio-Psych. Aspects of Clothing	3
F. C. Dev.	620	325	The Preschool Child	3
F. C. Dev.	620	326	Preschool Child Lab	1
F. C. Dev.	620	350	Family Relationships	2
F. C. Dev.	620	360	Middle Childhood	2
F. C. Dev.	620	361	Middle Childhood Lab	1
F. C. Dev.	620	470	Creative Experiences for Preschool Child	2
F. C. Dev.	620	471	Creative Exp. for Preschool Child Lab	1
F. C. Dev.	620	650	Advanced Study of Child.	3
F. C. Dev.	620	660	The Family	3
F. C. Dev.	620	670	Dir. Exper. Early Childhood Education	6
F. C. Dev.	620	675	Parent Education	3
F. C. Dev.	620	700	Child Dev. Center Programming	2 or 3
F. C. Dev.	620	780	Problem in Fam. and Child Development	1
F. & N.	640	132	Basic Nutrition*	3
F. & N.	640	603	Child Nutrition	3
			Professional Elective**	3

Option Requirements	63-66
Unrestricted Electives	11-14
Curriculum Requirements***	47
	124

*If not taken in Home Economics Core.

**Selected in consultation with faculty advisor.

***Under Liberal-General Education take six hours of literature or language; eight hours Biological Science and four hours Physical Science.

Option in Community Services (F. C. Dev.)

This option is for students interested in family life programs, child welfare with

community agencies, or youth leadership in organized groups.

Professional and Supporting Courses

Pol. Sci.	269	110	Prin. Pol. Sci.	3
Sociology	277	211	Intro. to Sociology	3
			Social Science electives at 400 level or above**	9
			Communications elective***	3
C. & T.	610	131	Socio-Econ. of Clothing	3
			OR	
C. & T.	610	440	Socio-Psych. Aspects of Cloth	3
F. C. Dev.	620	325	The Preschool Child	3
F. C. Dev.	620	326	Preschool Child Lab	1
F. C. Dev.	620	350	Family Relationships	2
F. C. Dev.	620	360	Middle Childhood	2
F. C. Dev.	620	361	Middle Childhood Lab	1
F. C. Dev.	620	475	The Adolescent	2
F. C. Dev.	620	476	The Adolescent Lab	1
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			Intro. to Social Work	3
Sociology	277	260	Soc. Work as Soc. Inst.	3
Sociology	277	510	Additional hours in management; nutrition; community organization, problems and resources; language**	12-15
Youth Work			Intro. to Social Work	3
Soc.	277	260	Additional hours in rec. creation, literature, crafts, special education, music, community programs**	15-18
Family Life Education			Intro. to Social Work	3
Sociology	277	260	Additional hours in communications, adult education, family problems and resources, and related areas of home economics**	15-18
Option Requirements				57-63
Unrestricted Electives				14-20
Curriculum Requirements***				47
				124

*If not taken in Home Economics Core.

**Selected in consultation with faculty advisor.

***Under Liberal-General Education take eight hours Biological Science and four hours Physical Science.

Option in Extension (F. C. Dev.)

This option prepares a student 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

Pol. Sci.	269	110	Prin. Pol. Sci.	3
Sociology	277	211	Intro. to Sociology	3
			Social Science electives at 400 level or above**	9
			Communications elective***	3
C. & T.	610	131	Socio-Econ. of Clothing	3
			OR	
C. & T.	610	440	Socio-Psych. Aspects of Clothing	3
F. C. Dev.	620	325	The Preschool Child	3
F. C. Dev.	620	326	Preschool Child Lab	1
F. C. Dev.	620	350	Family Relationships	2
F. C. Dev.	620	360	Middle Childhood	2
F. C. Dev.	620	361	Middle Childhood Lab	1
F. C. Dev.	620	475	The Adolescent	2
F. C. Dev.	620	476	The Adolescent Lab	1
F. C. Dev.	620	660	The Family	3
F. & N.	640	132	F. C. Dev. Elective	3
A. & O.	410	605	Basic Nutrition*	3
A. & O.	410	752	Organ. & Prog. Adult Educ.	3
			Methods of Adult Tchg.	3
			Professional Electives***	12
Option Requirements				57-60
Unrestricted Electives				17-20
Curriculum Requirements***				47
				124

*If not taken in Home Economics Core.

**Selected in consultation with faculty advisor.

***Under Liberal-General Education take eight hours Biological Science and four hours Physical Science.

Consumer Interest Option (F. Ec.)

This option allows 31 hours of electives, designed to permit combinations of course work in social work, marketing, family financial counseling, consumer education, business or public service with a new emphasis, that of recognizing the growing concern for the consumer. The curriculum is well balanced, enabling students to consider a variety of job opportunities.

Professional and Supporting Courses

Economics	225	120	Economics II	3
Pol. Sci.	269	110	Prin. Pol. Sci.	3
Sociology	277	211	Intro. to Sociology	3
			Soc. Sci. Electives	9
C. & T.	610	131	Socio-Econ. of Clothing	3
			OR	
C. & T.	610	260	Textiles	3
F. C. Dev.	620	325	Preschool Child	3
			OR	
F. C. Dev.	620	660	The Family	3
F. Ec.	630	305	Family Finance	3
F. Ec.	630	320	The House	3
F. Ec.	630	340	Household Equipment	3
F. Ec.	630	360	Home Management	2
F. Ec.	630	365	Home Management Lab.	2
F. Ec.	630	600	Fam. in Amer. Econ.	3
F. Ec.	630	605	Consumers and the Mkt.	3
F. & N.	640	132	Basic Nutrition	3
			Prof. Electives*	15
Option Requirements				61
Unrestricted Electives (if F. C. Dev. 620 660 is elected, take F. C. Dev. 620 350)				16
Curriculum Requirements**				47
				124

*Selected in consultation with faculty advisor.

**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

Chemistry	221	110	General Chemistry	5
Chemistry	221	190	El. Org. Chemistry WITH	3
Chemistry	221	191	El. Org. Chem. Lab.	2
			OR	
Biochemistry	020	120	Intro. Org. & Biochem.	5
Mathematics	245	100	College Algebra	3
Physics	265	112	Descriptive Physics	4
Mathematics	245	150	Plane Trigonometry	3
			OR	
Statistics	285	320	Elem. of Statistics	3
C. & T.	610	260	Textiles	3
F. C. Dev.	620	660	The Family OR	3
Sociology	277	646	Sociology of the Family	3
F. Ec.	630	305	Family Finance	3
F. Ec.	630	320	The House	3
F. Ec.	630	340	Household Equipment	3
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	601	Food Science	4
			Prof. Electives*	16
Option Requirements				65
Unrestricted Electives (if F. C. Dev. 620 660 is elected, take F. C. Dev. 620 350)				12
Curriculum Requirements**				47
				124

*Selected in consultation with faculty advisor.

**Under Liberal-General Education Additional Requirements, take Biol. 198 and 450; 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.

Supporting Courses

Biology	215	198	Principles of Biology	4
Biology	215	450	General Microbiology	4
Chemistry	221	110	Gen. Chem.	5
Chemistry	221	190	El. Org. Chem.	3
			with	
Chemistry	221	191	El. Org. Chem. Lab.	2
			OR	
Biochemistry	020	120	Intro. Org. & Biochem.	5
			Physics Course	4

CHOOSE ONE OF THE PROFESSIONAL AREAS I, II, III

Area I — Business Organization

ASI	005	280	Meat Sel. Utiliz., HE	2
Journalism	289	306	Reporting I	3
Journalism	289	610	Family Page	3
F. Ec.	630	340	Household Equip.	3
F. Ec.	630	605	Consumer & Market	3
			OR	
Bus. Ad.	305	440	Marketing	3
F. & N.	640	300	Meal Management*	3
F. & N.	640	301	Trends in Food Products	3
F. & N.	640	410	Prin. of Food Demon.	2
F. & N.	640	601	Food Science	4
F. & N.	640	602	Principles of Nutrition	3
F. & N.	640	605	Food Research Tech.	3
F. & N.	640	680	Seminar Foods & Nutr.	2
I. M.	660	340	Quantity Foods	4

Area II — Extension Service

ASI	005	280	Meat Sel. Utiliz., HE	2
Journalism	289	306	Reporting I	3
			OR	
Journalism	289	350	Agri. Journalism	3
A. & O.	410	605	Organ. & Prog. Adult Educ.	3
A. & O.	410	752	Methods of Adult Tchg.	3
F. Ec.	630	305	Family Finance	3
F. Ec.	630	340	Household Equip.	3
F. Ec.	630	605	Consumer & Market	3
			OR	
Bus. Ad.	305	440	Marketing	3
F. & N.	640	300	Meal Management*	3
F. & N.	640	301	Trends in Food Products	3
F. & N.	640	410	Prin. of Food Demon.	2
F. & N.	640	601	Food Science	4
F. & N.	640	602	Principles of Nutrition	3
F. & N.	640	680	Seminar Foods & Nutr.	2
I. M.	660	340	Quantity Foods	4

(F. & N. Option continued next column)

Area III — Communication Services

ASI	005	280	Meat, Sel. Utiliz., HE	2
Journalism	289	306	Reporting I	3
Journalism	289	316	Reporting II**	3
Journalism	289	320	Prin. of Advertising	3
			OR	
Journalism	289	635	Public Relations	3
Journalism	289	330	Editing I	3
Journalism	289	610	Family Page	3
F. & N.	630	340	Household Equipment	3
F. & N.	640	300	Meal Management*	3
F. & N.	640	410	Prin. of Food Demon.	2
F. & N.	640	601	Food Science	4
F. & N.	640	602	Principles of Nutrition	3
F. & N.	640	605	Food Research Tech.	3
F. & N.	640	680	Seminar Foods & Nutr.	2
I.M.	660	340	Quantity Foods	4
Option Requirements				57-63
Unrestricted Electives				14-20
Curriculum Requirements***				47
				124

*Option requirement, unless taken as part of Home Economics Core.

**May be waived by consent of instructor.

***Under Liberal-General Education Additional Requirements, take Speech 225; and an additional six hours social science including Sociology 211; five hours communication electives; six hours humanities.

Option in Foods and Nutrition Science (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.

Supporting Courses

Biochemistry	020	200	Elem. Biochemistry	5
Biology	215	198	Prin. of Biology	4
Biology	215	450	Microbiology	4
Biology	215	425	Human Physiology	4
Chemistry	221	110	General Chemistry	5
Chemistry	221	190	El. Org. Chem.	3
			with	
Chemistry	221	191	El. Org. Chem. Lab.	2
Physics	256	112	Descriptive Physics	4

CHOOSE ONE OF THE PROFESSIONAL AREAS I, II**Area I — Community Nutrition**

F. & N.	640	304	Applied Nutrition	3
F. & N.	640	305	Nutr. in Med. Science	6
F. & N.	640	306	Nutr. Social Serv. Agcy.	6
F. & N.	640	601	Food Science	4
F. & N.	640	602	Prin. of Nutrition	3
			Foods & Nutr. Elective*	6
			Home Economics Elective	3

Area II — Foods and Nutrition Science

F. & N.	640	133	Food for Man	3
			OR	
F. & N.	640	300	Meal Management	3
F. & N.	640	601	Food Science	4
F. & N.	640	602	Prin. of Nutrition	3
F. & N.	640	605	Food Research Tech.	3
F. & N.	640	680	Seminar in Foods and Nutrition	2
F. & N.	640	710	Nutr. Throughout Life Cycle	3
F. & N.	640	301	Trends in Food Products	3
			Home Ec. Elective	3

Option Requirements				55-62
Unrestricted Electives				12-19
Curriculum Requirements***				50

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*Meal Management if not taken as part of the core.

**Under Liberal-General Education Additional Requirements, take five hours elective, nine hours humanities, Math. 100 or 220, and an additional six hours social science.

Option in Dietetics and Institutional Management (Ins. M.)

The demands and opportunities for dietitians or directors of food services in hospitals, college residence halls, schools, and cafeterias far exceed the supply. To help meet the need for more dietitians a new innovative program has been developed. A four year undergraduate program that combines classroom teaching with clinical experiences of an internship leads to a B.S. degree and membership in the American Dietetic Association. (See Area III). A B.S. degree may be earned by the completion of Area I or II and qualifies graduates to accept internships. Graduates may apply for membership in the American Dietetic Association at the conclusion of an approved internship.

Supporting Courses

Biology	215	198	Prin. of Biology	4
Biology	215	425	Human Physiology	4
Biology	215	450	Microbiology	4
Chemistry	221	110	General Chemistry	5
Biochem.	020	120	Intro. Organic Biochem.	5

CHOOSE ONE OF THE PROFESSIONAL AREAS I, II, III**Area I — College and School Food Service**

ASI	005	280	Meat Sel. Utiliz., HE	2
Bus. Ad.	305	275	Fund. of Accounting	4
Bus. Ad.	305	305	Managerial Accounting	3
Bus. Ad.	305	431	Personnel Administration	3
			OR	
Bus. Ad.	305	400	Management Concepts	3
F. & N.	640	602	Principles of Nutrition	3
F. & N.	640	601	Food Science	4
F. & N.	640	605	Food Research Tech.	3
Ins. M.	660	340	Quantity Foods	4
Ins. M.	660	350	Food Serv. Systems	6
Ins. M.	660	635	Food Serv. Equip. & Layout	2
Ins. M.	660	640	Org. & Mgmt. of Food Services	3
			Additional Business Courses	6

Area II — Hospital Dietetics

To meet academic requirements for application to American Dietetics Association approved internship

ASI	005	280	Meat Utiliz., HE	2
Bus. Ad.	305	400	Management Concepts	3
			OR	
Bus. Ad.	305	431	Personnel Administration	3
A. & O.	410	551	Meth. of Tchg. for Diet. Stu.	3
F. & N.	640	601	Food Science	3
F. & N.	640	602	Principles of Nutrition	3
F. & N.	640	605	Food Research Tech.	3
F. & N.	640	710	Nutr. Life Cycle	3
F. & N.	640	712	Diet. Therapy	3
Ins. M.	660	340	Quantity Foods	4
Ins. M.	660	350	Food Serv. Systems	6
Ins. M.	660	635	Food Serv. Equip. & Layout	2
Ins. M.	660	640	Org. & Mgmt. of Food Ser.	3

Area III — Coordinated Undergraduate Program in Dietetics

An interdepartmental program with Institutional Management and Foods and Nutrition to meet academic and clinical requirements for membership in the American Dietetics Association. Selected Admission. (See below)

Bus. Ad.	305	400	Management Concepts	3
			OR	
Bus. Ad.	305	431	Personnel Administration	3
A. & O.	410	551	Meth. of Tchg. for Diet. Stu.	3
F. & N.	640	601	Food Science	4
F. & N.	640	602	Principles of Nutrition	3
Ins. M.	660	330	Intro. Dietetics	1
Ins. M.	660	340	Quantity Foods	4
Ins. M.	660	350	Food Serv. Systems	6
Ins. M.	660	360	Mngt. in Dietetics	9

Clinical Experience in Wichita

F. & N.	640	304	Applied Normal Nutr.	3
F. & N.	640	305	Nutr. in Medical Science	6
F. & N.	640	306	Nutritional Care of Patients	6
Ins. M.	660	370	Seminar in Dietetics	1

(Ins. M. continued next column)

Criteria for Admission to and Continuation in Program:

1. Fulfillment of KSU admission requirements.
2. Grade point average 2.2 (on 4.0 basis) for first two years.
3. Approval of Dietetics Coordinating Committee, based on grades and personal qualifications.
4. Grade point average 2.5 in professional courses at end of junior year for continuation in program.
5. Application to program is made in the spring of the sophomore year.

Option Requirements	61-71
Unrestricted Electives	14-24
Curriculum Requirements*	39
	124

*Under Liberal-General Education take Sociology 211 and 9 hours elective in Soc. Sci. and Humanities.

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
English	229 100
English	229 120
Speech	281 105
Humanities Electives	Minimum 3
Social Science	12
Economics	225 110
Economics	225 120
Psychology	265 110
Sociology	277 211
Biological Science	4
Biology	215 198
Physical Science	10
Chemistry	221 110
Biochemistry	020 120

Professional and Supporting Courses, 60-61 Hours

ASI	005 280	Meat Sel. and Util., HE	2
Biology	215 450	Microbiology	4
Bus. Ad.	305 275	Fund. of Accounting	4
Bus. Ad.	305 305	Managerial Accounting	3
Bus. Ad.	305 400	Management Concepts	3
Bus. Ad.	305 425	Business Law I	3
Bus. Ad.	305 431	Personnel Admin.	3
Bus. Ad.	305 440	Marketing	3
I. Des.	611 101	Design for Contem. Living	3
F. & N.	640 132	Basic Nutrition	3
		OR	
F. & N.	640 133	Food for Man	3
		OR	
F. & N.	640 300	Meal Management	3
F. & N.	640 303	Food Prep.	3
		OR	
F. & N.	640 601	Food Science	4
Ins. M.	660 340	Quantity Foods	4
Ins. M.	660 350	Food Serv. Systems	6
Ins. M.	660 635	Food Serv. Equip. and	
		Layout	2
Ins. M.	660 640	Org. and Mgmt. of	
		Food Serv.	3
Ins. M.	660 780	Prob. in Inst. Mgmt.	3
		Electives in Bus. Admin.	
		or related areas	9

Unrestricted Electives, 16-17 Hours

Other	0
Physical Education (two semesters)	0
Total for Graduation	124 Hours

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 special interest pages on newspapers, or writing promotional material for businesses and other organizations. The curriculum includes journalism and mass communications courses and a concentration in one field of home economics.

Liberal-General Education Courses, 34 Hours

Communications	8
English	229 100
English	229 120
Speech	281 105
Social Science	6
Economics	225 110
Psychology	273 110
Economics I	3
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 additional course.)

Home Economics Core, 13 Hours

I. Des.	611 101	Design for Cont. Living	3
F. C. Dev.	620 250	Human Relations	2
F. Ec.	630 300	Family Economics	3
F. & N.	640 133	Food for Man	3
		OR	
F. & N.	640 300	Meal Management	3
		OR	
F. & N.	640 132	Basic Nutrition	3
General H. E.	650 110	Intro. to Home Ec.	1
General H. E.	650 300	Home Economics Seminar	1

Professional and Supporting Courses, 61-69 Hours

Journalism	289 235	Survey of Mass Media	3
		OR	
Journalism	289 660	Journalist in a Free Society	3
Journalism	289 306	Reporting I	3
Journalism	289 316	Reporting II	3
Journalism	289 330	Editing I	3
Journalism	289 425	Family Page	3

Home Economics Courses,* 22-26 Hours

Area of Concentration (14-16)

Courses selected from at least one area other than concentration (8-10)

Basic Disciplines, 9-10 Hours**

Courses selected to support home economics areas

15 to 18 Hours in Journalism may be selected from, but not limited to the following courses:

Journalism	289 320	Prin. of Advertising	3
Journalism	289 615	Magazine Article Writing	3
		OR	
Journalism	289 620	Interpretation of Cont. Affairs	3
Journalism	289 335	Photojournalism I	3
Journalism	289 635	Public Relations	3
		OR	
Journalism	289 455	Ad. Copy and Layout	3
		OR	
Journalism	289 617	Magazine Production	3
		OR	
Journalism	289 331	Editing II	3
Journalism	289 626	Formation of Pub. Opinion	3
		OR	
Journalism	289 640	Law of the Press	3
		OR	
Journalism	289 606	History of Journalism	3
R. & TV.	290 152	Radio-TV Speech and	
		Procedures	3
		OR	
R. & TV.	290 225	Radio-TV Continuity	1
Journalism	289 358	Publications Management	1
		OR	
Journalism	289 799	Problem in Journalism	1
		OR	
Journalism	289 645	Readings in Journalism	1

Unrestricted Electives, 8-16 Hours

Other	0
Physical Education (two semesters)	0
Total for Graduation	124

*Under Liberal-General Education Additional Requirements, take Soc. 211 and Pol. Sci. 110.

**Selected in consultation with Home Economics faculty adviser.

Curriculum in Home Economics with Liberal Arts

B.S. in Home Economics

This curriculum is for the student who wishes to combine a broad liberal arts education with home economics. Maximum flexibility is provided for the selection of courses best suited to individual abilities and interests. The student in consultation with a faculty adviser selects a sequence of courses for concentration in one or more academic areas. This curriculum provides excellent background for professional careers, graduate study, and the responsibilities of homemaking and citizenship.

Liberal-General Education Courses, 65-68 Hours

Communications				8
English	229	100	English Composition I	3
English	229	120	English Composition II	3
Speech	281	105	Oral Communication I	2
Social Science				12
Economics	225	110	Economics I	3
Psychology	273	110	General Psychology	3
			Electives in Soc. Sci.	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 Contemp. Living	3
F. C. Dev.	620	250	Human Relations	2
F. Ec.	630	300	Family Economics	3
F. & N.	640	133	Food for Man	3
			OR	
F. & N.	640	300	Meal Management	3
			OR	
F. & N.	640	132	Basic Nutrition	3
General H. E.	650	110	Intro. to Home Economics	1
General H. E.	650	300	Home Economics Seminar	1

Courses in Home Economics in one of the following areas of concentration 20

a. Clothing, Textiles, and Interior Design. C. & T. 131 (3), C. & T. 260 (3), courses in fashion and interior design, construction and related areas in home economics (14).

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 (12).

c. Family Economics: F. Ec. 305 (3), F. Ec. 360 (2), F. Ec. 605 (3), courses in Family Economics and related areas in home economics (12).

d. General Home Economics. F. & N. 132 (3), F. Ec. 360 (2), F. C. Dev. 325 (3) and selected home economics courses (12).

Unrestricted Electives, 23-26 Hours

Other				0
Physical Education (two semesters)				
Total for Graduation				124

Clothing, Textiles, and Interior Design

JESSIE A. WARDEN,* Head of Department

Professors Brockman, and Warden;* Associate Professor Cormany;* Assistant Professors Craigie,* and Newby; Instructors Brawley, Braun, Coleman, Munson, Dollar, and Peterson; Emeritus: Professors Barfoot* and Latzke;* Associate Professors Hess,* Hill,* 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: (1) retailing, (2) fashion design, (3) textile research, and (4) interior design—designing living environments and retailing. 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.

Courses in Clothing and Textiles

UNDERGRADUATE CREDIT

610 131. Socio-Economics of Clothing. (3) 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) I, 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 "dress-maker 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 244, 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. Principles of design, color, and texture applied to textile construction. Pr.: Art 100 or consent of instructor. May be taken more than one semester.

610 395. Window Display. (3) II. Designing and executing displays for windows and interior cases. Experience through cooperation of local stores. Pr.: Art 100.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

610 440. Socio-Psychological Aspects of Clothing. (3) I, II, alt. S. An interdisciplinary approach to the concepts and theories applied to the study of clothing and its expression and use in relation to self, society and culture. Not open to students who have taken C. & T. 131. Pr.: Soc. 211 and Psych. 110.

610 520. Fashion Life Sketch. (2) II, alt. years. 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. Laboratory experience arranged. Pr.: C. & T. 230 and B. S. 545. Senior in option, 2.00 GPA.

UNDERGRADUATE AND GRADUATE CREDIT

610 605. Study Tour in Clothing and Textiles. (Var.) On demand. A study of significant aspects of environment, culture and technology as related to Clothing and Textiles. Pr.: Six hours Clothing and Textiles or consent of instructor.

610 610. Pattern Development Theory I. (3) I, II, S. Introduction to basic principles and techniques used in the development, alteration, and styling of patterns by drafting, draping, construction. Pr.: C. & T. 210; C. & T. 220 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 B. S. 545 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.

610 680. 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 and construction of a coat or suit; techniques of custom tailoring; Six hours lab. a week. Pr.: C. & T. 610 or 615 or consent of instructor.

610 715. Pattern Development Theory II. (3) II, alt. S. Continuation of development, alteration, and styling of patterns with application to size ranges and figure types. Pr.: C. & T. 610; C. & T. 320 recommended.

610 725. Pattern Development Theory III. (3) I, alt. S. A critical analysis of pattern styling for women's fashions with emphasis on the development of original designs. Pr.: C. & T. 320, and C. & T. 715; C. & T. 625 recommended.

610 730. History of Costume. (3) I, II, alt. S. Aspects of the culture of various countries and periods of history as reflected in costume. Pr.: Hist. 101.

610 750. Experimental Textiles. Credit arranged. Offered on sufficient demand. Individual investigation into textile research. 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.

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.

610 860. Contemporary Topics in Clothing and Textiles. (2-3) I, Alt. S. Analysis of social and environmental factors related to Clothing and Textiles. May be taken more than one semester with consent of student's ad-

visory committee. Pr.: Eight hours of credit basic to field.

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 textiles which may form the basis for the master's thesis. Pr.: Consent of instructor.

Interior Design

Concentration in interior design prepares students for professional work in space planning and retailing. 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.

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. Introduction to Interior Design. (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. (3) I, II. Designing of interiors for homes today. One hour rec. and three hours lab. a week. Pr.: Art 100, 190 and Arch. 208 (or concurrent enrollment).

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. (3) I. Materials and constructions used in home furnishings—sources and professional practice. Pr.: I. Des. 240.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

611 500. Interior Design Store Service Laboratory (5) I. Observation and supervised experience in merchandising procedures in a retail establishment. Pr.: Senior in option, 2.0 GPA, I. Des. 340, B. A. 545.

UNDERGRADUATE AND GRADUATE CREDIT

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.

611 650. Study Tour in Interior Design. (Var.) On demand. A study of significant aspects of environment, culture and technology as related to Interior Design. Pr.: Six hours Interior Design or consent of instructor.

611 680. Interior Design Seminar. (2-3) II, Alt. S. Analysis of current developments in the field. May be taken more than one semester with a maximum of six credit hours. Pr.: Eight hours of credit basic to field and 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.

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 Kennedy,* McCord,* and Stith;* Associate Professor Bollman;* Instructors Branscum, Bergen, Glasscock, Moxley, and Sistrunk; Emeritus: Professors Kell* and Williams;* Associate Professor Aldous;* Assistant Professor Raffington.

This department offers unique opportunities for study of the child and his family, with enriching experiences in the child development laboratory and community. 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. Three options for those interested in working with children and families are: (1) Early Childhood Education, (2) Community Services, and (3) Extension. Within the Community Services option there are three areas of specialization: social welfare, youth work, and family life education.

Early Childhood Certification: Completion of the option in Early Childhood Education

meets the requirements for a 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 overall grade point average of 2.2 on all work taken at Kansas State University, and (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 officer of Kansas State University.

Departmental facilities include a research room with one-way vision mirrors and an intercommunication system that provides opportunities for students to observe individuals or groups in an experimental setting. The Child Development Laboratory, with morning and afternoon sessions, is located on campus. Field experiences are available through the Friendship Tutoring Program, Larned Semester, and additional programs in Manhattan and other communities. During one semester a field placement out of Manhattan is arranged for an eight-week period.

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 day care programs and on culturally disadvantaged families and children provides new professional opportunities to the home economist with a graduate degree in child development and family relationships.

Courses in Family and Child Development

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, S. Principles of development and guidance of children from conception to five years of age in homes and in groups. Pr.: Psych. 110 and sophomore standing.

620 326. Preschool Child Lab. (1) I, II, S. Observation of the development and guidance of children from birth to

five years of age with emphasis on observation of children in groups. Open to F.C. Dev. and Home Ec. Ed. majors only. Concurrent with F.C. Dev. 325.

620 327. Observation of the Preschool Child. (1) I, II, S. Observation and recording of behavior of children from birth to five years of age. Concurrent or following F.C. Dev. 325.

620 340. Problem in Family and Child Development. Credit arranged. I, II, S. Independent or small group study. Pr.: Consent of instructor.

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. (2) I, II, Alt. S. Developmental characteristics of middle childhood as a basis for guidance with emphasis on understanding of family and peer group relationships. To be taken concurrently with F.C. Dev. 361. Pr.: Psych. 110 and one of the following: F.C. Dev. 325, Educ. 202, or Psych. 415.

620 361. Middle Childhood Lab. (1) I, II, Alt. S. Observation, recording and evaluating out-of-school behavior of children 6 to 12 years of age with a focus on the helping relationship in light of developmental aspects. To be taken concurrently with F. C. Dev. 360.

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. Pr.: Sophomore standing; consent of department head.

620 375. Family Health. (2) I, II. Factors conducive to maintaining health for family members from the prenatal period through old age. Pr.: Sophomore standing.

620 395. The Helping Relationship. (2-3) I, II, S. Characteristics of the helping relationship; consideration of personal qualities necessary for recognizing needs of individuals and families; identification of effective procedures for referral to appropriate professions and agencies. Pr.: Psych. 110 or F. C. Dev. 250.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

620 470. Creative Experiences for Preschool Children. (2) I, II. Techniques of meeting the needs of preschool children through their experiences with stories, music, play activities, and creative media. Take F.C. Dev. 471 concurrently. Pr.: F. C. Dev. 325, F. C. Dev. major or consent of instructor.

620 471. Creative Experiences for Preschool Children Lab. (1) I, II. Application of principles and techniques covered in F. C. Dev. 470 in the Child Development Lab. To be taken concurrently with F. C. Dev. 470.

620 475. The Adolescent. (2) I, II, S. Focus on interpersonal processes; principles and characteristics of the helping relation in light of developmental aspects of adolescence. Take F. C. Dev. 476 concurrently. Pr.: Five hours of F. C. Dev. or five hours of a combination of Psych. and Educ. Psych. and junior standing.

620 476. The Adolescent Lab. (1) I, II, S. Observation, recording and evaluating of out-of-school behavior of adolescents with focus on developing a helping

relationship with an adolescent. To be taken concurrently with F.C. Dev. 475.

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. 325 or Psych. 415 or consent of instructor.

620 660. The Family. (2-3) I, II, S. Consideration of the family 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.

620 661. The Black Family. (2-3) I, II, S. Interim semester. Selected topics for understanding life styles of black families. Implications for professionals working with black children and families. Pr.: 9 hours of Social Science or consent of instructor.

620 670. Directed Experiences in Early Childhood Education (with children 2-5). (4-6) II, S. Participation in the Child Development Laboratory: planning, instruction, administration, evaluation. Field experiences arranged. Pre-arrangement and consent of instructor required. Two hours rec. and two hours conference, eight weeks preschool participation. Pr.: F. C. Dev. 470 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 information on varied topics 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 Family and Child Development or consent of instructor.

620 700. Child Development Center Programming. (2 or 3) I, S. Rationale for and techniques of administering programs for preschool children, including health, education, social services, parent involvement. Pr.: Nine hours Family and Child Development or consent of instructor.

620 720. Infant Behavior and Development. (3) II. Study of 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 Biol. 425 or equiv.

620 730. Low-Income Families. (2-3) II, S. Factors affecting family life in disadvantaged families; life styles of sub-cultures; proposed programs; implications for persons working with low-income children and families. Pr.: F. C. Dev. 660 or consent of instructor.

620 760. Marital Interaction. (3) I, II, S. A study of the dynamics of marital interaction with emphasis upon the interpersonal relationships and processes of adjustment. Pr.: F. C. Dev. 350, F. C. Dev. 660, consent of instructor.

620 780. Problems in Family and Child Development. Credit arranged. I, II, S. Independent study on aspects of Family and Child Development. Students writing a master's report enroll in this course. Pr.: Consent of department head.

GRADUATE CREDIT

620 803. Research Methods in Family and Child Development. (2-3) I, II or S. Study and application of family and child development methodology for research in graduate programs and professional careers. Pr.: Six hours in family and child development at 600 level or higher or consent of instructor.

620 820. Readings in Family and Child Development. (3) II, S. Implications of research findings in 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. May be taken more than once.

620 830. Characteristics and Developmental Processes of College Students. (3) II. Study of characteristics of college students; relate patterns of maturity 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., or Educ. and 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.

620 850. Theories of Child Development. (3) II, alt. S. Theories of development relating to physical, social and psychological patterns of children's growth and interaction with the family and the community. Pr.: F. C. Dev. 650 or equivalent.

620 851. Principles of Marriage and Family Counseling. (3) I, S. Examination of processes in marriage and family counseling; study of interactions within the counseling setting; and application of knowledge of the family and of marriage to the helping relationship. Pr.: F. C. Dev. 840; Educ. 832; F. C. Dev. 881, 882, or 883 or consent of instructor.

620 860. Practicum in Counseling. Credit arranged. I, II, S. Supervised 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 and Educ. 863).

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 Family and Child Development; 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 Family and Child Development; 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. 650; F. C. Dev. 881, 882, or 883; three other graduate hours in Family and Child Development; consent of department head.

620 864. Practicum in Parent Education. Credit arranged. I, II, S. Supervised experience in providing help to parents; organization of parent groups. Pr.: F. C. Dev. 675; F. C. Dev. 881, 882, or 883; three other graduate hours in Family and Child Development; 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 in the study of college students in individual and group situations; collecting and processing in-life data. 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; Instructors Fasse and Riemann; 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 the family, and to study management of resources in relation to family goals. Undergraduate options are: (1) Consumer Interest, and (2) Housing and Equipment.

Work leading to the Master of Science degree is offered by this department. Graduate students can prepare for positions in social work, home management, family financial counseling, consumer education, or as specialists in extension or college and university faculty. Field study and research is conducted in community programs, consumer issues, public policy on housing, credit and family resource management. Research opportunities also are available in air pollutants, environmental factors, and household equipment. 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.

Courses in Family Economics

UNDERGRADUATE CREDIT

630 300. Family Economics. (3) I, II, S. Economics forces affecting families, and management by families of their economic resources. Pr.: Econ. 110 or equiv.

630 305. Family Finance. (3) 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. (3) 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. Two hours lec. and three hour 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, or consent of department head.

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. Pr.: Econ. 110.

630 610. Consumer Marketing Programs and Policies. (2 or 3) 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. (1-4) I, S. Housing requirements of families as influenced by their interests, activities, and socio-economic status; effective ways of meeting these requirements in homes in this area. Rec., lab. & field trips. Pr.: F. Ec. 320, 340; or consent of instructor.

630 630. Household Equipment Theory. (2 or 3) I, S. Analytical study of appliance design, performance and evaluation concepts for application in consumer decision-making. Not open to students with credit in F. Ec. 340. Six hours rec. and lab. a week. Pr.: 4 hours lab. science course.

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; 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. (2 or 3) S. Survey and evaluation of the subject matter content of consumer education books, pamphlets and audio-visuals. Pr.: C. & I. 550, A. & O. 652 or degree in social science.

630 711. Consumer Education. (2 or 3) S. Evaluate syllabi and approaches to teaching consumer education. Relate consumer education to consumer economics and consumer affairs. Pr.: C. & I. 550 or A. & O. 752 and F. Ec. 300 or consent of instructor.

630 715. Advances in Consumer Economics. (1 or 3) 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.

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.

630 840. Experimental Methods in Household Equipment. (2) I. Philosophy of household equipment evaluation and experimentation; emphasis upon instrumentation, selection of variables and data analysis. Pr.: A course in statistics, F. Ec. 640 or consent of instructor.

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

Professors Caul,* Finkelstein,* Harrison,* Tinklin,* and Wakefield;* Associate Professors Bowers* and Fryer;* Assistant Professor Newell; Instructor Hudgins; Emeritus: Associate Professors Browning* and 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 food and nutrition, dietitians, extension specialists, food editors or work with 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 science. Students prepare for business, extension work, and communications under option one. Students interested in food sciences and community nutrition select option two. Basic courses in foods and nutrition are offered for all home economics students and for those outside the field of home economics.

The Departments of Institutional Management and Foods and Nutrition offer the four-year undergraduate coordinated program in Dietetics leading to a B.S. degree and membership in The American Dietetic Association.

M.S. and Ph.D. programs are offered by the department. 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.

The Department of Foods and Nutrition is a participating member of the graduate programs in Food Science and in Physiology leading to the M.S. degree and Ph.D.

Courses in Foods and Nutrition

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.** (3) 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.

640 301. **Trends in Food Products.** (3) I, or II. The effects of food processing and convenience foods on today's consumer.

640 302. **Introduction to Flavor.** (3) I, or II. Rudiments of flavor perception and its role in food acceptance and preference. 6 hours of combined lecture, discussion and laboratory.

640 303. **Food Preparation.** (3) I, II. Effect of preparation, conditions, and ingredients on physical characteristics of standard food products. Pr.: Biochem. 120 or Chem. 190 and 191.

640 304. **Applied Normal Nutrition** (3) I, II. Theory observation and supervised application. Emphasis on communication and nutrition with child, aged and psychiatric patients. Two credits recitation, 1 credit of supervised experience. Pr.: Biochem. 200 or 421, Biol. 425, consent of instructor.

640 305. **Nutrition in Medical Science** (6) I, II. Therapeutic nutritional principles related to anomalies in disease. Supervised experience. Three credits recitation and 3 credits of supervised experience. Pr.: Biochem. 200 or 421, Biol. 425, consent of instructor.

640 306. **Nutritional Care of Patients.** (6) I, II. Routine observation and supervised experience in nutritional care of patients. One credit recitation and five credits of supervised experience. Pr.: Biochem. 200 or 421, Biol. 425, consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

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 300.

640 450. **Practicum in Foods and Nutrition.** (5) I, S. Supervised professional field experience in foods and nutrition. 2 credits recitation and 3 credits of supervised

experience. Pr.: F. & N. 300, 410 and-or consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT

640 601. **Food Science.** (4) I, II, S. Preparation of foods as related to their chemical, physical, and organoleptic properties. Two hour rec. and five 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 two hours lab. a week. Pr.: Chem. 190, 191, or 350, 351 or Biochem. 120; and 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, 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 instructor.

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 instructor.

640 608. **World Nutrition.** (2 or 3) I, or II. Analysis of factors that contribute to malnutrition, effects of undernutrition and malnutrition, methods for assessing nutritional status and measures for improvement. Pr.: F. & N. 602 or consent of instructor.

640 609. **Community Nutrition.** (3) I, or II. Organizations and personnel involved in action programs for nutrition; methods for determining and implementing nutrition education programs. Pr.: F & N 132, or 602; or consent of instructor.

640 610. **Practicum in Community Nutrition.** (3) I, II, S. Supervised experience in community nutrition agencies. Pr.: F & N. 609.

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.

640 612. **Principles of Food Product Development.** (3) I, II, or S. Food product concept, feasibility and evaluation. Pr.: F. & N. 601 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 instructor.

640 710. **Nutrition Needs Throughout the Life Cycle.** (3) I, II. Food patterns, dietary intakes and nutritional requirements of infants, children, adolescents, and adults. Pr.: Biochem. 200 or 421, Biol. 425, F. & N. 602.

640 712. **Diet Therapy.** (3) II. Dietary modifications for pathological conditions. Pr.: F. & N. 602, Biochem 200 or 421, Biol. 425.

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.

640 761. Application of Food Flavor Analysis. (2) I, II, S. Application of flavor panel analysis to food research problems. One hour lecture, two hours lab. a week. Pr.: F. & N. 760, 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.: F. & N. 602 or 605.

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 421, Biol. 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, Biol. 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 instructor.

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 instructor.

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, or consent of instructor.

640 810. Methods of Nutrition Consultation. (3) I or II. Consultation techniques stressing technical and socio-psychological factors in meeting nutritional problems of individuals and agency personnel. Pr.: F. & N. 712.

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. Pr.: Consent of instructor.

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. Pr.: Consent of instructor.

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 HOFFMAN,* Head of Department

Professors Hoeflin* and Hoffman;* Assistant Professor Reehling; Instructor Sego; Emeritus: Professor Kramer;* Assistant Professor Barnes.*

Courses in General Home Economics

UNDERGRADUATE CREDIT

650 110. Introduction to Home Economics. (1) I. Scope, educational preparation and trends in home economics professions.

650 300. Home Economics Seminar. (1) I, II. Current issues, professionalism and place of research in home economics. Pr.: Senior standing or consent of instructor.

650 308. Home Economics Colloquium. Credit arranged. I, II, S. Special topics for home economics majors.

650 350. The Home Economist and Rehabilitation. (2-3) I, II. The concept and history of rehabilitation; agencies involved and the place of the home economist as a member of the rehabilitation team.

650 351. The Home Economist and Rehabilitation Lab. (1-3) I, II. Supervised experience in various agencies and facilities involved with rehabilitation of the handicapped. May be taken more than once.

650 385. Problem in General Home Economics. Credit arranged. I, II, S. Independent study. 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 Honors Program only.

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.

GRADUATE CREDIT

650 880. Seminar in Home Economics. (1-3 hours) I, II, S. Current research and trends in home economics. May be taken more than once for credit. Pr.: Consent of instructor.

650 900. Methods of Research in Home Economics. (2) I, S. Fundamental procedures for research; meaning and organization of research from conception through publication.

650 980. Research in General Home Economics. Credit arranged. I, II, S. Individual research problems. Pr.: Consent of instructor.

The Merrill-Palmer Program

Selected graduate and undergraduate students may attend Merrill-Palmer Institute in Detroit for a summer session or one or two semesters if recommended by the Dean of College of Home Economics and accepted by Merrill-Palmer Institute.

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. 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 in home economics education may plan a graduate program of study to include one or more areas in home economics with emphasis in one area. A student may choose one of three options for a Master's degree: (1) thesis, (2) report, or (3) non thesis or report plan based on course work. Prerequisites for graduate work include admission to Graduate School and a background in home economics and education courses as required for undergraduate students majoring in home economics education. Home Economics Education courses are listed on pages 190-192. Graduate faculty members in Home Economics Education serve as major advisers 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 Bottger and Middleton;* Instructors Roach and Vaden; 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 Home Economics for students majoring in Dietetics and Institutional Management and a bachelor of Science in Restaurant Management. A four-year undergraduate program that combines classroom teaching with clinical experiences

of an internship leads to a B.S. degree and membership in the American Dietetic Association.

Graduate study toward the M.S. degree is offered after 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 institutional 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 K-State Union.

Courses in Institutional Management

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.

660 330. Introduction to Dietetics. (1) I. A study of the dietitian's role in the nutritional care of people with emphasis on the attributes and characteristics of professional practice.

660 340. Quantity Foods. (4) I, II. Principles and methods of preparing food items in quantity with emphasis on acceptability by people. 2 hr. rec. and 6 hr. lab. Pr. or concurrent: 3 hour foods course and Biochem. 120 or Chem. 190 and 191.

660 350. Food Service Systems. (6) II. Institutional food service as a system; menu planning, forecasting; food ordering, production and service; employee training; supervisory experience in campus food services. 3 hr. rec., 8 hr. lab. Pr.: Ins. M. 340.

660 360. Management in Dietetics. (9) I, II. Functions of management in food service; financial control policy making, interdepartmental relationships, food service planning; independent study and management experience in campus and other food services. 3 hr. rec., 16 hr. lab. Pr.: Ins. M. 350 and consent of instructor.

660 370. Seminar in Dietetics. (1) I, II. Investigation of trends and current research in dietetics. Pr.: Ins. M. 350 and consent of instructor.

UNDERGRADUATE AND GRADUATE CREDIT

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. 340.

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. 340.

660 635. Food Service Equipment and Layout. (2) I. Factors affecting the selection and arrangement of equipment in food service systems. Pr.: Ins. M. 340.

660 640. Organization and Management of Food Services. (2 or 3) 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. 340 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.

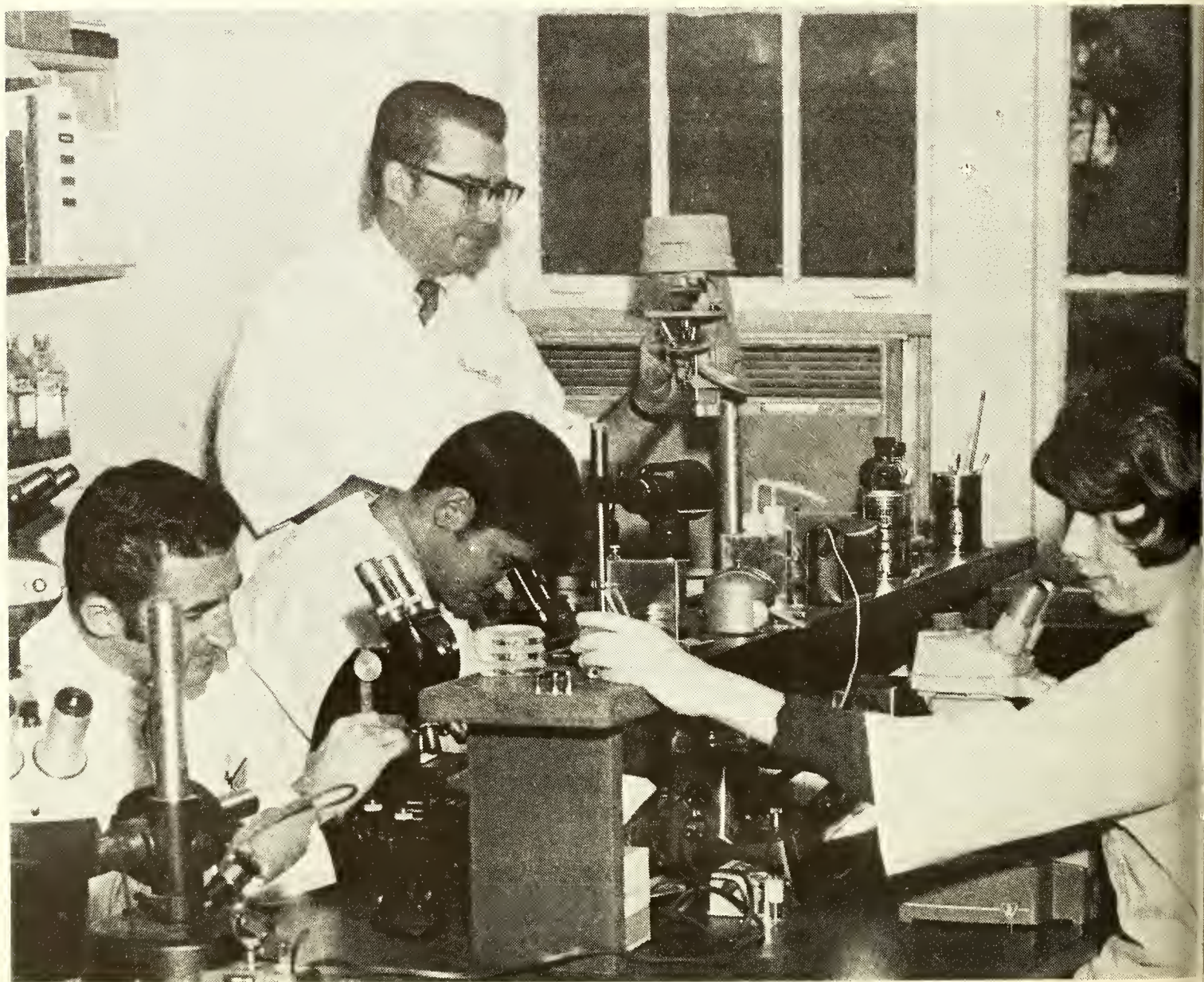
GRADUATE CREDIT

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

DONALD M. TROTTER,* Dean

LEE T. RAILSBACK, Assistant 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 November 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. 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 completed form to the dean's office within six days, after which time the Committee on Selection will proceed with interviews and the process of selection. In general, no requests for ad-

mission to the professional curriculum will be approved after February 15.

Applicants must offer: (1) satisfactory evidence of completing the high school units required for admission to the University, and (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 or the College of Agriculture or in any approved junior college or university.

Course	Semester Hours
English Composition I	3
English Composition II	3
Social Science Electives	6
Chemistry I	5
Chemistry II	3
Chemical Analysis	4
General Organic Chemistry	5
Principles of Animal Science	3
Animal Science & Industry	1
Oral Communications	2
Humanities Electives	6
Physics I and II	8
Trigonometry	3
General Zoology or Principles of Biology	4
Genetics	3
Dairy Science	1
Poultry Science	1
Electives*	2-4
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* may be 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 nonresident is one who is required to pay nonresident 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 Library on campus.

Fees for Veterinary Medical Students

Assessments

Per semester (if enrolled in more than six hours)

	Kansas Residents or Staff Members	Non- residents
1. Incidental	\$220.00	\$535.00
2. Student Health	25.00	25.00
3. Student Union Annex I	2.25	2.25
4. Student Union Annex II	10.25	10.25
5. Student Activities (incl. Union operations)	16.25	14.25
6. Stadium Bonds	4.25	4.25
Total for Veterinary Medical Students	\$278.00	\$593.00

Doctor of Veterinary Medicine Curriculum

The Curriculum in Veterinary Medicine at Kansas State University was established to give the young men and women 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 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 MS and PhD degrees.

For admission to the curriculum in Veterinary Medicine 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. (Hours required for graduation: Pre-veterinary—64; professional—149; total—213.)

First Professional Year

Fall Semester

		Course	Semester Hours
Physiological Sci.	740 630	Physiological Chemistry	2
Biochemistry	020 421	Biochemistry	3
Physiological Sci.	740 600	Gross Anatomy I	7
Physiological Sci.	740 610	Microscopic Anatomy I	5
Physiological Sci.	740 140	Veterinary Orientation	1
			18

Spring Semester

		Course	Semester Hours
Infectious Diseases	720 610	Vet. Microbiology I	5
Physiological Sci.	740 605	Gross Anatomy II	5
Physiological Sci.	740 615	Microscopic Anatomy II	3
Physiological Sci.	740 635	Physiology I	5
			18

Second Professional Year

Fall Semester

		Course	Semester Hours
Animal Sci. & Ind.	005 240	Livestock Feeding	3
Infectious Diseases	720 620	Vet. Microbiology II	5
Physiological Sci.	740 645	Physiology II	5
Pathology	730 603	General Pathology	5
			18

Spring Semester

		Course	Semester Hours
Physiological Sci.	740 670	Pharmacology	6
Pathology	730 610	Systemic Pathology	5
Infectious Diseases	720 675	Clinical Pathology	3
Infectious Diseases	720 695	Parasitology I	3
Surgery	750 610	Propaedeutic Medicine	2
			19

Third Professional Year

Fall Semester

		Course	Semester Hours
Surgery	750 695	Toxicology	4
Infectious Diseases	720 697	Parasitology II	3
Surgery	750 605	Surgery I	3
Surgery	750 630	Medicine I	5
Surgery	750 640	Radiology I	2
Surgery	750 700	Clinic I	2
			19

Spring Semester

		Course	Semester Hours
Physiological Sci.	740 620	Anatomy III	2
Surgery	750 615	Surgery II	8
Surgery	750 650	Medicine II	7
Surgery	750 710	Clinic II	2
			19

*Those receiving the BS degree in Agriculture must use Agriculture in Our Society (2 hours) for 2 hours of their electives.

Fourth Professional Year**Fall Semester**

			Course	Semester Hours
Business Admin.	305	201	Fundamentals of Business for Professional People	2
Infectious Diseases	720	751	Public Health I	4
Pathology	730	757	Avian Medicine	3
Surgery	750	670	Medicine III	6
Surgery	750	725	Clinical Medicine	4
				19

Spring Semester

			Course	Semester Hours
Surgery	750	720	Therapeutic Nutrition	3
Infectious Diseases	720	753	Public Health II	3
Surgery	750	665	Lab. Animal Medicine	3
Surgery	750	690	Medicine IV	6
Surgery	750	735	Clinical Medicine II	4
				19

Infectious Diseases

S. E. LELAND, JR.*, Acting Head of Department

Professors Coles,* Kelley,* Leland,* and Lindquist,* Associate Professors Burroughs,* Minocha,* and Osbaldiston,* Assistant Professors Moore,* Ridley, and Wilcox.

Basic courses in parasitology, microbiology, public health and clinical pathology are offered for students enrolled in the veterinary medicine curriculum. 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 work toward the Doctor of Philosophy is offered in the interdepartmental group in Pathology. (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**UNDERGRADUATE AND GRADUATE CREDIT**

720 610. Veterinary Microbiology I. (5) II. A study of host-parasite interaction and principles of immunology. Three hours rec. and four hours lab. a week. Pr.: Physi. 630 or consent of instructor.

720 620. Veterinary Microbiology II. (5) I. Morphology, biology, classification of pathogenic microorganisms and their study in relation to the cause of disease. Three hours rec. and four hours lab a week. Pr.: Inf. Dis. 610 or consent of instructor.

720 645. Veterinary Mycology. (3) I. 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.: Biol. 220, Path. 610.

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.: Biol. 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 helminth parasites—nematodes, cestodes, trematodes, and acanthocephalans 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 the College of Veterinary Medicine or consent of instructor.

720 697. Veterinary Parasitology II. (3) I. Study of arthropod and protozoan parasites 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.

720 715. Experimental Parasitology. (3) I. In even years. Planning, execution, analysis and reporting of experiments in parasitology. Techniques concerning interaction between host and parasite, in vitro cultivation, tracers, anthelmintic evaluation. Pr.: Consent of instructor and two semesters of parasitology.

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.: Inf. Dis. 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.: Inf. Dis. 603, Physi. 645.

GRADUATE CREDIT

720 802. Research in Infectious Diseases. (1-6) I, II, S. Individual research in infectious diseases. Pr.: Consent of instructor. This work may form the basis for the Master's thesis and the Ph.D. dissertation.

720 810. Problems in Infectious Diseases. (1-6) I, II, S. Work is offered in infectious diseases including

parasitology, clinical pathology, virology, bacteriology, food hygiene. Pr.: Consent of instructor.

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.: Inf. Dis. 820 or consent of staff.

720 830. Infectious Disease Seminar. (1) I, II, S. Designed primarily for graduate and veterinary students interested in infectious diseases. Each student is required to give reports on subjects related to infectious diseases.

720 835. Veterinary Epidemiology. (2) I, II. 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.: Pat. 753, Med. 670.

720 850. Advanced Veterinary Parasitology. (3) II in odd years. Structure, life cycle, pathology, immunology, public health significance, diagnosis and treatment of protozoan and metazoan parasites of veterinary significance. Pr.: Consent of instructor and two semesters of parasitology.

Pathology

S. M. DENNIS,* Head of Department

Professors Anthony,* Dennis,* and Cook;* Associate Professors Gray,* Leipold,* McGavin,* Smith,* and Straffuss;* Assistant Professor Munger; Instructor Bozarth.

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, systemic, cellular and molecular pathology.

Courses in Pathology

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. (S) 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 Diagnostic Pathology. (3) I. Study of pathologic alterations of disease with emphasis on diagnostic characteristics. Pr.: Path. 610 and consent of instructor.

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.

750 758. Avian Pathology. (2) II. Study of etiology, pathogenesis, gross and microscopic characteristics of avian diseases. Pr.: Path. 757 or consent of instructor.

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.

GRADUATE CREDIT

730 800. Pathology of Diseases of Laboratory Animals, Fish and Wildlife. (3) I in even years. Pathology of diseases affecting laboratory animals, fish and wildlife. Pr.: Path. 745 and consent of instructor.

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 pathology, pathological techniques, avian diseases, and diseases of laboratory animals, fish and wildlife. Pr.: Path. 610 and consent of instructor.

730 830. Pathology Seminar. (1) I, II, S. Pr.: Consult department head.

730 840. Advanced Systemic Pathology I. (5) I in odd years. 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) II in even years. 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.

730 847. Developmental Pathology. (2) I in even years. A bridging course between embryology and pathology with emphasis on congenital defects in domestic animals. Pr.: Path. 610 and consent of instructor.

730 850. Advanced Principles of Pathology. (3) II in even years. Advanced study of disease and its effects with emphasis on etiology and pathogenesis; morphologic change will be correlated with changes in chemical composition and function. Pr.: Path. 610 and consent of instructor.

730 855. Oncology. (4) II in odd years. Etiology, behavior, gross, microscopic characteristics, identification and prognosis of tumors. Pr.: Path. 745 and consent of staff.

730 860. Necropsy Diagnosis. (1-3) I, II, S. Necropsy procedures and diagnosis. May be repeated each semester by pathology majors with a maximum of 6 credit hours (M.S.) and 10 credit hours (Ph.D.). Pr.: Path. 745 or consent of staff.

730 862. Histopathological and Photographic Techniques. (2) II in odd years. Principles of routine histopathological techniques with emphasis on special stains, together with principles of light microscopy with emphasis on obtaining optimal black and white and color photomicrographs. Pr.: Path. 745 or consent of staff.

730 865. Cellular and Molecular Pathology. (4) I. Biochemistry of the injured cell; relationship of intracellular parasitism to cellular metabolism; metabolic and genetic basis of inherited disease. Pr.: three hours credit in biochemistry or physiological chemistry and consent of instructor.

730 866. Cellular and Molecular Pathology Lab. (1) I, II, S. Basic techniques used in the study of cellular and molecular pathology. Pr.: Path. 870 or conc. enrollment and consent of instructor.

Physiological Sciences

EMERSON L. BESCH,* Head of Department

Professors Besch,* Trotter,*; Associate Professors Cardinet,* Clarenburg,* Fedde,* Frey,* Gronwall,* Oehme,* Upson,* and Westfall; Assistant Professors Chapman,* Chen,* Purinton, and St. Omer; Instructors Hartke, and Erichsen.

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, environmental chambers, scintillation counter, and other instruments are available for physiological and anatomical studies.

Graduate programs are offered leading to the Doctor of Philosophy degree in the field of physiology and to the Master of Science degree in anatomy and in physiology.

A combined anatomy-physiology course is offered for undergraduate and graduate students outside the field of veterinary medicine.

Courses in Physiological Sciences

UNDERGRADUATE CREDIT

740 140. Veterinary Orientation. (1) I. Lectures on introduction to veterinary medicine. One hour lec. a week. Pr.: Third-year standing in College of Veterinary Medicine.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

740 431. Anatomy and Physiology. (4) I. General anatomy and physiology of the domestic animals. Three hours rec. and three hours lab. a week.

740 531. Introduction to Pharmacology of Farm Animals. (2) Interim Semester. The study of the basic principles of pharmacology as related to the proper and safe use of drugs and chemicals by the livestock industry. Pr.: Physiological Sciences 431 or equivalent.

UNDERGRADUATE AND GRADUATE CREDIT

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 twelve hours lab. a week. Pr.: First-year standing in College of 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 nine 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. One hour 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 College of 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, or consent of instructor.

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.

740 655. Comparative Physiology (3) II. Comparisons of physiological functions in the animal kingdom; including respiration, circulation, digestion, excretion, locomotion and control. Pr.: Biol. 201, Physi. 431 or equivalent.

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.

740 695. Environmental Toxicology (2) II odd years. An advanced toxicology course concerned with the occurrence, biological effect, detection, and control of foreign chemicals in the environment. Pr.: Consent of staff.

740 670. Pharmacology. (6) I. 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 and Biochem. 421 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.

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. or 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, 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.

740 870. 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,* Butler,* and Noordsy;* Associate Professors Anderson,* Frey,* Guffy,* Oehme,* and Wallace;* Assistant Professors Brandt, Carnahan, Harris, Jernigan, Milleret, and Taussig; Instructors Anderson, Blauch, Greve, Hulse, Kennedy, Kruckenberg, Olson, Reagor, Schoneweis, Vestweber, and Wilson.

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 large animal patients and 100 small animal patients. Members of clinical staff, accompanied by students, conduct a field service for the purposes of diagnosing and treating 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 on a rotation basis during the year to various specialists within the clinical and pathology staffs. 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, obstetrics and gynecology to veterinary students.

Opportunities leading to the Master of Science degree 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 and medicine.

Courses in Surgery

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.

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.

750 845. Comparative Surgical Ophthalmology. (3) I. Rationale and techniques of orbital and ocular surgical techniques will be studied with primary emphasis on orbital, eyelid, corneal and glaucoma surgery. Pr.: D. V. M., Med. 850.

750 865. The Physiologic Effects of Surgery. (3) II in even numbered years. A study of the effects of surgery on the different body systems. Pr.: D.V.M. degree or consent of staff.

750 870. Organ Transplantation. (3) II in odd numbered years. The study of transplantation of tissues and associated problems. Pr.: D.V.M. degree or consent of staff.

750 875. Orthopedic Surgery. (4) I in even numbered years. Fundamentals, theory and practice concerning genetic, metabolic, infectious, neoplastic and traumatic diseases of bones and joints. Pr.: D.V.M. degree of consent of instructor.

750 885. Problem in Medicine or Surgery. (3) I, II, S. The course provides for the study of medical or surgical problems. The student in conference with his major professor outlines the methodology and procedures, conducts the study, and prepares a detailed report. Pr.: D.V.M.

Courses in Medicine

UNDERGRADUATE CREDIT

750 135. Principles of Animal Disease Control. (3) II. 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.S.I. 101 or equiv., Physi. 431, and sophomore standing.

UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

750 400. Diseases of Wildlife. (3) II. Infectious and non-infectious diseases of birds, fur-bearing animals, zoological animals, and fish, with reference to methods of prevention and control. Pr.: Biol. 205, Biol. 220.

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.: Pr.: Second-year standing in College of Veterinary Medicine.

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.

750 640. Radiology. (2) I. The theory and principles of x-rays, production and interpretation of radiographs and exposure factors, special radiographic 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.

750 650. 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.

750 685. 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.

750 690. 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.

750 695. Toxicology. (4) I. Effects of harmful substances on the animal body. Emphasis placed on toxicologic principles, and management of the poisoned patient. Four hours lec. per week. Pr.: Third-year standing in College of Veterinary Medicine.

750 700, 750 710. Clinic I. (2) and II. (2) I and 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) and II. (4) I and II respectively. Study of the hospitalized veterinary medical and surgical patient; participation in field studies of animal disease, veterinary public health, seminars, and clinicopathologic conferences. Twenty-two hours lab. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

750 740. Clinical Medicine III. (6) S. Offered during the summer for those students selected as participants for the Special Undergraduate Program during their fourth year of professional study in lieu of 6 credit hours of Clinical Medicine I and II. Pr.: Fourth-year standing in College of Veterinary Medicine.

750 742. Clinic Seminar I. (1) and II. (1) I and II respectively. A companion course to Clinical Medicine III designed to allow participants in the Special Undergraduate Program to complete the Clinical Medicine I and II requirement of the professional curriculum. Pr.: Fourth-year standing in College of Veterinary Medicine.

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.: 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.

750 835. Interpretation of Radiologic Studies of Body Systems. (4) II in odd numbered years. The rationale of

radiologic procedures are studied and the interpretation of radiographs of body systems emphasized. Pr.: D. V. M. degree or consent of instructor prior to registration.

750 840. Comparative Gastroenterology. (3) II in even numbered years. A comparative medical study of the etiopathogenesis, diagnostic criteria and treatment of gastroenteric disorders in the canine, equine, porcine, and bovine species. Comparable disorders in man are discussed. Pr.: D. V. M. degree.

750 850. Comparative Medical Ophthalmology. (3) II in odd numbered years. Diseases of the eye and orbit of animals are studied utilizing tonometry, photography, slit lamp biomicroscopy, gonioscopy and electoretinography. Pr.: D. V. M. degree and consent of staff.

750 855. Experimental Gastroenterology. (3) II in odd numbered years. Studies of the pathogenesis, complications, water and electrolyte changes, diagnostic criteria, prognosis and treatment of these gastrointestinal disorders, utilizing clinical and experimental subjects. Pr.: 750-840, D.V.M. degree and consent of instructor.

750 880. Clinical Science Seminar. (1) I, II, S. A participating seminar for graduate students in the clinical sciences. Case studies will form the basis of the seminars. One hour conference weekly. May re-enroll for total maximum of two credits. Pr.: Consent of staff.

750 885. Problem in Medicine or Surgery. (3) I, II, S. The course provides for the study of medical or surgical problems. The student in conference with his major professor outlines the methodology and procedures, conducts the study, and prepares a detailed report. Pr.: D.V.M.

750 890. Toxins in the Biological System. (2) I. An advanced toxicology course concerned with the cellular and subcellular effects of various groups of toxins on the intact animal organism. Pr.: Biochemistry, organic chemistry, pharmacology, or consent of instructor.



THE GRADUATE SCHOOL

R. F. KRUH, Dean

JOHN P. NOONAN, Associate Dean

Graduate Study at Kansas State University: Its Beginning 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, the the Bureau of General Research specifically serves the Colleges of Arts and Sciences, Commerce, and Education.

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 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.

Probationary admission to the Graduate School will be considered if all of the foregoing requirements are not met provided there is other evidence that the applicant 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, Box 955, Princeton, New Jersey 08540. The fee for either test must be paid by the applicant.

Students may be admitted provisionally if there is uncertainty in evaluating transcripts, as in the case of some international students, or if there are undergraduate deficiencies which must be removed.

Once admitted, probationary and provisional students will be advised of deficiencies or other conditions to be met to attain full standing. Full standing is attained automatically upon completion of a least nine hours of work for graduate credit with a grade of B or better, and upon the removal of any deficiency which was specified at the time of admission.

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 9 semester hours earned as a special student may be transferred into a regular degree program.

International Students. The Graduate School requires each foreign applicant, whose national language is not English, 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

a degree is not jeopardized by language difficulties. The TOEFL is offered several times a year in the student's home country through the Educational Testing Service, Princeton, New Jersey. Further information 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.

In addition to the TOEFL all international students entering Graduate School will be required to demonstrate proficiency in written and oral English at the time of their enrollment. Students who fail to meet this requirement must enroll in and satisfactorily complete English 075, Speech 070, or both, as appropriate.

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

Registration and Enrollment. 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.

Not more than 16 hours, including those obtained from research, may be assigned in a single semester, nor more than nine hours during a summer session. If a part of the assignment is for undergraduate credit, a student may be assigned to 17 hours during a semester or nine hours during a summer session. Full-time staff members of the University may not be assigned to more than six hours in one semester, nor more than three hours in a summer session. (See section on Assistantships and Fellowships for limitations applying to students holding assistantships.) These limitations apply to classes audited as well as classes for which credit is earned.

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.

All graduate students who have matriculated at Kansas State University and

are using faculty time and-or University facilities for research or other academic pursuits must be enrolled. The enrollment should reflect, as accurately as possible, the demands made on faculty time and use made of University facilities. Further, a graduate degree candidate must be enrolled during the semester in which the requirements for a degree are completed.

A student working for the Ph.D. must enroll during the session in which the preliminary examination is taken and subsequently in each semester until the degree requirements are met and the dissertation is accepted by the Graduate School. Failure to enroll will result in loss of candidacy. To regain candidacy, the student will be re-examined over the areas covered in his preliminary examinations in a manner to be determined by the supervisory committee. If it is necessary to interrupt progress toward the degree after the preliminary examination has been passed, the student (or his major professor) may petition for leave of absence for up to one year which subsequently may be renewed. Renewals for those who are meeting their military service requirement will be automatic. The petition must be submitted at least one month before the effective date of leave. Approval must be granted by the major professor, chairman of the department or graduate group, and the dean of the Graduate School.

Candidates who do not live in the vicinity of Manhattan may make arrangements to enroll by mail but should request permission for doing so by writing the Graduate Office prior to the enrollment period.

Fees. See the General Information section in the front of this catalog for detailed information about fees.

Graduate Study by Seniors. A senior at Kansas State University who is within two semesters of receiving his bachelor's degree may enroll for one or more courses for graduate credit, **provided he has at least a B average on his prior work at the junior-senior level.** His total enrollment in such cases 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. A student who was enrolled during a summer session who wishes to enroll in problems or research during the August following may do so with the approval of his major professor, department head, and graduate dean. Forms for such enrollment are available in the Graduate Office about July 15. Enrollment must be completed by August 1 and may not exceed one credit hour per week.

Grades. The following grades are used in the Graduate School: A, B, C, D, F, Credit, No Credit, Incomplete, 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 nine 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.

Non-Graded Work. At the discretion of the Graduate Faculty of the department or interdepartmental committee concerned, seminars or colloquia in which letter grading conflicts with the objectives intended may be offered on a credit-no credit or pass-fail basis rather than for a letter grade. The seminars and colloquia which are to be offered for credit-no credit or pass-fail shall be listed with the Dean of the Graduate School. All courses on the program of study except research (report, thesis, or dissertation) and seminars or colloquia which have been approved for credit-no credit or pass-fail must be taken for letter grades. Independently of the program of study, additional courses may be taken on a credit-no credit or pass-fail basis with the approval of the major professor and the professor offering the course. These courses may not be applied toward a degree. No more than three hours of credit-no credit or pass-fail courses may appear on the

program of study for the master's degree nor more than six for the Ph.D.

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 seven years prior to receiving a Ph.D., require validation either by repeating the course, by passing an advanced course in the subject area, or by successfully completing a validation examination. However, credits in a doctoral program which have been earned as part of a master's degree remain valid and require no further validation. The department may choose which of the above methods is to be used for validation, and validation is to be completed at least one semester before the effective date of the degree. The preliminary examinations may not be used for validation.

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 one 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 30 semester hours of graduate credit including a written report of two semester hours either of research or of problem work on a topic in the major field, or (3) a minimum of 30 semester hours of graduate credit in course work only but including evidence of scholarly effort such as term papers, production of creative work, and so forth, as determined by the student's supervisory committee. Candidates for the Master of Regional and Community Planning degree must satisfactorily complete a minimum of 48 hours.

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.

Successful completion of a final oral examination or comprehensive written examination or both shall be required of all master's degree candidates, the specific form being determined by individual departments. The final examination is administered by the advisory committee and may include a defense of the thesis or report, an interpretation of other scholarly products, or a testing of the student's understanding of his field(s) of study.

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 and a dissertation are required of candidates for the degree of Doctor of Philosophy (Ph.D.). A full year of residency (a minimum of 24 credit hours of course work) is required. The foreign language requirement for the Ph.D. is determined as a matter of policy by the graduate faculty in each department. There is no such requirement in the following programs: agronomy, animal breeding, economics, education, food science, foods and nutrition, genetics, grain science, horticulture, pathology, plant pathology, and psychology. For all other programs the department should be consulted for details of the foreign language requirement. Where a language is required, it is understood that "foreign language" refers to languages other than English and that the language(s) required will have a significant body of literature relevant to the field. Required foreign language examinations shall be administered by the Department of Modern Languages. The language requirement must be satisfied before the student is admitted to candidacy.

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 final examination the student must have met the preliminary examination requirement, successful completion of which is a necessary condition for admission to doctoral candidacy. The supervisory committee is responsible for recommending candidacy to the Graduate Council. On completion of at least three years of graduate study as prescribed by the supervisory committee and on completion of a dissertation, the candidate must pass a final examination. Final dissertation copies must be submitted to the Dean of the Graduate School as a last requirement to be met for award of the degree.

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.

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.

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 Office 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 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 assistantships 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 and social sciences. Several departments also have federally supported traineeships available under the programs of the National Institutes of Health.

Organizations, Housing, Loans

For information about student organizations, graduate student housing and loans, see the General Information section of this catalog, near the front.

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:

Agricultural Economics
Agricultural Education
Agricultural Engineering
Agricultural Mechanization
Agronomy
Anatomy
Animal Science and Industry
Applied Mechanics
Biochemistry
Biology
Chemical Engineering
Chemistry
Civil Engineering
Clothing and Textiles and Interior Design
Computer Science
Dairy Manufacturing
Dairy Production
Education
Electrical Engineering
Entomology
Family and Child Development
Family Economics
Food Science
Foods and Nutrition
General Home Economics
Genetics
Geochemistry
Geology
Grain Science
Home Economics Education
Horticulture
Industrial Engineering
Infectious Diseases
Institutional Management
Journalism and Mass Communication
Mathematics
Mechanical Engineering
Microbiology
Nuclear Engineering
Parasitology
Pathology
Physical Education
Physical Science Teaching
Physics
Physiology
Plant Pathology
Poultry Science
Psychology
Statistics
Surgery and Medicine

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
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 Business Administration

Major work leading to the degree Master of Business Administration is offered in the College of Business Administration.

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 Music

Major work leading to the degree Master of Music is offered in the Department of Music.

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 Department of Regional and Community Planning.

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
Biochemistry

(Continued on next page)

Biology
 Chemical Engineering
 Chemistry
 Computer Science
 Economics (Agricultural)
 Economics (Arts and Sciences)
 Education
 Electrical Engineering
 English
 Entomology
 Food Science
 Foods and Nutrition
 Genetics
 Geochemistry
 Grain Science
 History
 Horticulture
 Industrial Engineering
 Mathematics
 Mechanical Engineering
 Microbiology
 Nuclear Engineering
 Parasitology
 Pathology
 Physics
 Physiology
 Plant Pathology
 Psychology
 Statistics

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

R. R. SCHALLES, Chairman

Professors Craig, Farmer, Gier, Huston and Wheat; Associate Professors Dayton, Kemp, Kiracofe, Schalles and Smith; Assistant Professor Ames.

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

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 advisors 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. No foreign language is required for Ph.D. candidates in animal breeding.

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 addition 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

D. B. PARRISH, Chairman

Professors Bartley*, Koch, Parrish*, Richardson, Sanford*, Smith, Underbjerg, and Ward; Associate Professors Adams, Brent*, Frey*, Harbers, Hines and Morrill; Assistant Professors Allee and Ames.

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. Students desiring such a program should consult the Dean of the Graduate School and the representatives of the appropriate departments. For courses, see departmental sections in this catalog.

To enter graduate study in Animal Nutrition, the student should have preparation in (1) animal, dairy and-or poultry science, (2) biological sciences including general microbiology, (3) general chemistry, including laboratory, chemical analyses, and general organic chemistry, (4) mathematics, including college algebra and trigonometry, and (5) physics for which trigonometry is a prerequisite (Physics I & II).

Where necessary background courses are lacking, the student will be required to take additional undergraduate courses.

For the advanced degree, candidates are expected to acquire training in (1) nutrition (animal nutrition, Animal Science and Industry 600; or principles of animal nutrition, Biochemistry 670, or equivalent, and 3 credit hrs. selected from advanced animal nutrition, Biochemistry 825; dairy cattle nutrition, Dairy-Poultry Science 610; nutrition of the fowl, Dairy-Poultry Science 612); (2) biochemistry, including laboratory; (3) Physiology I and II or ten credit hours equivalent; (4) Statistical Methods 520, 521 or equivalent; (5) Special Anatomy 625 (minimum 2 hours); (6) histology, Biology 415; (7) seminar; (8) tool courses (minimum 3 hours) such as computer science and

programing, design of experiments, foreign language. These can be used for credit if graduate level. A foreign language is not a specific requirement.

Additional courses as appropriate to complete the program of study may be selected from the following departments: animal science and industry, biochemistry, biology, chemistry, dairy-poultry science, foods and nutrition, grain science and industry, physiological sciences, statistics and computer science.

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

Biochemistry

R. E. CLEGG, Chairman

Professors Bode, Burkhard, Clegg, H. L. Mitchell, Nordin, Parrish, Ruliffson, and Tsen; Associate Professors Clarenburg, Hedgcoth, Lineback, and Seib; Assistant Professors Center, B. Cunningham, Klopfenstein, Mueller, and Williams.

The Graduate Biochemistry Group has the responsibility for the graduate biochemistry program leading to the M.S. and Ph.D. degrees and is directly responsible to the dean of the Graduate School. The Graduate Biochemistry Group consists of biochemists, regardless of department of college affiliation, who are approved for membership in the Graduate Biochemistry Faculty. An executive committee composed of three members of the Graduate Biochemistry Group and elected by the group serves an administrative function. One member of the executive committee serves as chairman of the group. Units of the University currently cooperating in the program are the Department of Biochemistry, the Division of Biology, and the Department of Physiological Sciences.

Entering graduate students must meet the entrance requirements of the Graduate School and must have completed one year of analytical, organic and physical chemistry, differential and integral calculus, and a course in biology, including a laboratory. A student entering this program with considerable training in biology must meet these requirements, but he may satisfy the physical chemistry requirement by including the year

*Members of the Animal Nutrition Coordinating Committee.

of physical chemistry as a part of his graduate program. A year of French, German or Russian is a requirement for admission into the Graduate Biochemistry Program. The Graduate Record Examination is required.

Food Science

DAVID R. LINEBACK, Chairman

Professors Caul, Claydon, Clegg, Deyoe, Fan, Farrell, Finkelstein, Greig, Harrison,* Hoover,* J. Johnson, Kyle, H. L. Mitchell, P. Nordin, Parrish, Pfost,* Ruliffson, Shugart, Tinklin, Tsen, Wakefield, and Ward; Associate Professors Allen, Bassette, Brent,* Cunningham,* L. Erickson, B. Fryer, Kropf, Lineback, and Tuma;* Assistant Professors Bowers, Dikeman, Iandolo,* Klopfenstein, Mickelsen,* Middleton, Miller, and R. J. Robinson.

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 committee. 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.

There is no foreign language requirement.

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

Biochemistry

Proteins
Chemistry of Carbohydrates
Lipids
Advanced Biochemistry Laboratory
Enzyme Chemistry
Enzyme Laboratory
Conformational Analysis of Biopolymers
Theoretical Biochemistry

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

(Continued on next page)

Advanced Flow Sheets
 The Qualities of Wheat and Flour
 Foods 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

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

Genetics

E. G. HEYNE, Chairman

Professors Bode, Casady, Craig*, Hall*, Heyne*, Huston*, Pittenger*, Sorensen and Wheat*; Associate Professors Barnett, Liang, Nassar*, Nickell, Smith, Schalles and Wassom; Assistant Professor Williams.

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 of faculty from participating departments which sets the academic requirements for degrees and 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 in genetics should have at least an introductory course in genetics and six hours of biological sciences. Students who do not meet these requirements can 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 a minimum to allow specialization in different areas of genetics such as plant and animal breeding, plant and animal genetics, population and statistical genetics; and microbial, cellular and

molecular genetics. The minimum academic requirements are as follows:

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

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

(3) 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
 Plant Breeding

Animal Science and Industry

Population Genetics

Biology

Genetics of Microorganisms
 Microbial Genetic Techniques
 Molecular Genetics

Dairy and Poultry Science

Quantitative Genetics and Poultry Improvement
 Dairy Cattle Genetics

Horticulture

Plant Breeding

Statistics

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

Descriptions of these courses can be found in the respective departmental sections of this catalog.

The participating Departments are Animal Science and Industry, Agronomy, Horticulture, Dairy and Poultry Science, Statistics, and the Division of Biology.

No foreign language is required; however, if the supervisory committee believes a reading knowledge of foreign languages is essential to a particular research problem, it may be required.

Parasitology

C. W. PITTS, Chairman

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

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,

*Member of the Genetics Coordinating Committee.

Infectious Diseases and Plant Pathology. 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 faculty and the student's advisory committee.

One foreign language is required for the degree Doctor of Philosophy in Parasitology.

Facilities for research work in parasitology include rearing rooms; small and large parasite-free domestic animals; environmental control chambers; animal rooms; in vitro culturing; toxicology, physiology, and behavioral laboratories; scanning electron microscope, and field study areas.

Pathology

JOSEPH E. SMITH, Chairman

Professors Anthony, Coles, Cook, Dennis, Kelley, Leland, and Lindquist; Associate Professors Burroughs, Leipold, McGavin, Minocha, Osbaldiston, Smith, and Strauss; Assistant Professor Moore.

Graduate work is offered by 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 clinical pathology laboratory; animal isolation units; parasitological, mycological, bacterial, viral, immunological, histopathological research laboratories, and laboratories in perinatal diseases and public health. There are extensive files of tissue slides and opportunities for experimental work with animals in studying diseases.

Graduate training leading to the degrees of Master of Science and Doctor of Philosophy is available in the fields of clinical pathology, general pathology, and systemic pathology. Master's degree work is offered in the study of infectious diseases.

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

There are no requirements for a reading knowledge of a foreign language.

Physical Science Teaching

HENRY V. BECK, Chairman

Professors Beck, Curnutte, James, 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 each program must be approved by the coordinating committee. The student, with consent of the committee, has the option of a program of 30 hours including a report of two hours or a program of 30 hours of graduate level courses. The nature of the final examination will be governed by the program chosen.

Physiological Sciences

M. R. FEDDE,* Chairman

Professors Bartley, Besch, Farmer, Gier*, Hopkins, Koch, Underbjerg, Ward, and Wakefield; Associate Professors Cardinet*, Clarenburg, Fedde, Gronwall, Kiracofe, Kropf, Mitchell, J. Morrill, Oehme, Osbaldiston, Upson, Westfall*, and Wilson; Assistant Professors Ames*, Chapman, and Chen.

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

*Members of the Physiological Sciences Coordinating Committee.

of physiology to students located in many departments of the University. Departments cooperating in the program are Animal Science and Industry, Dairy and Poultry Science, Entomology, Foods and Nutrition, Infectious Diseases, Physiological Sciences, Psychology and the Division of Biology.

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 (Biochemistry 655, 656, 665, and 666 or the equivalent); physical chemistry; gross and microscopic anatomy (Anatomy 700 and Biology 415 or the equivalent); systemic physiology (Physiology 635 and 645 or the equivalent); cellular physiology; and graduate seminar. Elective courses may be selected from graduate courses in related areas (see selected list following). The student also is encouraged to obtain experience in the teaching laboratory in one or more areas of physiology.

No foreign language is required for this degree.

Following are selected elective courses:

Animal Science and Industry

Research Techniques in Reproduction
Analytical Techniques in Animal Science and Industry
Environmental Physiology

Biochemistry

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

Biology

Advanced Cell Biology I and II
Comparative Anatomy of Vertebrates
Embryology
Human Physiology
Zoological Microtechniques
Principles of Zoophysiology
Comparative Embryology
Endocrinology
Experimental Endocrinology
Advanced Endocrinology

Dairy and Poultry Science

Milk Secretion
Avian Metabolism
Rumen Metabolism
Mammalian Reproduction

Entomology

Insect Physiology
Advanced Physiology of Insects
Insect Behavior

Infectious Diseases

Principles and Techniques of Research in Medical Investigations

Physiological Sciences

Special Anatomy
Avian Anatomy
Bovine Anatomy
Canine Anatomy
Anatomy of Laboratory Animals
Reproductive Organ Anatomy
Anatomical Techniques
Special Microscopic Anatomy
Research in Anatomy
Physiologic Constituents of Body Fluids
Pharmacology
Physiology and Pharmacology of Hormones
Histophysiology of Nutritional Deficiencies
Physiology of Reproduction
Advanced Physiology
Comparative Physiology
Environmental Toxicology

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.

Regional and Community Planning

VERNON P. DEINES,* Chairman

Professors Blackburn*, Deines*, Douglas, Ealy*, Emerson, Friedmann*, Kelley*, Morse, Pine, Secher*, and Smith; Associate Professors Edmonds, Erickson, McGraw, Rosebraugh, Siddall, and Weisenburger; Assistant Professors Bollman, Day, Ernst, Funk, and Kromm.

Graduate study leading to the two-year professional degree Master of Regional and Community Planning is offered on an interdepartmental basis by the Department of Regional and Community Planning and faculty from the Departments of Architecture, Civil Engineering, Commerce, Economics, Education, Family Economics,

*Members of Regional and Community Coordinating Committee.

Family and Child Development, Geography, 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, agriculture, architecture, business, economics, engineering, geology, 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. Graduate students may also work toward a traditional one-year Master of Arts, Master of Science, or Ph.D. degree in their discipline or profession with a minor in planning.

Ad hoc committees for curriculum development, professional relations, public service, and research include faculty and students from the University.

Typical courses in the program include the following:

Agricultural Economics

- Agricultural Policy
- Natural Resources Economics
- Seminar in Land Economics
- Rural Human Resource Development

Business Administration

- Management Concepts
- Business and Society
- Real Estate
- Organization Behavior and Administration
- Behavioral Management Concepts

Architecture

- Environmental Seminar
- Advanced Environmental Seminar
- Theory of Design
- Environmental Aesthetics
- Inspection Trip

Civil Engineering

- Economics of Design and Construction
- Planning Engineering
- Urban Transportation Analysis I & II
- Air Photo Interpretation
- Traffic Engineering I & II

Computer Science

- Computer Organization & Programming I & II
- Programming Systems
- Programming Languages
- Information Organization and Retrieval

Construction Science

- Sanitation Systems
- Construction Management I & II
- Construction Estimating

Economics

- Public Finance
- Location of Economic Activities
- Regional Economic Analysis
- Development Economics
- Introduction to Econometrics
- Urban and Regional Economics

Education

- The School Plant
- School Business and Finance
- General School Administration
- Educational Systems Analysis
- Higher Education Administration

Geography

- Urban Geography
- Geography of Transportation
- Resources and Economic Development
- Quantitative Analysis in Geography
- Man's Impact on the Environment

Geology

- Applied Geology
- Earth Science

History

- American Ethnic History
- Black American History
- American Urban History
- Frontier America
- The Great Plains

Home Economics

- Housing Requirements of Families
- Seminar on Aging
- The Black Family
- Low Income Families

Industrial Engineering

- Introduction to Operations Research I
- Linear Programming
- Design Ergonomics

Journalism

- Formation of Public Opinion
- The Black Press in America
- Public Relations
- Communication Theory
- Public Affairs Reporting

Landscape Architecture

- Site Planning and Analysis
- Community Planning
- Design of Parks and Recreation Areas

Planning

- Planning and Development Codes
- Planning Graphics
- Planning Principles

Planning Theory
 City Planning
 Urban Design I
 Regional Planning I
 Topics in Planning
 Urban Visual Analysis
 Housing and Renewal
 Institutional Planning and Development
 Research Methods in Planning
 Planning Administration and Implementation
 Internship in Planning
 Practicum in Planning
 Seminar in Planning
 Advanced Planning Theory
 City Planning II
 Urban Design II
 Regional Planning II
 Research in Planning

Political Science

The Administrative Process
 Urban Politics
 Administration in Developing Nations
 Seminar in Public Policy and Decision Making
 Seminar in Public Administration

Psychology
 Group Dynamics
 Social Psychology

Sociology

Methods of Social Research I
 Urban Sociology
 Population and Human Ecology
 Community Organization and Leadership
 Advanced Rural Sociology
 Methods of Demographic Analysis
 Seminar in Community Analysis
 Seminar in Demographic Analysis
 Racial and Cultural Minorities

Statistics

Statistical Methods I & II
 Introductory Probability and Statistics I & II
 Theory of Statistics I & II
 Sample Survey Methods

CHILDREN'S THEATER—ONE OF THE SPECIALTIES OF THE CONTINENTAL THEATER COMPANY



DIVISION OF CONTINUING EDUCATION

E. NORMAN HAROLD, Director
MICHAEL WILLIAMSON, Assistant Director,
Operations

Assistant Professors Miller, Mordy, and Williamson; Instructors Dieckhoff, Frye, Horton, Lockhart, McCarthy, Midcap, Reichow, Richardson and Swegle; Assistant Instructors Eckelman, Maes, Marr and Vieux.

The Division of Continuing Education brings to the residents of Kansas educational services on whatever level and in whatever area of interest the personal demands desire.

Through various means of modern communications and by making use of local facilities and instructional talent across the state, the Division of Continuing Education is able to respond to the requests and needs of citizens and set up and provide the best instruction available to any group in the state on most subjects.

Courses for college credit, non-credit, graduate or undergraduate credit can be arranged through the Division. Course purposes may be for pleasure, personal interest, job advancement, professional updating, job training, skill building, or community and civic services.

Most courses offered on the K-State campus may be brought to any interested group in the state. Courses and subjects unrelated to the university curriculum also may be arranged.

Telenetwork

Through special telephone hook ups, the K-State campus educational staff comes to you live with two-way remote teaching-learning programs. With connections presently to 15-20 towns and cities in the state, the university professor is able to teach his course from the campus to each town at the same time.

Telenetwork can bring any speaker from any location to a local conference or meeting and can include many participants from several locations in a local conference or meeting.

The University Telenetwork is also available to other organizations for educational purposes.

This new method of instruction offers expandable dimensions of the services available from the Division of Continuing Education.

Conferences and Short Courses

Staffed with personnel trained in coordinating, planning, budgeting, facilitating and serving conferences and short courses, the Division of Continuing Education offers on the K-State campus, or at any location that contributes educational effectiveness, these services to individuals and organizations.

The combination of facilities and services made available for hosting such activities is the result of a cooperative effort by the Division of Continuing Education with the K-State Union for food service and meeting facilities, and nearby modern housing facilities.

Continuing educational programs are set up between a community or interested group and the Division of Continuing Education. Regular extension classes are offered to the students and classrooms are equipped with instructors and supplies.

A continuing program with Fort Riley is offered under this arrangement to provide military persons with instruction in courses in which they express an interest. The courses may vary each session, depending on the requests and needs.

The following extension courses are regularly offered by the Division in addition to other courses described under other University departments.

Extension Course Offerings

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 (CAC 300, BA 273, 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) Continuation 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, conte, 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 Fundamentals 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 Paint Adaptation).

CAR 8. Painting Fundamentals II. (2) Continuation 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) Continuation 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) Continuation of CAR 13.

Continental Theater Company

A new and popular service of the Division of Continuing Education is a professional acting troupe. The Continental Theater Company travels on the road offering its repertory of plays to educational groups, civic organizations, school systems, leagues, clubs or any interested sponsor.

A variety of plays are offered by the company during the season. Each is designed for presentation to a different age or type of audience so that the booking organization may request a play to suit its needs.

The Continental Theater Company functions to bring one of the fine arts to a community that may or may not have readily available to it the services of a theater group.

Kansas Rural-Urban Art Program

KRUAP is a functional program centered around the appreciation for and the involvement in art. It offers credit and non-credit courses and sponsors regional art shows and critiques and a state-wide amateur art exhibition.

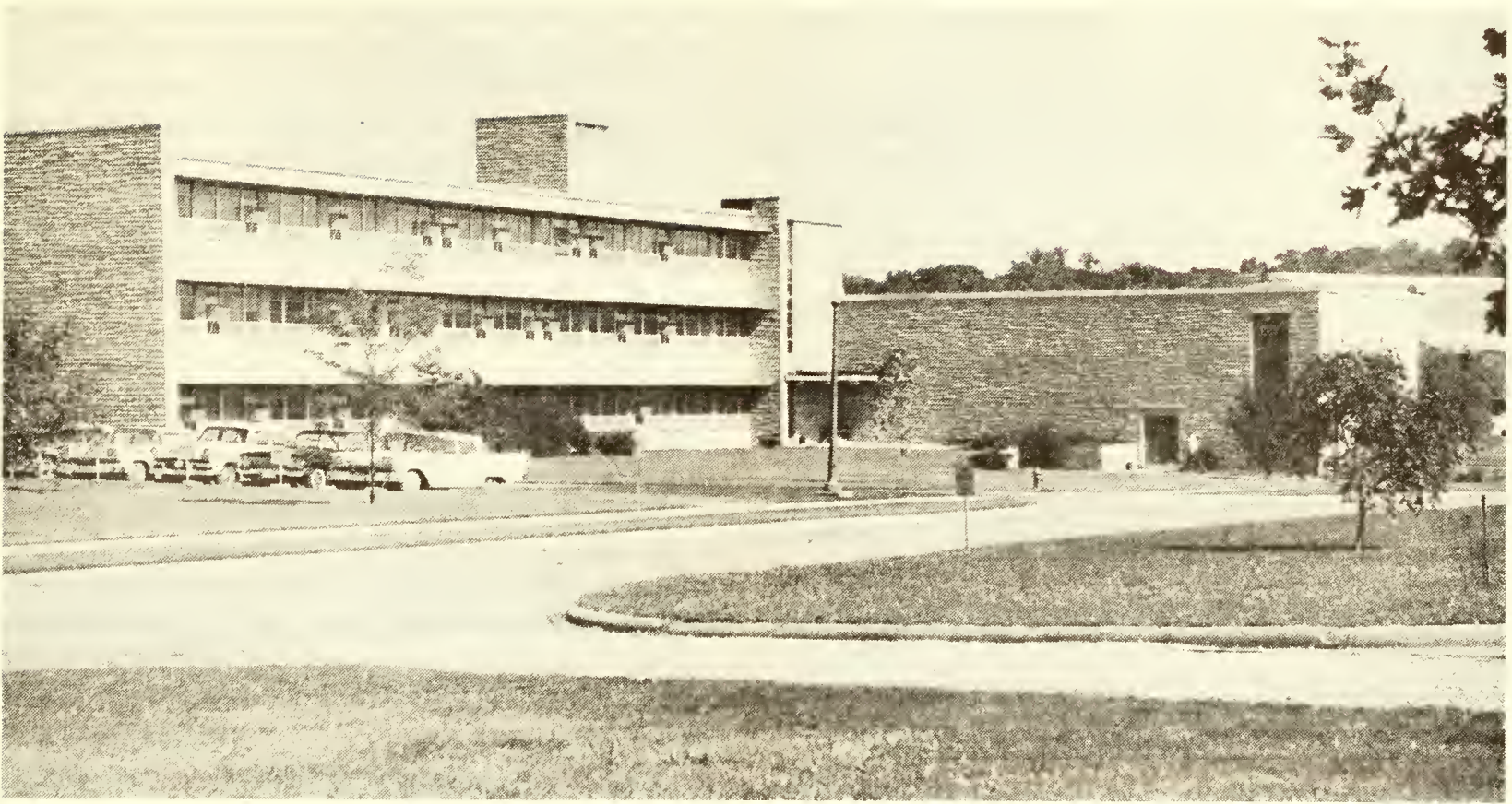
Rural Police Training Program

An opportunity for rural and small town law officers to advance their educations in or near their home communities is provided through the Telenetwork system of the Division.

Instruction by highly qualified educators supplements the law officers with information not normally available at the rural community level. Courses are offered according to interests and needs of the working police.

Civil Defense Training

This program is responsible for the technical Civil Defense training throughout the state of Kansas. Instruction in radiological monitoring, shelter management, and emergency preparedness for business and industry and public officials are among the training courses available.



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 not enrolled as resident students of the University. The principal purpose of these programs is disseminating up-to-date, practical information developed through research and experimentation by 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 many 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 persons participating in the Cooperative Extension program also is expanding and now includes urban and suburban people in addition to 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 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 with Kansas State University.

Extension Teaches in Many Ways

The methods of instruction used by Extension workers are quite informal. 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 persons to work together as a group for common goals such as organizing county-wide campaigns to control diseases, pests and weeds; conserve soil and moisture in an entire watershed, and 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 persons with the work of the University by organizing

and conducting groups to visit the University and its branch experiment stations and fields. Many 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. The agents serve as the local source of information regarding programs of all other governmental agencies affecting agriculture, such as the Soil Conservation Service, Rural Electrification Administration, Farm Credit Administration, and Agricultural Stabilization and Conservation Service.

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 throughout the State. These specialists assist the county Extension agents in solving problems for individuals that arise. They also train the county Extension agents in 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 agri-business 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 farms, firms and homes.

Office of Studies and Staff Development

ROBERT L. JOHNSON, State Leader

Professors Johnson and Prawl; Assistant Professor Jorns.

The Extension program constantly must be at the forefront, dealing with the most current and pressing problems facing people and their communities. Educational programs that help people meet their major concerns can be developed only by having a clear understanding of the situation, and by having adequate facts for this purpose. Administrative decisions must be made in a host of areas that usually are in a state of dynamic change. Studies assist the Extension administration in providing leadership so the total program direction effectively deals with these problems.

The Office of Studies and Staff Development provides counsel to the Director of Extension regarding state training programs, policies and their implementation.

The educational efforts of professional Extension staff require specific preparation. Professional improvement in an area which deals with constructive change must be a continuous process. Staff development has as one of its major purposes helping professional workers experience satisfaction and growth throughout their professional career. At the same time, training programs make it possible for the Extension Service to modify and retool for meeting new challenges. Education provided by colleges and universities establish an excellent foundation, but must be built upon throughout the professional Extension worker's career.

Staff development consists of pre-service, induction, in-service, and graduate training. At the pre-service level, Extension Education courses are taught for undergraduates who are considering the Extension Service as a career. These courses consist of selected concepts, mostly from the social sciences, which have proven useful in effective Extension programming efforts.

Intensive orientation and induction training is provided new staff during the first year of their employment. One-week schools are held, taught by experienced staff, to help each new staff member become a successful Extension educator.

In-service training schools for county and central staff members are an important and inherent part of the Extension Service. In areas where there are Extension specialists, they assume responsibility for staff training. Experts from other fields are called upon to provide in-service training where needed.

Graduate studies are an essential part of an Extension worker's professional improvement program. The Office of Studies and Staff Development teaches graduate courses in Extension and Adult Education, through the College of Education.

Each professional Extension worker is encouraged to maintain a professional improvement plan to give direction to his or her efforts. Extension personnel are informed of opportunities for graduate study, and of fellowships and scholarships that are available.

Extension Information

KENNETH E. THOMAS, Head of Department

State Leader and Director, Division of University Information.

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: Office of Extension Information and Office of Extension Radio-Television-Film.

Office of Extension Information

E. D. WARNER, Extension Editor and Associate State Leader

Professor Warner; Associate Professors Dexter, Graham, Parris and Unruh; Assistant Professors Medlin, Peck and Tennant; Instructors Crawford, Dierking, Kingsley and Peterson; Extension Assistants Bunting and Sullins; Emeritus: Associate Professor Shankland.

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 mass communications media. 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 home-making for an improved agricultural industry. All means of communication are utilized in the dissemination of information for the benefit of all Kansas residents.

Scientific information, as written in popular version by the departmental staff, is channeled through all practical means of communication, including newspapers, publications, circulars and posters, printed annual reports, exhibits, motion pictures, slides, radio and television.

The state's weekly and daily newspapers and various Kansas farm publications are provided periodically with news stories and pictures about research work of the Kansas Agricultural Experiment Station and program activities of the Kansas Cooperative Extension Service.

County Extension 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.

Each year three million copies of timely, popular Extension Service, Experiment Station and USDA publications, and other materials are printed and distributed.

A limited library of motion pictures and slides for visual instruction is maintained for use by county agents, field workers, vocational education instructors, and personnel of cooperating agencies of govern-

ment. Providing exhibits and other visual aids materials represents an important phase of work in the department.

Office of Extension Radio-Television-Film

JACK M. BURKE, Manager, Radio Station KSAC and Associate State Leader

Associate Professors Burke and Titus; Assistant Professors DeWeese, Springer and Stockard; Instructors Brewer, Kuehn, Nagel and Wright; Extension Assistants Jones and Marrs.

Radio is divided into two phases: broadcasting programs over KSAC, an institution-owned, non-commercial, educational station; and broadcasting script and recorded services and live programs over more than 80 cooperating commercial radio stations in Kansas and close to our borders.

Station KSAC, the University radio station, is used exclusively for the dissemination of informative and cultural programs produced by this and other educational institutions. Five 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 programs originating from within the Extension Service.

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 cooperative television 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.

Motion pictures for the University and off-campus groups with educational objectives are produced on a fee basis.

Agricultural Production Management, and Natural Resource Development

WILBER E. RINGLER, Assistant Director

The departments listed on following pages include those members of the Extension staff

who conduct and supervise programs in agricultural production and management education throughout Kansas. 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, Head of Department

NORMAN V. WHITEHAIR, Assistant Head of Department

Farm Management

Associate Professors Schlender and Thomas; Assistant Professors Figurski, Langemeier, McReynolds, Overley, Treat and Whipps; Instructors Appleby, Collins, Delano, Dickson, Faidley, Frederick, Germann, Greene, Guy, Hackler, Herod, Kepley, McMinimy, Mullen, Olson, Parker, Pretzer, Reimer, Stielow, Trayer, and Urban. Emeritus: Professor Coolidge; Instructors Bartlett, Hagemen, McClelland and Means.

The Extension educational program in farm management is divided into two sections: Kansas Farm Management Association Programs and District Farm Management Programs.

In the Kansas Farm Management Association Programs, the twenty Extension economists, farm management (fieldmen) conduct an intensive educational program with 3,500 Kansas farm families via the County Agricultural Extension Councils in the six Farm Management Associations. Each fieldman conducts a person-to-person educational program in farm management with 150-160 farm units. Each farm family or farm unit is considered as an extension result and-or method demonstration. This educational program is administered via two 2-hour on-the-farm and home management counsel and advisory visits (additional visits are made to those units requesting special assistance on important or problem decisions); sub-total visit in November and December for tax management purposes; county summary and analysis meetings; county fall crops and livestock forward planning meetings; county special interests meetings; individual summary and analysis of the farm and household record; special field days or tours; publications and educational materials prepared for distribution via county Extension offices for the agricultural industry; and public tax management schools.

The Kansas Farm Management Association Program provides Kansas State University with a field laboratory on representative samples of many varied types of farms for obtaining data and information which is important in the conduct of viable research, training, and Extension educational programs.

This representative sample of Kansas farms provides the basic foundation for development of publications and educational materials for the entire agricultural industry in Kansas. In addition, each association farm family serves as an Extension leader in the dissemination of useful information in agriculture, home economics, and related subject matter areas.

The Area Farm Management Programs: The five district Extension economists, farm management, conduct county in-depth educational programs in cooperation with the county Extension agents and district home management specialists. The district specialists conduct in-depth workshops in farm business management with farm families, provide a nearby reference resource for agents and develop educational materials for agent use.

Special interest topics include estate planning, credit, land economics, machinery analysis, farm leases, farm records, corporation farming, farm supplies, etc. In-depth workshops are conducted in cooperation with the production specialists and county agents.

Special educational efforts include the educational needs of the agri-related businesses and persons, such as bankers, PCA managers, machinery dealers, feed and supply firms.

Public Affairs And Economic Information

Assistant Professors Flinchbaugh and Vacin.

The public affairs Extension educational program is designed to provide the people of Kansas and their leaders with educational information on public issues which are of current interest. The purpose is to provide the people with the facts so they have a broader and more accurate knowledge-base from which to make a decision. No causes are espoused and no positions are taken; the program is educational, not political.

Problems are analyzed, alternatives and consequences examined, and the people are challenged to reach decisions. The issues to be covered are determined by the people.

The economic information program provides the people of Kansas with current data on factors affecting farming, business and industrial operations, labor supply and demand, and family living costs. The purpose of the program is to disseminate economic information to individuals which helps them make day-to-day decisions or which can be used for immediate or long-term business planning.

Extension Agronomy

HYDE S. JACOBS, Head of Department
FRANK G. BIEBERLY, Section Leader

Professors Bieberly, Jacobs, and Jones; Associate Professors Edelblute, Harper, Hyde, Nilson, Peterson, and Whitney; Assistant Professors Dicken and Stiegler; Emeritus: Cleavinger and Lind.

The Extension Agronomy department conducts a state-wide educational program in agricultural crop production and resource conservation. The object of the program is to improve crop production efficiency, stabilize the agricultural economy through stable agricultural production, and conserve natural resources through the acceptance by the farm operators of proven production and conservation practices.

The responsibility of the agronomy specialists in this program is to interpret and disseminate the results of research conducted by the Agricultural Experiment Station and the United States Department of Agriculture, promote the adoption of proven practices, and inform the Agricultural Experiment Station of needed research. The agronomy specialists correlate their program with specialists in all other subject matter areas in order to insure the most effective overall Extension program.

The major teaching methods employed by the Extension specialists include county agent training schools, in-depth schools for producers, dealer training, result demonstrations, public meetings and tours, Extension publications, radio, television and press.

Extension Animal Science and Industry

DON L. GOOD, Head of Department
WENDELL A. MOYER, Section Leader

Professors Good and Moyer; Associate Professors Francis and Zoellner; Assistant Professors Ahlschwede and Westmeyer; Extension Associates Olson and Schafer; Emeritus: Professors Elling and McAdams.

Extension specialists in Animal Science and Industry provide leadership for state programs in beef, sheep, swine and meats. Programs are conducted in counties with producers (both adult and youth) and the allied industry in cooperation with and the support of county Extension personnel.

Extension Dairy and Poultry Science

CHARLES L. NORTON, Head of Department

Professor Norton; Associate Professors Adams, Bonewitz, and Jackson; Assistant Professor Dunham.

Dairy Science

The Extension specialists in dairy science provide educational dairy information to enable Kansas families to effectively participate in community, state, national and international affairs. Leadership and direction is provided for Extension dairy programs in Kansas counties based on changing social and economic conditions. The specialists supervise the National Dairy Herd Improvement Program in Kansas.

Poultry Science

Extension education in poultry science is the development of practical information from research for the poultry industry. This involves working with all segments of the industry including producers, hatcheries, turkey producers, marketing organizations, feed companies and other interested organizations and groups. Extension programs are involved with developing projects that improve the opportunity for increased income to persons in the poultry industry.

Extension Entomology

HERBERT C. KNUTSON, Head of Department

Professors Gates and Knutson; Assistant Professor Brooks.

Extension Entomology is concerned with practical insect control measures for Kansas citizens. The proper, safe use of insecticides

is one of the methods used by Kansas producers to prevent insect damage. Extension entomology uses meetings, newsletters, and mass media to keep Kansas producers informed of populations of insects that may create problems. The 4-H entomology project is designed to teach the interrelation of insects and the environment, as well as the identification of insects.

Extension Horticulture and Forestry

RONALD W. CAMPBELL, Head of Department
HAROLD G. GALLAHER, Assistant Head of Department

Extension Horticulture

FRANK D. MORRISON, Section Leader

Associate Professor Morrison; Assistant Professors McDaniel and Marr; Instructors Jones and Leuthold.

Programs in Extension Horticulture and Landscape Architecture are developed to serve persons interested in horticultural plants, including fruits, nuts, vegetables, flowers, turf, shrubs, and ornamental and shade trees. Special interests may include food products for commercial sales or personal use, the use of horticultural plants for therapeutic purposes, or for environmental improvement.

Assistance is available to suburban, urban and rural homeowners; and to commercial producers, such as florists, nurseries, greenhouse operators, fruit, vegetable and nut growers.

Programs are developed for public and private concerns, such as park departments, schools, cemeteries, municipalities, highway departments, industrial parks and golf clubs. Youth education programs also are developed relating to the understanding and use of horticultural plants.

Information developed includes selection, production, use and maintenance of the various horticultural plant materials. Assistance is available in every Kansas county and is conducted in a variety of ways, including training schools, workshops, demonstrations, publications, slides and scripts, news releases, radio and television programs and personal contact.

State and Extension Forestry

HAROLD G. GALLAHER, State and Extension Forester

Professor Gallaher; Associate Professors Biswell, Grey and Strickler; Assistant Professors Deutsch, Gaylor, Moyer, Naughton, Nighswonger, Pinkerton, and Rowland; Instructors Atchison, Baughman, Biles, Bratton, Geisler, Gould, Loucks, and Shreve.

This section is responsible for all State and Extension Forestry programs in Kansas. The foresters provide direct technical assistance to landowners in all forestry and forestry-related areas. Landowners receive assistance in management and marketing of their timber.

Assistance also is given in various types of conservation tree and shrub planting. A tree distribution program is operated, providing approximately one million low-cost seedlings each year for these conservation-type plantings.

A seed orchard for growing superior walnut and cottonwood planting stock is being established near Milford Reservoir.

Foresters work closely with wood-using industries in the State to improve efficiency and better utilization of the timber crop.

The section also operates a Cooperative Rural Fire Control program. Assistance is given to rural fire districts in organizing, planning, fire prevention, obtaining fire equipment, and training fire district personnel.

Through a contract with the Corps of Engineers, the section develops vegetative management plans for public use areas around Corps reservoirs. The section is also responsible for implementing these plans through tree planting, grass seeding and recreational timber stand improvement.

The forestry offices are located off the main campus. The Forestry Building, at 2610 Claflin Road in Manhattan, also houses the tree distribution, tree cold storage and shop facilities. Paneling of twelve Kansas hardwood species is on display in the building. Area forestry offices are located in Chanute, Garden City, Hays, Hutchinson, and Manhattan.

Extension Plant Pathology

JOHN F. SCHAFER, Head of Department

Professors King and Schafer; Associate Professor Willis.

The purpose of the work by Extension specialists in plant pathology is to keep the people of Kansas informed about the occurrence and nature of plant diseases and economic means for their control. This includes diseases of field crops, vegetables, fruits, trees, flowers, lawngresses and shrubs.

The specialists, working with the county Extension agents, furnish plant disease information to rural and urban persons by news articles in local papers, radio, television, meetings, field and home visits and office and phone calls.

Extension Veterinary Medicine

HOMER K. CALEY, Section Leader

Associate Professor Caley; Assistant Professor Breeden; Emeritus: Associate Professor Osburn.

Extension veterinary medicine serves the livestock industry and veterinarians as a source of scientific material pertaining to the most recent information on disease prevention and control. Current research is evaluated and adapted for use in this area.

Field trials and surveys are implemented into the work program in order that our livestock interests can be provided with actual test results as they exist on Kansas farms and ranches.

Extension Wildlife Management

Associate Professor Halazon

The wildlife management section deals with enhancement of beneficial aspects of wildlife. Some of the projects covered include construction of farm ponds and development for multiple use; stressing recreation; habitat development for fish, game and non-game species; plans and development for commercial ventures such as shooting preserves, fish production, camping and recreation areas; special schools for the development of recreational skills and safety in hunting, fishing, camping, boating and water safety.

Emphasis is placed on the ecological impact of man's use of his environment.

Training schools are conducted for young adults and adult groups. Regular radio and television programs are produced for KSAC and the K-State radio network and for KARD, KAKE, and KTVH television stations and their satellite networks.

Extension Wildlife Damage Control

Assistant Professor Henderson.

The function of this section is to carry on an educational program throughout the state dealing with application of wildlife damage control methods that will minimize conflict between man and wildlife.

The work is based on attitudes that recognize that all species of wild animals are an important part of the environment in which we live, and that all species of wild animals have both negative and positive social and economic values. Encouragement is given to the use of techniques known to be of value in counteracting areas of conflict between man and wildlife. Lethal control, where and when employed, should be related to social and economic benefits and be the minimum necessary to bring damage within tolerable limits.

The specialist further encourages that animal damage control programs be thoroughly planned, justified, carried out and evaluated on the basis of total social benefits.

The work of this section is carried to every county in the state by conducting on-farm and ranch surveys immediately after loss of livestock from predators, giving control recommendations, demonstrations of equipment on an individual basis where damage has occurred.

Counsel is given on proper and up-to-date wildlife damage control procedures on animals and birds such as rats, mice, moles, gophers, coyotes, sparrows, starlings, pigeons or other non-game species. Information is disseminated by means of radio and television, and printed educational materials.

Extension Agricultural Engineering

WILLIAM H. JOHNSON, Head of Department
LEO T. WENDLING, State Leader

Professors Herpich, Johnson and Wendling; Associate Professors Holmes, Schindler, and Selby; Assistant Professors Hay, Jepsen, and Pope. Emeritus: Professors Ferguson and Stover.

The function of the Department of Extension Agricultural Engineering 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.

The department conducts educational programs throughout the state in subject matter fields such as the control of soil erosion; the development, conservation and utilization of water resources; irrigation systems and water management; animal waste management and water pollution control; the location, layout and design of livestock production plants; selection, maintenance and operation of farm machinery; systems for handling, storing, conditioning, and processing grains and feeds; the selection, installation and use of the electrical power on the farm and in the home; the design and development of improved housing for all Kansas families; and minimizing the loss or hazard of natural or manmade disasters, such as floods, tornados, or nuclear attack.

The department conducts a safety program in all subject matter areas. The department also assists with the development and planning of 4-H club programs which relate to the engineering phases of agriculture.

Much of the work is conducted in cooperation with the county extension office in each county. The remaining work is done in cooperation with various governmental agencies, the manufacturers and distributors of supplies, equipment and machinery used on the farms, other groups or organizations which serve agriculture, electrical power suppliers, state officials, and regional and national professional groups.

Marketing and Utilization of Agricultural Products

Agricultural Economics

PAUL L. KELLEY, Head of Department
NORMAN V. WHITEHAIR, Assistant Head

Professors Coppersmith, Kelley, and Whitehair; Associate Professors Jackson and Walker; Assistant Professors Fenwick and Frederick.

The Extension Marketing program operates on the philosophy that all people in Kansas have a vested interest in the efficient distribution of food and fiber products. Thus, the educational program remains open to all ideas, interests, and approaches to marketing, and a team approach method is used to solve problems in the marketing field.

The main projects of marketing include marketing information, agri-business, and commodity marketing products. Marketing news releases, publications directed to the general public, and special information directed toward specific agricultural audiences are methods used in disseminating marketing information.

County public meetings are held where information covering price outlook, market systems, market structure, general economic trends in the nation, international trade, money and credit, bargaining power, balance of payment, and analysis of alternative farm policy proposals is presented.

Educational work is conducted with agricultural business firms handling food and fiber. Those firms are included which buy directly from the farmer, sell input products and retail products and services. Educational work is conducted in the fields of sales, cooperatives, business management, market expansion, personnel training, advertising, and public relations.

The commodity marketing educational program emphasizes livestock, grain, dairy and poultry marketing. Also included are market organization, supply-demand analysis, short-range price outlook, bargaining power, and transportation problems.

Extension Grain Science and Industry

W. J. HOOVER, Head of Department
ROBERT W. SCHOEFF, Section Leader
Professors Hoover, Schoeff, and Wilcox; Extension Assistant Balding.

Kansas State University has the only Formula Feed Extension program in the United States designed for the feed industry. This unique Extension program, established in 1962, has as its purpose to assist personnel in the formula feed and allied industries in (1) the adoption and use of the latest manufacturing techniques, safety equipment and practices; quality control procedures, marketing methods, and modern

management principles and tools, including plant feasibility; and (2) the proper use of drugs and feed additives in animals and manufacturing practices as required by state and federal laws and regulations.

The clientele served are feed manufacturers, retail feed dealers, ingredient and equipment supply firms, building contractors, commercial feedlots, and others involved in the manufacturing, custom mixing and marketing of commercial feeds.

Extension Home Economics

BETTY J. BRANNAN, Assistant Director

Professor Brannan; Associate Professors Anderson, Elithorpe, Johnson and Wells; Assistant Professors Atkinson, Brill, Carlson, Guthrie, Howe, Miller, Patrick, Redeker, Spoon and Zimmerman; Instructors Meyer and Slinkman. Emeritus: Professors Allen, Koenig, Myers, and Smurthwaite; Associate Professors Dickinson, Self, and Wiggins; Assistant Professors Briggs and Starkey.

Educational programs designed to improve the quality of living are carried on in each Kansas County under the direction of Extension Home Economics.

Program emphases are in the areas of: Development of children and youth; adjustments in everyday living; adjustments in marital and parental roles; preparation for retirement years; changing roles of women; management in allocation of family resources; family financial security; money management; consumer performance in the market; nutrition and health; food safety and sanitation; health hazards in the home; community health hazards; home selection, building, buying, and remodeling (design, materials, finishes, lighting, etc.); housing costs and finance; community factors in housing decisions; furnishing and equipping the home; and developing community economic, social, cultural, human resources including understanding public concerns affecting families, expansion and improvement of cultural opportunities, employment and educational opportunities for women, and development of leadership abilities.

Each county tailors its home economics program according to its individual need.

Educational materials are prepared by Extension specialists and county Extension home economists. Educational programs are carried on through organized study groups,

public meetings, individual consultation, self-teaching materials and through the mass media of press, radio and television.

Extension Home Economics often works jointly with other agencies and organizations in carrying out educational programs.

4-H and Other Youth Programs

GLENN M. BUSSET, Head of Department

Professors Apel and Busset; Associate Professors Borst, Eyestone, Hanna, Honstead, and Neely; Assistant Professors Area, Bates, and Coen. Emeritus: Professors Johnson and Regnier.

4-H work is the out-of-school youth educational program of the University, conducted in cooperation with County Agricultural Extension Councils and the United States Department of Agriculture. In 4-H work young people take part in agricultural, homemaking, community service, health, education, safety, recreation, and other activities. 4-H work is often explained by the slogan "Learning by Doing." Through projects, scientific information recommended by the University is applied to problems of home living and personal development.

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 member's home or in a public building. The meetings have educational features, such as demonstrations, talks, and discussions. Adult leaders counsel with the 4-H members and give guidance to their club activities. Each 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 members work in cooperation with the county Extension agents.

In addition to approximately 34,000 boys and girls enrolled in 1,050 4-H Clubs, another 6,000 boys and girls have had one or more 4-H educational experiences as special 4-H members. The 4-H program nationally has more than 30 million alumni, and has been adopted per se or adapted into nearly 100 foreign countries.

4-H work began as the University sought to expand 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. So the 4-H program was broadened to include not only projects of a farm and home nature, but many other activities such as health, music, conservation of wildlife and natural resources, recreation, parliamentary practices and art.

The present 4-H 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 work around the world, is the 4-H International Farm Youth Exchange (IFYE). Kansas 4-H members have lived for periods of up to one year with farm families in foreign countries around the world. Youths from foreign countries have lived in Kansas host family homes. Kansas has sent and received more "IFYE's" than any other state, giving national leadership to the program for international understanding.

Center for Rural Development

Assistant Professors Frazier and Olsen.

The Center has two purposes: The first aim is to provide a stimulus and educational guidance in developing and implementing county or area-wide resource development programs that will strengthen the local economic well-being of people. The second objective is the optimum development and utilization of all local resources. The staff works with county Extension agents, local leaders, civic and governmental agencies,

and lay organizations to improve agriculture, promote non-farm employment and strengthen community service.

Extension Field Operations

Professors Cox and Norby; Associate Professors Hoss, King, and Mann; Assistant Professors Appleby, Baker, Blankenhagen, Crist, Finley, Neufeld, and Schroeder; Emeritus: Professors Baird and Blecha; Associate Professors Glover and Hagans; Assistant Professor Meyer.

County Extension work is designed to take research information from the University to the people of Kansas to help them solve problems.

There are county Extension offices in each of the 105 counties. These offices are presently staffed with two or more county Extension agents. County Extension positions available in these offices include county Extension director, agricultural agent, home economist, 4-H agent, and horticultural agent. The professional persons holding these positions are members of the faculty of Kansas State University and hold the academic rank of instructor.

County Extension work is financed by federal, state and local tax funds. A local nine member executive board aids in directing the programs and activities of the county Extension professional staff.

In addition to the problem-solving responsibility, local Extension professionals assist local persons in organizing group action to help solve community problems.

Probably no greater opportunity exists for a professional person to express himself through working with local people. A tremendous amount of self-satisfaction is gained by the Extension professional as he views the results of his efforts as he helps people — individually and collectively — from all races and income levels — move from where they are to where they want to be.

KSU ADMINISTRATORS AND FACULTY MEMBERS

Includes only those with rank of instructor or above

Reading Key — Academic ranks are abbreviated as follows: Professor, Prof.; Associate Professor, Assoc. Prof.; Assistant Professor, Asst. Prof.; Instructor, Instr. Academic ranks are current as of February, 1972. The first year listed in parentheses following the title is the date of initial employment at KSU; subsequent yearly dates (if any) are dates of appointment to higher academic ranks or to new positions. (GF) following a person's listing means he or she is a member of the Graduate Faculty; such persons also are designated as Graduate Faculty members in the body of the catalog by placement of asterisks following the names.

Officers of Administration

- ALLOWAY, JAY E.**, Instr., Computing Center (1970). BS 1970, Kansas State Univ.
- AYRES, JANET SPRANG**, Asst. Alumni Secretary (1970). BS 1970, Kansas State Univ.
- BEATTY, DANIEL D.**, Business Manager, Prof. of Business Administration (1956, 1959). AB 1947, Hope Col.; MBA 1949, Univ. of Michigan.
- BECK, GLENN H.**, Vice President for Agriculture (1936, 1965). BS 1936, Univ. of Idaho; MS 1938, Kansas State University; PhD 1950, Cornell Univ. (GF)
- BONEBRAKE, CASE A.**, Administrator of Physical Plant (1947, 1967). BS 1947, BS 1955, Kansas State Univ.
- BROWN, WILBUR E.**, Director, Student Publications, Asst. Prof. (1970). BS 1949, Kansas State Univ.
- CHALMERS, JOHN**, Vice President for Academic Affairs, Prof. of Economics (1963, 1969). AB 1938, Middlebury Col.; PhD 1943, Cornell Univ. (GF)
- COOL, VINCENT J.**, Asst. Prof. of Architecture; Asst. Vice President for Planning (1957, 1967). BS 1951, Kansas State Univ.; Registered Architect, 1952.
- DALLAM, JERALD**, Asst. Director of Records, Instr. (1968). BS 1959, Northwest Missouri State Col.; MS 1964, Oklahoma State Univ.
- DODGE, THEODORE O.**, Director, Budget Office, Asst. Prof. (1946, 1957). BS 1940, Kansas State Univ.; CPA 1954, Kansas.
- EDELMAN, SHELDON K.**, Office of Educational Resources, Assoc. Prof. (1964). BA 1952, Univ. of Illinois; MA 1956, Roosevelt Univ.; PhD 1960, Purdue Univ. (GF)
- ELKINS, RICHARD NELSON**, Assoc. Director of Admissions, Instr. (1966, 1968). BS 1956, MS 1963, Kansas State Univ.
- FORD, KENNEY LEE**, Alumni Secretary Emeritus (1928). BS 1924, MS 1932, Kansas State Univ.
- FOSTER, DONALD E.**, Director of Records, Instr. (1965, 1968). BS 1960, MS 1961, Kansas State Univ.
- GALLAGHER, TOM L.**, Director of Computer Science (1970); Assoc. Prof. of Computer Science (1970). BA 1953 and MS 1954, North Texas State Col.; DSc 1967, Washington Univ. (GF)
- GALE, HENRIETTA**, Instr. and Manager of Information Services, Computing Center (1969-1971). BS 1964, Univ. of Missouri; MS 1968, St. Cloud State Col.
- GERRITZ, ELLSWORTH M.**, Dean of Admissions and Records; Prof. (1954, 1962). BE 1938, St. Cloud State Teachers Col.; MS 1948, PhD 1951, University of Minnesota. (GF)
- HAINES, RICHARD D.**, Director, Office of Univ. Publications, Asst. Prof. (1967). BS 1953, Kansas State Univ.
- HAJDA, JOSEPH**, Director of International Activities, Assoc. Prof. of Political Science (1957, 1965, 1960). BPolSci 1948, Charles Univ., Prague (Czechoslovakia); AB 1951, MA 1952, Miami Univ., PhD 1955, Indiana Univ. (GF)
- HESS, H. DEAN**, Executive Alumni Secretary (1961). BS 1950, Kansas State Univ.
- HEYWOOD, KENNETH M.**, Director, Endowment and Development (1956). BS 1938, Kansas State Univ.; MA 1949, Univ. of Wyoming.
- HOYT, DONALD P.**, Director, Office of Educational Resources, Prof. (1968). BS 1948, Univ. of Illinois; MA 1950, PhD 1954, University of Minnesota. (GF)
- KEPPLE, MELVIN T.**, Director, Data Processing Center (1967). BS 1950, Washburn University.
- KRUH, ROBERT F.**, Dean of the Graduate School, Prof. of Chemistry (1967). AB 1948, PhD 1951, Washington Univ. (St. Louis). (GF)
- LAMBERT, JOHN P.**, Instr., Radiation Safety Officer (1964). BS 1959, Lebanon Valley College; MPH 1963, Univ. of Michigan.
- LEWIS, JAMES J.**, Director of Admissions, Asst. Prof. (1963). BS 1953, MS 1954, Kansas State University; EdD 1961, Univ. of Kansas.
- MCCAIN, JAMES ALLEN**, President (1950). AB 1926, LLD 1951, Wofford Col.; MA 1929, Duke Univ.; EdD 1948, Stanford Univ.; LLD 1964, Montana State Univ.; DSc, Andhra Pradesh State Univ. (India), 1967; LLD 1965, Colorado State Univ.
- MILBOURN, MAX W.**, Asst. to the President, Assoc. Prof. of Journalism (1949, 1957). AB 1938, Univ. of Wichita.
- MILLER, MICHAEL H.**, Asst. Director of Computing Center (1964-1966), and Asst. Prof. of Computer Science (1960-1965). BS 1958, and MS 1960, Iowa State.
- MURRY, JOHN P.**, Instr.; Asst. to the Vice President for Academic Affairs (1962, 1972). BS 1955, Rockhurst Col.; MS 1960, PhD 1971, Kansas State Univ.
- NELSON, DE VERE V.**, Director, Office of Sports Information, Asst. Prof. (1966). BS 1949, Kansas State Univ.
- NOONAN, JOHN P.**, Assoc. Dean of Graduate School (1947, 1966); Prof. of English (1968). BS 1947, Rockhurst Col.; MS 1950, Kansas State Univ.; PhD 1955, Denver Univ. (GF)
- OWENS, RICHARD E.**, Office of Educational Resources, Assoc. Prof. (1964, 1969). AB, BS 1949, Northwest Missouri State Col.; MS 1953, EdD 1964, Colorado State Col. (GF)
- PERRINE, LARRY G.**, Univ. Publications Editor, Instr. (1970). BS 1967, Oklahoma State Univ.
- PERRY, RALPH H.**, Comptroller, Asst. Prof. (1946, 1953, 1962). BS 1946, Kansas State Univ.
- ROCHAT, CARL ROBERT**, Director, Office of Univ. News, Assoc. Prof. of Journalism (1953, 1963). BS 1940, Kansas State Univ.; MS 1948, Univ. of Illinois.
- SCHWAB, MERLE E.**, Instructor, Vice President for Univ. Development (1970). BS 1949, Kansas State Univ., Registered Professional Engineer.
- SMITH, RONALD G.**, Instr., Manager of Programming Services, Computing Center (1969-1971). BS 1968; MS 1971, Kansas State Univ.
- STEHRLEY, DONALD R.**, Assoc. Alumni Secretary (1961, 1966). BS 1950, Kansas State Univ.
- TADTMAN, EMERSON L.**, Director, Personnel Services (1964, 1969).

TARRANT, DONALD H., Office of Educational Resources, Instructor, (1970). BS 1948, Morningside College; MS 1959, Iowa State University. (GF)

THOMAS, KENNETH EUGENE, Director, Division of Univ. Information, Prof. (1951, 1963). BA 1951, Southwestern Col.; MS 1952, Kansas State Univ.; PhD 1961, Univ. of Wisconsin. (GF)

UNGER, ELIZABETH A., Assoc. Director, Computing Center, Asst. Prof. of Computer Science (1966, 1969). BS 1961, MS 1963, Michigan State Univ.

WEBER, ARTHUR D., Vice President Emeritus (1924, 1963). BS 1922, MS 1926, Kansas State Univ.; PhD 1940, DSc 1950, Purdue Univ.

YOUNG, PAUL M., Prof., Vice President Univ. Development (1970). AB 1937, Miami Univ.; MA 1939, PhD 1941, Ohio State Univ. (GF)

Library Faculty

BAEHR, WILLIAM FREDERICK, Prof. Emeritus (1943, 1969). BS, LS 1927; MA 1930, Univ. of Illinois.

CAMP, MILDRED, Assoc. Prof. Emeritus (1927, 1955). AB 1912, Eureka Col.; BLS 1924, Univ. of Illinois.

DOBBYN, MARGARET L., Instr. (1970). BS 1942, Oklahoma State Univ.; MLS 1969, Univ. of Oklahoma.

FARLEY, RICHARD A., Director of Library, Professor (1966). BA 1940, Northland Col.; BLS 1941, Univ. of Wisconsin; MS 1952, PhD 1967, Univ. of Illinois. (GF)

FERGUSON, JANNA M., Instr. (1969). BA 1964, Tulane Univ.; MLS 1966, Univ. of Michigan.

FRANCO, CAROLE A., Instr. (1971). AB 1968, Baker Univ.; ML 1969, Kansas State Teachers Col.

GREENWOOD, L. LARRY, Instr. (1972). BA 1967, Kansas Wesleyan Univ.; MLS 1969, Kansas State Teachers Col.

GREGORY, MARGARET T., Instr. (1969). BS 1968, Univ. of Kansas; ML 1969, Kansas State Teachers Col.

HUBBARD, ADA M., Instr. (1971). BA 1955, Oklahoma Col. for Women; MA 1960, Northwestern Univ.

JOHNSON, JOHN L., Instr. (1970). BA 1967, Kansas State Univ.

KAISER, KATHLEEN K., Instr. (1971). BA 1967, Univ. of Kansas; ML 1969, Kansas State Teachers Col.

LITCHFIELD, MEREDITH C., Asst. Prof. (1967, 1970). BS 1950; MS 1967, Kansas State Teachers Col.

LITZ, LAURA HEINRICH, Instr. (1972). AB 1959, Kalamazoo Col.; AMLS 1968, AM 1970, Univ. of Michigan.

LU, JAMES Y., Instr. (1969). BA 1960, Tamkang Col.; MS 1965, MS 1970, Kansas State Teachers Col.

MASTER, SEVAKAL M., Instr. (1968). BA 1950, Wilson Col.; MLS 1965, Rutgers Univ.

MORELAND, RACHEL S., Instr. (1971). BS 1955, Univ. of Arizona; MS 1970, Kansas State Univ.

OWSLEY, CAROLE L., Instr. (1942, 1947). BS 1932, MS 1947, Kansas State Univ.; Library Certificate 1937, Kansas State Teachers Col.

QUIRING, VIRGINIA M., Instr. (1971). BA 1943, Ottawa Univ.; ML 1971, Kansas State Teachers Col.

RICHARDS, ARNE H., Asst. Prof. (1965). BA 1954, Yankton Col.; MLS 1960, Univ. of Illinois.

ROBERTS, MARY EILLEN, Asst. Prof. Emeritus (1938, 1970). BS 1930, Kansas State Univ.; BLS 1938, Univ. of Illinois; AM 1949, Univ. of Michigan.

ROHRER, RICHARD L., Instr. (1968). BS 1960, ML 1968, Kansas State Teachers Col.

RUDY, MICHELLE M., Instr. (1970). BS 1964, Univ. of Arizona; BA 1968, MLS 1970, Univ. of Washington.

SODERHOLM, DOROTHY J., Instr. (1966). BA 1946, Kearney State Teachers Col.; MA 1956, Wheaton Col.; MS 1959, Univ. of Illinois.

TAYLOR, ELLYN M., Instr. (1957, 1958). BS 1938, Kansas State Teachers Col.

VANDER VELDE, JOHN J., Instr. (1968). BA 1967, ML 1968, Kansas State Teachers Col.

WANCURA, ELTON N., Assoc. Prof., (1962, 1970). BS 1957, Kansas State Univ.; MA 1961, Denver Univ.

WHITE, NEVA L., Assoc. Prof. (1966, 1970). AB 1944, Goshen Col.; AB In LS 1946, Univ. of Michigan.

WILDE, LUCY M., Instr. (1967). BA 1965, Avila Col.; MLS 1967, Rosary Col.

WILLIAMS, EVAN W., Asst. Prof. (1964, 1971). AB 1955, Washington Univ.; MLS 1956, Univ. of Illinois.

WILSON, SANDRA L., Instructor (1972). BA 1969, Michigan State Univ.; MLS 1970, Western Michigan Univ.

WINTER, DOROTHY M., Instr. (1970). BS 1946, Kansas State Univ.; ML 1971, Kansas State Teachers Col.

Student Personnel Services Faculty

AKIN, JAMES N., Assoc. Director, Career Planning and Placement Center (1966). BS 1960, MS 1964, Kansas State Univ.

BERGEN, GERALD R., Director, Aids, Awards and Veterans Service (1965, 1969). BS 1958, MS 1967, Kansas State Univ.

BLACKBURN, RICHARD D., Director, K-State Union (1963). BS 1950, Kansas Wesleyan Univ.; MPS 1956, Univ. of Colorado.

BRADSHAW, MICHAEL H., Asst. Director, Health Education Section, Student Health Center, Instr. (1971). BS 1968, MEd 1971, Brigham Young Univ.

BRETTELL, J. ALLAN, Foreign Student Adviser, Asst. Prof., Center for Student Development (1966). BA 1949, MS 1951, Westminster Col.

BUTLER, NORVILLE L., Assoc. Prof., Student Health Center (1964). BA 1931, Nebraska Wesleyan Univ.; MD 1940, Univ. of Nebraska.

CARNEY, CLARKE G., Asst. Prof., Center for Student Development (1971). BA 1967, San Francisco State Col.; MA 1968, Bradley Univ.; PhD 1972, Univ. of Utah.

COON, CAROLYN A., Residence Hall Director, Instr. (1967, 1968). BBA 1964, Univ. of Iowa.

DANSKIN, DAVID G., Prof. of Psychology and Education, Center for Student Development (1959, 1966, 1968). AB 1950, Univ. of Redlands; MA 1951, PhD 1954, Ohio State Univ. (GF)

DE ORDIO, JOSEPH P., Instr., Center for Student Development (1968). BA 1964, MEd 1968, Univ. of Rochester; PhD 1971, Kansas State Univ.

EDWARDS, A. THORNTON, Director, Housing and Food Service, Assoc. Prof. of Psychology (1945, 1949). BS 1941, MS 1946, Kansas State Univ.

FRITH, THOMAS J., Residence Halls Program Director, Asst. Prof. (1965). BA 1960, MA 1963, EdS 1965, Univ. of Iowa.

GEISSLER, VERNON V., Asst. Director, Career Planning and Placement Center (1966). BS 1942, MS 1966, Kansas State Univ.

GREIG, BETTY SUE, Instr., Housing and Food Service (1958, 1971). BS 1948, Univ. of Arkansas; MS 1968, Kansas State Univ.

HILL, CYNTHIA J., Instructor, Housing and Food Service (1968, 1971). BS 1965, Ohio Univ.

KASPER, EUGENE C., Director, Center for Student Development, Dean of Students, Assoc. Prof. of Education (1968). BS 1956, MS 1956, Kansas State Teachers Col.; EdD 1963, Univ. of North Dakota. (GF)

KENNEDY, CARROLL E., Prof. of Family and Child Development, Center for Student Development (1954, 1970). AB 1949, Wheaton Col.; MS 1953, Kansas State Univ.; EdD 1963, Univ. of Maryland. (GF)

KERR, WENDELL ROBERT, Asst. Director, Housing and Food Service, Asst. Prof. of Education (1947, 1957). BS 1947, MS 1951, Kansas State Univ.

KOENIGSBERG, STEVEN M., Asst. Prof., Student Health Center (1971). BA 1964, Rutgers Univ.; MA 1966, Temple Univ.; PhD 1971, Univ. of South Carolina.

LACY, BURRITT S., JR., Consulting Psychiatrist, Student Health Center (1964). BA 1941, Harvard Univ.; MD 1944, Cornell Univ.; 1951, American Board of Psychiatry and Neurology.

LAFENE, BENJAMIN WILLIAM, Director Emeritus, Student Health Center, (1946, 1948, 1962). BS 1923, Michigan State Univ.; MD 1931, Western Reserve Univ.

LAMBERT, JOHN P., Instr., Radiation Safety Officer (1964). BS 1959, Lebanon Valley Col.; MPH 1963, Univ. of Michigan.

LAUGHLIN, J. BRUCE, Director, Career Planning and Placement Center, Asst. Prof. (1962, 1966). BS 1950, Univ. of Kansas; MS 1961, Kansas State Univ.; JD 1967, Washburn Univ.

LILLY, JERRY A., Administrative Asst., Vice President for Student Affairs, Instr. (1967). BS, Ed, 1964, Concord Col.

MASON, CLAUDE T., Prof., Student Health Center (1966, 1969). BSc 1930, MD 1932, Univ. of Nebraska.

MCCOY, DONALD E., Associate Prof., Student Health Center (1970). BS 1937, MD 1945, Univ. of Kansas.

MCMANIS, HELEN L., Instr., Housing and Food Service (1966, 1971). BS 1941, Kansas State Univ.

MITCHELL, SHARLENE K., Residence Hall Director, Instr. (1969). BS 1968, Kansas State Univ.

NORDIN, MARGARET N., Assoc. Director, Center for Student Development, Dean of Women, Assoc. Prof. (1957). BS 1941, MA 1953, PhD 1962, Univ. of Minnesota.

OGG, WILLIAM D., Instr., Center for Student Development (1964). BS 1956, MS 1964, Kansas State University.

PEINE, CAROLINE F., Instr., Center for Student Development (1961). AB 1947, Carleton Col.; MS 1951, Kansas State Univ.

PENCE, JOHN T., Instr., Housing and Food Service (1963, 1971). BS 1963, Purdue Univ.; MS 1970, Kansas State Univ.

PETERS, CHESTER E., Vice President for Student Affairs, Prof. (1947, 1953, 1962, 1967). BS 1947, MS 1950, Kansas State Univ.; PhD 1953, Univ. of Wisconsin.

PHILLIPS, STEPHEN B., Chief, Clinical Medicine, Student Health Center, Assoc. Prof. (1967). AB 1942, MD 1945, Univ. of Kansas.

REYNOLDS, JAMES R., Asst. Director, K-State Union (1967, 1970). BA 1964, Southern Illinois Univ.

RIGGS, JEAN M., Assoc. Director, Housing and Food Service, Assoc. Prof. of Institutional Management (1960). BS 1939, MS 1956, Iowa State University.

ROBEL, RAYDON H., Asst. Director, Department of Intramurals and Recreation (1970). BS 1965, MS 1970, Kansas State Univ.

ROOF, DONALD B., Residence Hall Director, Instr. (1964). BS 1964, Kansas State Univ.

ROSE, DONALD L., Director, Department of Intramurals and Recreation (1968). BS 1953, Kansas State Univ.

SEGO, WILBURN, Residence Hall Director, Instr. (1967). AB 1951, Western Kentucky Univ.

SINCLAIR, ROBERT E., Director, Student Health Center, Prof. (1970). BA 1948, MD 1952, Ohio State Univ.

SINNETT, E. R., Asst. Director, Mental Health Section, Student Health Center, Prof. of Psychology (1962). AB 1948, Univ. of Iowa; MA 1950, PhD 1953, Univ. of Michigan.

SISTRUNK, JOAN N., Instr., Center for Student Development (1969). BS 1951, Kansas State Univ.; MA 1957, Univ. of Minnesota.

SMITH, ROBERT W., Residence Hall Director, Instr. (1968). BS 1964, Kansas State Univ.

SMITH, WALTER D., Assoc. Director, K-State Union (1957, 1966). BA 1950, Kansas Wesleyan Univ.

STEFFEN, JOHN D., Asst. Prof. of Education, Center for Student Development (1967). BA 1956, Hamline Univ.; PhD 1968, Univ. of Minnesota.

STRONG, MABEL B., Residence Hall Director, Instr. (1961, 1964). BS 1961, Kansas State Univ.

SWITZER, VERYL A., Asst. to Vice President for Student Affairs for Univ. Human Relations, Instr. (1969). BS 1954, Kansas State Univ.

TROTTER, MARILYN B., Instr., Center for Student Development (1967). BS 1965, MS 1967, Kansas State Univ.

UPHAM, JAMES A., Assoc. Director, Aids, Awards and Veterans Service (1967, 1969). BS 1943, MS 1969, Kansas State Univ.

ZEIGLER, MERNA MILLER, Director of Food Service, K-State Union, Assoc. Prof. of Institutional Management (1940, 1957). BS 1932, MS 1941, Kansas State Univ. (GF)

ZIELKE, DONALD D., Asst. Director, Aids, Awards and Veterans Service (1971). BS 1955, Wichita State Univ.; MS 1970, Kansas State Univ.

College of Agriculture

ABLE, BILLY V., Asst. Prof. of Animal Science and Industry (1970). BS 1962, Oklahoma State Univ.; MS 1964, Mississippi State; PhD 1970, Univ. of Kentucky. (GF)

ABMEYER, ERWIN, Asst. Prof. of Horticulture and Forestry; Asst. Pomologist, Northeast Kansas Experiment Field (1934, 1935). BS 1933, Kansas State Univ.

ADAMS, ALBERT W., Assoc. Prof. of Dairy and Poultry Science; Assoc. Poultry Scientist, Agr. Exp. Sta. (1962, 1968). BS 1951, MS 1955, Kansas State Univ.; PhD 1964, South Dakota State Univ. (GF)

AICHER, LOUIS CORNELIUS, Prof. of Animal Science and Industry Emeritus (1921, 1957). BS 1910, Kansas State Univ.

ALLEE, GARY L., Asst. Prof. of Animal Science and Industry (1970). BS 1966, MS 1967, Univ. of Missouri; PhD 1970, Univ. of Illinois. (GF)

ALLEN, DELORAN M., Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1966, 1970). BS 1961, Kansas State Univ.; MS 1963, Univ. of Idaho; PhD 1966, Michigan State Univ. (GF)

AMES, DAVID R., Asst. Prof. of Animal Science and Industry; Asst. Animal Scientist, Agr. Exp. Sta. (1969). BS 1964, MS 1966, Ohio State Univ.; PhD 1968, Michigan State Univ. (GF)

ANDERSON, KLING L., Prof. of Agronomy Emeritus (1936, 1967). BS 1936, Univ. of California; MS 1938, Kansas State Univ.; PhD 1951, Univ. of Nebraska.

AREHART, JR., LAURENCE A., Asst. Prof.; Asst. Animal Scientist, Colby Branch Agr. Exp. Sta. (1970). BS 1965, Virginia Polytechnic Institute; MS 1970, Kansas State Univ.

ARNETT, DUDLEY W., Assoc. Prof.; Assoc. Animal Scientist, Garden City Branch Agr. Exp. Sta. (1967). BS 1959, Texas Tech Col.; MS 1960, Univ. of Kentucky; PhD 1963, Oklahoma State Univ.

ATKINSON, C. HARRY, Assoc. Prof. of Agronomy; Soil Scientist, Soil Conservation Service, U.S.D.A., Agr. Exp. Sta. (1949). BS 1931, MS 1933, Pennsylvania State Univ.

AUBEL, CLIFF E., Prof. of Animal Science and Industry Emeritus (1915, 1961). BS 1915, Pennsylvania State Univ.; MS 1917, Kansas State Univ.; PhD 1931, Univ. of Minnesota.

AXELTON, MILBURN C., Asst. Prof. of Agronomy Emeritus (1929, 1970). BS 1928, Kansas State Univ.

BANBURY, EVANS E., Assoc. Prof.; Superintendent in charge, Colby Branch Agr. Exp. Sta. (1946, 1955). BS 1940, Kansas State Univ.

BARLOW, W. MACK, Instr. of Biochemistry (1970). AB 1938, MA 1945, Univ. of Kansas.

BARNETT, FRANCIS L., Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1956, 1959). BS 1952, McGill Univ. (Canada); MS 1954, PhD 1956, Pennsylvania State Univ. (GF)

BARTLEY, ERLE E., Prof. of Dairy and Poultry Science; Dairy Nutritionist, Agr. Exp. Sta. (1949, 1958). BS 1944, Allahabad Univ. (India); MS 1946, PhD 1949, Iowa State Univ. (GF)

BASSETTE, RICHARD, Assoc. Prof. of Dairy and Poultry Science; Assoc. Dairy Scientist, Agr. Exp. Sta. (1958, 1964). BS 1952, MS 1955, PhD 1958, Univ. of Maryland. (GF)

BAXTER, WILLIAM M., Asst. Prof. and Asst. to the Superintendent, Fort Hays Agr. Exp. Sta. (1949, 1967). BS 1949, Kansas State Univ.

BEASON, EDWIN J., Instr.; Asst. Agronomist, Southeast Kansas Branch Agr. Exp. Sta. (1966). BS 1965, MS 1966, Kansas State Univ.

BEAT, LARRY J., Instr. in Dairy and Poultry Science; Asst. in Dairy Improvement, Agr. Exp. Sta. (1970). BS 1967, Kansas State Univ.

BIDWELL, ORVILLE W., Prof. of Agronomy; Agronomist, Agr. Exp. Sta. (1950, 1960). AB 1940, Oberlin Col.; BS 1942, PhD 1949, Ohio State Univ. (GF)

BIERE, ARLO WILLIAM, Asst. Prof. of Agricultural Economics; Asst. Economist, Agr. Exp. Sta. (1968). BS 1963, Univ. of Nebraska; MA 1964, PhD 1967, Univ. of California. (GF)

BLOCKER, H. DERRICK, Assoc. Prof. of Entomology; Assoc. Entomologist, Agr. Exp. Sta. (1965, 1971). BS 1954, MS 1958, Clemson Univ.; PhD 1965, North Carolina State Univ. (GF)

BOLING, JOHNNY C., Asst. Prof. of Entomology; Asst. Entomologist, Agr. Exp. Sta. (1970). BS 1965, Texas A and M; MS 1968, PhD 1970, Mississippi State Univ. (GF)

BOLSEN, KEITH K., Asst. Prof. of Animal Science and Industry; Asst. Animal Scientist, Agr. Exp. Sta. (1971). BS 1966, MS 1967, Univ. of Illinois; PhD 1971, Univ. of Nebraska. (GF)

BONNE, DONALD J., Instr. of Agronomy; Asst. Agronomist, Southwest Kansas Experiment Field (1969). BS 1967, MS 1969, Univ. of Nebraska.

BORDOVSKY, DAVID G., Asst. Prof.; Agricultural Engineer, Colby Branch Agr. Exp. Sta. (1971). BS 1970, MS 1972, Texas A & M Univ.

BOREN, FRED W., Prof. and Superintendent in charge, Southeast Kansas Branch Agr. Exp. Sta. (1957, 1968). BS 1946, A & M Col. of Texas; MS 1950, Kansas State Univ.; PhD 1965, Utah State Univ.

BRANDNER, LOWELL, Prof.; Agricultural Editor (1947, 1961). AB 1937, BS 1937, Emporia State Teachers Col.; MS 1951, Kansas State Univ.; PhD 1960, Univ. of Wisconsin. (GF)

BRATCHER, BOBBY G., Instr. of Agronomy; Secretary, Kansas Crop Improvement Association (1971). BS 1969, MS 1971, Oklahoma State Univ.

BRENT, BENNY E., Assoc. Prof. of Animal Science and Industry (1966, 1969). BS 1959, MS 1960, Kansas State Univ.; PhD 1966, Michigan State Univ. (GF)

BRETHOUR, JOHN R., Assoc. Prof.; Assoc. Animal Scientist, Fort Hays Branch Agr. Exp. Sta. (1957, 1968). BS 1955, Kansas State Univ.; MS 1956, Oklahoma State Univ.

BRINKMAN, GEORGE L., Asst. Prof. of Agricultural Economics; Asst. Economist, Agr. Exp. Sta. (1969). BS 1964, MS 1965, Washington State Univ.; PhD 1969, Michigan State Univ.

BROWDER, LEWIS E., Asst. Prof. of Plant Pathology; Research Plant Pathologist, U.S.D.A., Agricultural Research Service (1958). AS 1952, Cameron State Agricultural Col.; BS 1954, MS 1956, Oklahoma State Univ.; PhD 1965, Kansas State Univ. (GF)

BULLER, ORLAN H., Assoc. Prof. of Agricultural Economics; Assoc. Economist, Agr. Exp. Sta. (1963, 1969). BS 1958, Kansas State Univ.; MS 1959, PhD 1965, Michigan State Univ. (GF)

BURCHETT, LOWELL A., Instr. in Agronomy; Asst. Agronomist, North Central Kansas Experiment Field (1965). BS 1956, Oklahoma State Univ., MS 1969, Kansas State Univ.

BURKHARD, RAYMOND KENNETH, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1950, 1957). AB 1947, Arizona State Col.; PhD 1950, Northwestern Univ. (GF)

CALL, EDWARD P., Assoc. Prof. of Dairy and Poultry Science; Assoc. Dairy Scientist, Agr. Exp. Sta. (1963, 1968). BS 1951, Ohio State Univ.; PhD 1967, Kansas State Univ. (GF)

CAMPBELL, RONALD W., Prof.; Head, Department of Horticulture and Forestry; Horticulturist in charge, Agr. Exp. Sta. (1946, 1966). BS 1943, MS 1946, Kansas State Univ.; PhD 1955, Michigan State Univ. (GF)

CARPENTER, FRANK R., Asst. Dean, Col. of Agriculture; Assoc. Prof. (1961, 1969). BS 1948, MS 1951, Kansas State Univ.; PhD 1967, Univ. of Missouri.

CASADY, ALFRED J., Prof. of Agronomy; Research Agronomist, U.S.D.A., Agricultural Research Service (1949, 1970). BS 1948, MS 1950, PhD 1962, Kansas State Univ. (GF)

CLAPP, ALFRED L., Prof. of Agronomy Emeritus (1915, 1961). BS 1914, MS 1934, Kansas State Univ.

CLAYDON, THOMAS J., Prof. of Dairy and Poultry Science; Dairy Scientist, Agr. Exp. Sta. (1946, 1965). BSA 1934, Univ. of Saskatchewan (Canada); MS 1936, PhD 1939, Iowa State Univ. (GF)

CLEGG, ROBERT E., Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1948, 1954). BS 1936, Rhode Island State Col.; MS 1939, North Carolina State Col.; PhD 1948, Iowa State Univ. (GF)

CONDRAV, JERRY L., Asst. Prof.; Asst. Agronomist, Garden City Branch Agr. Exp. Sta. (1968). BS 1966, MS 1968, Kansas State Univ.

COX, RUFUS F., Prof. of Animal Science and Industry Emeritus (1930, 1971). BS 1923, Oklahoma State Univ.; MS 1925, Iowa State Univ.; PhD 1941, Cornell Univ.

CRAIG, JAMES V., Prof. of Dairy and Poultry Science; Poultry Geneticist, Agr. Exp. Sta. (1955, 1960). BS 1948, MS 1949, Univ. of Illinois; PhD 1952, Univ. of Wisconsin. (GF)

CUNNINGHAM, BRYCE A., Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1963). BA 1955, BS 1958, PhD 1963, Univ. of Minnesota. (GF)

CUNNINGHAM, FRANKLIN E., Assoc. Prof. of Dairy and Poultry Science; Assoc. Poultry Scientist, Agr. Exp. Sta. (1969). BS 1957, Kansas State Univ.; MS 1959, PhD 1963, Univ. of Missouri. (GF)

DAINELLO, FRANK J., Asst. Prof. of Horticulture and Forestry; Sedgwick County Horticultural Field (1969). BS 1964, Southeastern Louisiana Col.; MS 1966, Louisiana State Univ.

DePEW, LESTER J., Asst. Prof. of Entomology; Asst. Entomologist (P.O. Garden City) (1954, 1959). BS 1949, Colorado A & M; MS 1954, Univ. of Minnesota.

DEYOE, CHARLES W., Prof. of Grain Science and Industry; Feed Technologist, Agr. Exp. Sta. (1962, 1968). BS 1955, Kansas State Univ.; MS 1957, PhD 1959, Texas A & M Col. (GF)

DICKERSON, OTTIE J., Assoc. Prof. of Plant Pathology; Nematologist, Agr. Exp. Sta. (1961, 1966). AS 1953, Arkansas Polytechnic Col.; BSA 1955, MS 1956, Univ. of Arkansas; PhD 1961, Univ. of Wisconsin. (GF)

DIKEMAN, MICHAEL E., Asst. Prof. of Animal Science and Industry; Asst. Animal Scientist, Agr. Exp. Sta. (1970). BS 1966, Kansas State Univ.; MS 1968, Michigan State Univ.; PhD 1970, Kansas State Univ. (GF)

DILLON, MERLIN A., Instr.; Asst. Agronomist, Tribune Branch Agr. Exp. Sta. (1971). BS 1967, Panhandle State Col.; MS 1970, Colorado State Univ.

DODGE, GILBERT R., Asst. Prof. and Administrative Asst., Agr. Exp. Sta. (1958). BS 1950, Kansas State Univ.; CPA 1957, Kansas.

DUITSMAN, W. WILLIAM, Prof. and Superintendent in charge, Fort Hays Branch Agr. Exp. Sta. (1941, 1970). BS 1940, Kansas State Univ.

EATON BENNY J., Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1970). BS 1966, MS 1968, Oklahoma State Univ.; PhD 1971, Kansas State Univ.

EDMUNDS, LEON K., Assoc. Prof. of Plant Pathology; Research Plant Pathologist, U.S.D.A., Agricultural Research Service (1960, 1968). BS 1953, PhD 1958, Univ. of Wisconsin. (GF)

EHLER, STANLEY W., Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1972). BS 1962, MS 1964, Univ. of Southern Illinois; PhD 1972, Univ. of Missouri.

- ELLIS, JR., ROSCOE**, Prof. of Agronomy; Agronomist, Agr. Exp. Sta. (1948, 1960). BS 1948, MS 1950, Kansas State Univ.; PhD 1952, Univ. of Wisconsin. (GF)
- ELMER, OTTO HERMAN**, Prof. of Plant Pathology Emeritus (1927, 1961). BS 1911, MS 1971, Oregon State Col.; PhD 1924, Iowa State Univ.
- ELZINGA, RICHARD J.**, Assoc. Prof. of Entomology, Assoc. Entomologist, Agr. Exp. Sta. (1961, 1966). BS 1955, MS 1956, PhD 1960, Univ. of Utah. (GF)
- ERHART, ANDREW B.**, Prof. and Superintendent in charge, Garden City Branch Agr. Exp. Sta. (1931, 1952). BS 1933, Kansas State Univ.
- ESHBAUGH, ELBERT L.**, Asst. Prof. of Entomology; Asst. Entomologist, Agr. Exp. Sta. (1945, 1952). BS 1936, MS 1951, Kansas State Univ.
- FARMER, EARL L.**, Prof. of Dairy and Poultry Science; Dairy Scientist, Agr. Exp. Sta. (1949, 1968). BS 1948, Univ. of Missouri; MS 1957, Kansas State Univ.; PhD 1963, Univ. of Wisconsin. (GF)
- FARRELL, EUGENE PATRICK**, Prof. of Grain Science and Industry; Milling Technologist, Agr. Exp. Sta. (1949, 1967). BS 1935, MS 1952, Kansas State Univ. (GF)
- FILINGER, GEORGE A.**, Prof. of Horticulture and Forestry, Emeritus (1931, 1966). BS 1924, MS 1925, Kansas State Univ.; PhD 1931, Ohio State Univ.
- FINNEY, KARL FREDERICK**, Prof. of Grain Science and Industry; Chemist, U.S.D.A., Agricultural Research Service (1938, 1948). AB 1935, Kansas Wesleyan Univ.; BS 1936, MS 1937, Kansas State Univ. (GF)
- FUNSCH, ROBERT W.**, Asst. Prof. of Horticulture and Forestry; Asst. Forester, Agr. Exp. Sta. (1968). BS 1958, Rutgers Univ.; MS 1959, Yale Univ.
- GEYER, WAYNE A.**, Asst. Prof. of Horticulture and Forestry; Asst. Forester, Agr. Exp. Sta. (1966). BS 1955, Iowa State Univ.; MS 1962, Purdue Univ. PhD 1971, Univ. of Minnesota.
- GOLTZ, STEWART M.**, Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1971). BS 1966, MS 1967, Univ. of California; PhD 1971, Univ. of Wisconsin.
- GOOD, DON L.**, Prof., Head of Department of Animal Science and Industry; Animal Scientist in charge, Agr. Exp. Sta. (1947, 1966). BS 1947, Ohio State Univ.; MS 1950, Kansas State Univ.; PhD 1956, Univ. of Minnesota. (GF)
- GREIG, JR., JAMES K.**, Prof. of Horticulture and Forestry; Olericulturist, Agr. Exp. Sta. (1952, 1969). BS 1949, MS 1950, Univ. of Arkansas; PhD 1960, Kansas State Univ. (GF)
- GRONAU, DON M.**, Instr. of Agronomy; Asst. Agronomist, Newton Experiment Field (1965). BS 1962, Kansas State Univ.
- GRUVER, CLIFFORD N.**, Instr. of Agronomy; Asst. Agronomist, East Central Experiment Field (1967). BS 1962, Kansas State Univ.
- GWIN, JR., ROY E.**, Asst. Prof. and Superintendent in charge, Tribune Branch Agr. Exp. Sta. (1957, 1966). BS 1943, MS 1963, Kansas State Univ.
- HACKEROTT, HAROLD LEROY**, Prof.; Agronomist, Fort Hays Branch Agr. Exp. Sta. (1954, 1970). BS 1945, MS 1946, Kansas State Univ.
- HADLE, FRED BENTON**, Asst. Prof. of Horticulture and Forestry; Asst. Pomologist, Agr. Exp. Sta. (1951). BS 1951, MS 1958, Kansas State Univ.
- HALL, CHARLES V.**, Prof. of Horticulture and Forestry; Olericulturist, Agr. Exp. Sta. (1953, 1969). BS 1950, MS 1953, Univ. of Arkansas; PhD 1960, Kansas State Univ. (GF)
- HANSING, EARL DAHL**, Prof. of Plant Pathology; Plant Pathologist, Agr. Exp. Sta. (1935, 1947). BS 1933, Univ. of Minnesota; MS 1937, Kansas State Univ.; PhD 1941, Cornell Univ. (GF)
- HARBERS, LENIEL H.**, Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1964). BS 1957, MS 1958, Texas A & M Col.; PhD 1961, Oklahoma State Univ. (GF)
- HARVEY, T. L.**, Prof. of Entomology; Entomologist, Agr. Exp. Sta. (1954, 1970). BS 1950, MS 1951, Kansas State Univ.; PhD 1963, Oklahoma State Univ. (P. O. Hays). (GF)
- HEDGCOCK, JR., CHARLES**, Assoc. Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1965, 1968). BS 1961, PhD 1965, Univ. of Texas. (GF)
- HELMER, LYLE G.**, Asst. Prof.; Dairy Scientist, Southeast Kansas Branch Agr. Exp. Sta. (1969). BS 1963, MS 1965, PhD 1969, Kansas State Univ.
- HERRON, GEORGE M.**, Assoc. Prof.; Assoc. In Solis, Garden City Branch Agr. Exp. Sta. (1956, 1971). BS 1949, MS 1950, Oklahoma State Univ.; PhD 1968, Univ. of Nebraska.
- HESS, CARROLL V.**, Dean, Col. of Agriculture; Assoc. Director, Agr. Exp. Sta. (1966). BS 1947, Pennsylvania State Univ.; MS 1948, PhD 1953, Iowa State Univ. (GF)
- HEYNE, ELMER GEORGE**, Prof. of Agronomy; Agronomist, Agr. Exp. Sta. (1936, 1947). BS 1935, Univ. of Nebraska; MS 1938, Kansas State Univ.; PhD 1952, Univ. of Minnesota. (GF)
- HINES, ROBERT H.**, Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1966, 1969). BS 1957, Purdue Univ.; MS 1961, PhD 1966, Michigan State Univ. (GF)
- HINRICHS, MARLIN D.**, Asst. Prof.; Asst. Agronomist, Colby Branch Agr. Exp. Sta. (1971). BS 1966, MS 1968, Univ. of Nebraska.
- HOBBS, JAMES A.**, Prof. of Agronomy; Agronomist, Agr. Exp. Sta. (1950, 1958). BS 1935, MS 1940, Univ. of Manitoba (Winnipeg); PhD 1948, Purdue Univ. (GF)
- HOOVER, JAMES D.**, Instr. in Animal Science and Industry; Asst. Animal Scientist, Agr. Exp. Sta. (1966). BS 1961, MS 1970, Kansas State Univ.
- HOOVER, WILLIAM J.**, Prof.; Head, Department of Grain Science and Industry, Director, Food and Feed Grains Institute (1966). BS 1950, MS 1954, PhD 1961, Univ. of Illinois. (GF)
- HOPKINS, THEODORE L.**, Prof. of Entomology; Entomologist, Agr. Exp. Sta. (1960, 1970). BS 1951, MS 1956, Oregon State Univ.; PhD 1960, Kansas State Univ. (GF)
- HORBER, ERNST K.**, Prof. of Entomology; Entomologist, Agr. Exp. Sta. (1970). BS 1945, DSc 1951, Swiss Federal Institute of Technology; PhD 1954, Kansas State Univ. (GF)
- HOSENEY, R. CARL**, Assoc. Prof. of Grain Science and Industry, Cereal Chemist, Agr. Exp. Sta. (1971). BS 1957, MS 1960, PhD 1968, Kansas State Univ. (GF)
- HOWE, HAROLD**, Dean of Graduate School Emeritus; Prof. of Agricultural Economics Emeritus (1925, 1964). BS 1922, Kansas State Univ.; MS 1923, Univ. of Maryland; PhD 1937, Univ. of Wisconsin; LLD 1950, St. Benedict's Col.
- HUMBURG, NEIL E.**, Asst. Prof. of Agronomy; Asst. Agronomist, Kansas River Valley Irrigation Experiment Field (1970). BS 1955, MS 1965, Colorado State Univ.; PhD 1970, Univ. of Wisconsin.
- HUSTON, KEITH**, Prof.; Assoc. Director of Agr. Exp. Sta. (1954, 1971). BS 1949, MS 1950, PhD 1951, Univ. of Wisconsin. (GF)
- JACKSON, WILLIAM P.**, Instr. in Dairy and Poultry Science; Asst. in Dairy Improvement (1965). BS 1965, Colorado State Univ.
- JACOBS, HYDE S.**, Prof., Head, Department of Agronomy; Agronomist in charge, Agr. Exp. Sta.; Director, Kansas Water Resources Research Institute; Director, Evapotranspiration Laboratory; (1957, 1971). BSA 1952, MS 1953, Univ. of Idaho; PhD 1957, Michigan State Univ. (GF)
- JOHNSON, JOHN A.**, Prof. of Grain Science and Industry; Milling and Baking Research, Agr. Exp. Sta. (1940, 1955). BS 1940, North Dakota Agricultural Col.; MS 1942, Kansas State Univ.; PhD 1954, Univ. of Minnesota. (GF)
- JOHNSON, LOWELL B.**, Assoc. Prof. of Plant Pathology; Assoc. Plant Pathologist, Agr. Exp. Sta. (1968, 1971). BS 1957, Univ. of Illinois; MS 1962, PhD 1964, Purdue Univ. (GF)
- KADOUM, AHMED M.**, Asst. Prof. of Entomology; Asst. Entomologist, Agr. Exp. Sta. (1966). BS 1958, Alexandria Univ.; MS 1963, PhD 1966, Univ. of Nebraska. (GF)
- KAHRS, AMOS J.**, Instr. in Dairy and Poultry Science; Asst. Poultry Scientist, Agr. Exp. Sta. (1956, 1958). BS 1953, Kansas State Univ.
- KANEMASU, EDWARD T.**, Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1969). BS 1962, MS 1964, Montana State Univ.; PhD 1969, Univ. of Wisconsin. (GF)
- KEEN, RAY A.**, Prof. of Horticulture and Forestry; Ornamental Horticulturist, Agr. Exp. Sta. (1947, 1956). BS 1942, Kansas State Univ.; MS 1947, PhD 1956, Ohio State Univ. (GF)
- KELLEY, PAUL LEO**, Prof.; Head, Department of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1943, 1968). BS 1943, MS 1946, Kansas State Univ.; PhD 1956, Iowa State Univ. (GF)
- KIRACOFE, GUY H.**, Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1966, 1969). BS 1958, MS 1960, Virginia Polytechnic Col.; PhD 1965, Kansas State Univ. (GF)
- KLOPFENSTEIN, WILLIAM E.**, Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1964). BS 1958, MS 1961, PhD 1964, Pennsylvania State Univ. (GF)
- KNIGHT, DALE A.**, Assoc. Prof. of Agricultural Economics; Assoc. Agricultural Economist, Agr. Exp. Sta. (1948, 1957). BS 1945, Kansas State Univ.; MS 1946, Cornell Univ.; AM 1948, PhD 1952, Univ. of Chicago. (GF)
- KNUTSON, HERBERT**, Prof.; Head, Department of Entomology, Entomologist in charge, Agr. Exp. Sta. (1953). AB 1936, Iowa Wesleyan Col.; MS 1937, Southern Methodist Univ.; PhD 1941, Univ. of Minnesota. (GF)
- KOCH, BERL A.**, Prof. of Animal Science and Industry; Animal Scientist, Agr. Exp. Sta. (1956, 1963). BS 1949, Iowa State Univ.; MS 1951, Cornell Univ.; PhD 1955, Univ. of California. (GF)
- KOUDELE, JOSEPH WENDELL**, Assoc. Prof. of Agricultural Economics; Assoc. Agricultural Economist, Agr. Exp. Sta. (1947, 1958). BS 1943, Univ. of Nebraska; MS 1947, Univ. of Minnesota; PhD 1956, Michigan State Univ. (GF)
- KROPF, DONALD HARRIS**, Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1962). BS 1952, Univ. of Wisconsin, MS 1953, Univ. of Florida; PhD 1956, Univ. of Wisconsin. (GF)
- KYLE, JACK H.**, Asst. Prof.; Asst. Horticulturist, Garden City Branch Agr. Exp. Sta. (1968). BS 1953, Kansas State Univ.; MS 1955, Univ. of Idaho; PhD 1959, Washington State Univ.
- LARSON, VERNON C.**, Prof.; Campus Coordinator, International Agricultural Programs (1962, 1970). BS 1947, MS 1950, PhD 1954, Michigan State Univ.
- LAUNCHBAUGH, JR., JOHN L.**, Prof.; Agronomist, Fort Hays Branch Agr. Exp. Sta. (1955, 1967). AB 1947, MS 1948, Fort Hays Kansas State Col.; PhD 1952, Texas A & M Col.
- LAWLESS, JOHN R.**, Asst. Prof.; Asst. Agronomist, Colby Branch Agr. Exp. Sta. (1960, 1965). BS 1958, Univ. of Nebraska; MS 1960, Washington State Univ.
- LIANG, GEORGE H. L.**, Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1964, 1969). BS 1956, Taiwan Provincial Col.; MS 1961, Univ. of Wyoming; PhD 1964, Univ. of Wisconsin. (GF)
- LINEBACK, DAVID R.**, Assoc. Prof. of Grain Science and Industry; Cereal Chemist, Agr. Exp. Sta. (1969). BS 1956, Purdue Univ.; PhD 1962, Ohio State Univ. (GF)
- LIVERS, RONALD W.**, Prof.; Agronomist, Fort Hays Branch Agr. Exp. Sta. (1962, 1966). BS 1948, MS 1949, Kansas State Univ.; PhD 1957, Univ. of Minnesota.
- LONG, CHARLES E.**, Instr. in Horticulture and Forestry; Ornamental Horticulturist, Agr. Exp. Sta. (1965). BS 1964, MS 1965, Oklahoma State Univ.; PhD 1972, Kansas State Univ.
- LUNDQUIST, MARVIN C.**, Asst. Prof. of Agronomy; Asst. Agronomist, Sandyland Experiment Fields (1951, 1965). BS 1950, MS 1952, Kansas State Univ.
- MACKINTOSH, DAVID L.**, Prof. of Animal Science and Industry Emeritus (1921, 1965). BS 1920, Univ. of Minnesota; MS 1925, Kansas State Univ.
- MACMASTERS, MAJEL M.**, Prof. of Grain Science and Industry Emeritus; Cereal Chemist, Agr. Exp. Sta. (1960). BS 1926, MS 1928, PhD 1934, Univ. of Massachusetts.
- MADER, ERNEST LEE**, Prof. of Agronomy; Agronomist, Agr. Exp. Sta. (1948, 1968). BS 1936, MS 1944, Oklahoma State Univ.; PhD 1948, Univ. of Nebraska. (GF)
- MANUEL, MILTON LLOYD**, Prof. of Agricultural Economics, Agricultural Economist, Agr. Exp. Sta. (1945, 1959). BS 1941, MS 1948, Kansas State Univ.; PhD 1952, Univ. of Minnesota. (GF)
- MARTIN, WILLARD HUNGATE**, Prof. of Dairy Science Emeritus (1925, 1928). BS 1918, Purdue Univ.; MS 1922, Pennsylvania State Univ.

- MATTSON, RICHARD H.**, Asst. Prof. of Horticulture and Forestry; Asst. Floriculturist, Agr. Exp. Sta. (1969). BS 1964, Univ. of Nebraska; PhD 1969, Univ. of Minnesota. (GF)
- MCCOLLOUGH, RICHARD A.**, Instr., Animal Science and Industry (1970). BS 1968, MS 1970, Kansas State Univ.
- MCCORMICK, DEWEY Z.**, Asst. Prof. of Animal Science and Industry Emeritus; International Agricultural Programs (1960, 1968). BS 1921, Kansas State Univ.
- MCCOY, JOHN HENRY**, Prof. of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1940, 1960). BS 1940, MS 1942, Kansas State Univ.; PhD 1955, Univ. of Wisconsin. (GF)
- McKEE, R. MILES**, Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1959, 1969). BS 1951, MS 1963, Kansas State Univ.; PhD 1967, Univ. of Kentucky.
- MELCHERS, LEO EDWARD**, Prof. of Plant Pathology Emeritus (1913, 1956). BS 1912, MS 1913, Ohio State Univ.
- MICHAELS, CHARLES L.**, Asst. Prof. in Dairy and Poultry Science; Asst. in Dairy Improvement, Agr. Exp. Sta. (1965, 1970). BS 1959, Kansas State Univ.
- MICKELSEN, ROSS**, Asst. Prof. of Dairy and Poultry Science; Asst. Dairy Scientist, Agr. Exp. Sta. (1957, 1963). BS 1953, MS 1957, Utah State Univ.; PhD 1971, Univ. of Wisconsin. (GF)
- MIDCAP, JAMES T.**, Instr., Horticulture and Forestry. BS 1965, Colorado State Univ.; MS 1969, Univ. of Nebraska.
- MILES, NEIL W.**, Asst. Prof. of Horticulture and Forestry; Asst. Pomologist, Agr. Exp. Sta. (1966). BS 1959, MS 1964, PhD 1965, Univ. of Minnesota. (GF)
- MILLER, GERALD DALE**, Asst. Prof. of Grain Science and Industry; Asst. Cereal Chemist, Agr. Exp. Sta. (1946, 1947). BS 1924, Univ. of Nebraska; MS 1953, Kansas State Univ. (GF)
- MILLS, ROBERT B.**, Assoc. Prof. of Entomology; Assoc. Entomologist, Agr. Exp. Sta. (1963, 1970). BS 1949, Kansas State Univ.; MEd 1953, Univ. of Colorado; PhD 1963, Kansas State University. (GF)
- MITCHELL, HOWARD LEE**, Prof. of Biochemistry, Biochemist, Agr. Exp. Sta. (1946, 1961). BS 1938, Oklahoma State Univ.; PhD 1946, Purdue Univ. (GF)
- MONGOLD, RONALD D.**, Instr. in Dairy and Poultry Science; Asst. in Dairy Improvement, Agr. Exp. Sta. (1971). BS 1966, Kansas State Univ.
- MONTGOMERY, GEORGE**, Prof. of Agricultural Economics Emeritus (1926, 1972). BS 1925, MS 1927, Kansas State Univ.; PhD 1954, Univ. of Minnesota.
- MOORE, WALTER ASHTON**, Asst. Prof. of Agronomy; Asst. Agronomist, South Central Kansas Experiment Field (1943, 1951). BS 1944, Kansas State Univ.
- MORRILL, JR., JAMES L.**, Assoc. Prof. of Dairy and Poultry Science; Assoc. Dairy Scientist, Agr. Exp. Sta. (1962, 1969). BS 1958, Murray State Col.; MS 1959, Univ. of Kentucky; PhD 1963, Iowa State Univ. (GF)
- MUELLER, DELBERT D.**, Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1968). BS 1962, PhD 1966, Univ. of Oklahoma. (GF)
- MUGLER, DAVID J.**, Asst. Prof. of Dairy and Poultry Science; Asst. Poultry Scientist, Agr. Exp. Sta. (1965). BS 1959, Kansas State Univ.; MS 1962, Univ. of Wisconsin; PhD 1969, Kansas State Univ. (GF)
- MULENBURG, GRACE E.**, Asst. Prof.; Asst. Agricultural Editor (1969). BS 1947, Univ. of Kansas; MA 1969, Univ. of Missouri-Columbia.
- MULLEN, CLYDE WILLIAM**, Asst. Dean Emeritus (1937, 1961). BS 1915, Oklahoma State Univ.; MS 1917, Kansas State Univ.
- MURPHY, LARRY S.**, Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1965, 1968). BS 1959, MS 1960, PhD 1965, Univ. of Missouri. (GF)
- NAUHEIM, CHARLES W.**, Agricultural Economist, U.S.D.A., Agricultural Research Service, Production Economics Research Branch (1954). BS 1932, MS 1934, Kansas State Univ.
- NIBLETT, CHARLES L.**, Asst. Prof. of Plant Pathology; Asst. Plant Pathologist, Agr. Exp. Sta. (1969). BS 1965, Univ. of New Hampshire; PhD 1969, Univ. of California. (GF)
- NICKELL, CECIL D.**, Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1967). BS 1963, Purdue Univ.; MS 1965, PhD 1967, Michigan State Univ. (GF)
- NORDIN, PHILIP**, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1954, 1969). BS 1949, MS 1950, Univ. of Saskatchewan (Canada); PhD 1953, Iowa State Univ. (GF)
- NORMAN, DAVID W.**, Assoc. Prof. of Agricultural Economics (1968, 1971). BS 1961, Wye Col.; MS 1963, PhD 1965, Oregon State Univ. (GF)
- NORTON, CHARLES L.**, Prof.; Head, Department of Dairy and Poultry Science; Dairy and Poultry Scientist in Charge, Agr. Exp. Sta. (1958, 1964). BS 1940, Univ. of Illinois; PhD 1944, Cornell Univ. (GF)
- ODOM, RICHARD E.**, Assoc. Prof. of Horticulture and Forestry; Assoc. Floriculturist, Agr. Exp. Sta. (1965, 1969). BS 1951, Texas A and M Col.; MS 1953, Colorado State Univ.; PhD 1965, Kansas State Univ. (GF)
- OHMES, FRANCIS E.**, Instr., Agricultural Engineer, Garden City Branch Agr. Exp. Sta. (1971). BS 1969, MS 1971, Kansas State Univ.
- OLSON, RAYMOND V.**, Prof.; Chief of Party, Nigeria (1947, 1970). AB 1939, North Dakota School of Forestry; BS 1941, North Dakota State Col.; MS 1942, PhD 1947, Univ. of Wisconsin. (GF)
- ORAZEM, FRANK**, Prof. of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1956, 1966). Cand. Rer. Pol., Dr. Rer. Pol., 1947, Karl Franzen Univ. (Graz, Austria); MS 1953, Kansas State Univ.; PhD 1956, Iowa State Univ. (GF)
- OTTO, MERTON L.**, Assoc. Prof. of Agricultural Economics Emeritus (1939, 1967). BS 1921, MS 1942, Kansas State Univ.
- OVERLEY, CARL BENJAMIN**, Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1946, 1971). BS 1946, Kansas State Univ., MS 1967, Univ. of Nebraska.
- OWENSBY, CLINTON E.**, Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1964, 1970). BS 1964, New Mexico State Univ.; PhD 1969, Kansas State Univ. (GF)
- PAIR, JOHN C.**, Asst. Prof.; Horticulture and Forestry; Sedgwick County Horticultural Field (1971). BS 1959, New Mexico State Univ.; MS 1961, PhD 1971, Kansas State Univ.
- PARRISH, DONALD BAKER**, Prof. of Biochemistry; Biochemist and Nutritionist, Agr. Exp. Sta. (1943, 1952). BS 1935, MS 1938, PhD 1949, Kansas State Univ. (GF)
- PARTIDA, JR., GREGORY J.**, Asst. Prof. of Entomology; Asst. Entomologist, Agr. Exp. Sta. (1971). BS 1965, California State Polytechnic Col.; MS 1969, PhD 1970, Univ. of California. (GF)
- PAULSEN, GARY M.**, Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1965, 1968). BS 1961, MS 1963, PhD 1965, Univ. of Wisconsin. (GF)
- PEDERSON, JOHN R.**, Instr. of Entomology; Asst. Entomologist, Agr. Exp. Sta. (1968). BS 1954, MS 1959, Kansas State Univ.
- PENAS, PAUL E.**, Asst. Prof.; Asst. Agronomist, Garden City Branch Agr. Exp. Sta. (1967). BS 1959, MS 1967, Univ. of Nebraska.
- PFOST, HARRY B.**, Prof. of Grain Science and Industry; Feed Technologist, Agr. Exp. Sta. (1959). BS 1940, Univ. of Missouri; MS 1948, Alabama Polytechnic Institute; PhD 1959, Michigan State Univ. (GF)
- PHILLIPS, RICHARD**, Prof. of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1970). BS 1948, MS 1949, PhD 1952, Iowa State Univ. (GF)
- PHILLIPS, WILLIAM M.**, Assoc. Prof.; Assoc. Agronomist, Weed Investigations, U.S.D.A., Agricultural Research Service, Fort Hays Branch Agr. Exp. Sta. (1952, 1966). BS 1947, MS 1949, Kansas State Univ.
- PICKETT, WILLIAM F.**, Prof. of Horticulture and Forestry Emeritus (1918, 1965). BS 1917, MS 1923, Kansas State Univ.; PhD 1935, Michigan State Univ.
- PINE, WILFRED HAROLD**, Prof. of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1934, 1949). BS 1934, MS 1938, Kansas State Univ.; PhD 1948, Univ. of Minnesota (GF)
- PITTS, CHARLES W.**, Assoc. Prof. of Entomology; Assoc. Entomologist, Agr. Exp. Sta. (1962, 1969). BS 1960, Mississippi State Col.; MS 1962, PhD 1965, Kansas State Univ. (GF)
- POWERS, WILLIAM L.**, Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1966, 1970). BS 1958, Colorado State Univ.; MS 1962, PhD 1966, Iowa State Univ. (GF)
- QUINLAN, LEON REED**, Prof. of Landscape Architecture Emeritus (1927, 1965). BS 1921, Colorado State Univ.; MLA 1925, Harvard Univ.
- RANEY, ROBERT J.**, Asst. Prof. of Agronomy; Asst. Agronomist, Irrigation Experiment Field (1953, 1965). BS 1952, MS 1954, Kansas State Univ.
- RICHARDSON, DRAYTFORD**, Prof. of Animal Science and Industry; Animal Scientist, Agr. Exp. Sta. (1951). BS 1938, Clemson Agricultural Col.; MS 1950, PhD 1951, Iowa State Univ. (GF)
- RILEY, JACK G.**, Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1971). BS 1962, MS 1963, PhD 1968, Univ. of Missouri.
- ROBERTS, HAROLD A.**, Asst. Prof. in Dairy and Poultry Science; Asst. Dairy Scientist, Agr. Exp. Sta. (1963, 1969). BS 1959, MS 1967, Kansas State Univ.
- ROBINSON, ROBERT J.**, Assoc. Prof. of Grain Science and Industry; Assoc. Cereal Chemist, Agr. Exp. Sta. (1957, 1970). BS 1939, Shaw Univ.; HA 1949, Cornell Univ.; MA 1950, New York Univ.; PhD 1957, Kansas State Univ. (GF)
- RULIFFSON, WILLARD S.**, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1953, 1968). BS 1940, Buena Vista Col.; MS 1948, PhD 1953, State Univ. of Iowa. (GF)
- RUSS, OLIVER G.**, Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1949, 1965). BS 1950, MS 1953, Kansas State Univ. (GF)
- SANCHEZ, CARLOS R.**, Instr. of Grain Science and Industry, Agr. Exp. Sta. (1970). BS 1970, Kansas State Univ.
- SANFORD, PAUL EVERETT**, Prof. of Dairy and Poultry Science; Poultry Scientist, Agr. Exp. Sta. (1949, 1960). BS 1941, Kansas State Univ.; MS 1942, PhD 1949, Iowa State Univ. (GF)
- SAUER, DAVID B.**, Asst. Prof. of Plant Pathology; Research Plant Pathologist, U.S.D.A., Agricultural Research Service (1967). BA 1961, Kent State Univ.; MS 1964, PhD 1967, Univ. of Minnesota. (GF)
- SCHAFER, JOHN F.**, Prof.; Head, Department of Plant Pathology; Plant Pathologist in charge, Agr. Exp. Sta. (1968). BS 1942, Washington State Univ.; PhD 1950, Univ. of Wisconsin. (GF)
- SCHALLES, ROBERT R.**, Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1966, 1970). BS 1963, Colorado State Univ.; MS 1966, PhD 1966, Virginia Polytechnic Institute. (GF)
- SCHNAKE, LAWRENCE D.**, Asst. Prof. of Agricultural Economics; Agricultural Economist, U.S.D.A., Economic Research Service (1971). BS 1960, Univ. of Missouri; MS 1967, PhD 1972, Oklahoma State Univ.
- SCHRUBEN, LEONARD WILLIAM**, Prof. of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1949, 1951). BS 1939, Kansas State Univ.; MS 1940, Univ. of Illinois; MPA 1948, MA 1949, PhD 1949, Harvard Univ. (GF)
- SCHWENK, FRED W.**, Asst. Prof. of Plant Pathology; Asst. Plant Pathologist, Agr. Exp. Sta. (1969). BS 1960, MS 1964, North Dakota State Univ.; PhD 1969, Univ. of California. (GF)
- SCOVILLE, ORLIN J.**, Prof. of Agricultural Economics (1966). BS 1931, MS 1933, Colorado State Univ.; PhD 1949, Harvard Univ. (GF)
- SEIB, PAUL A.**, Assoc. Prof. of Grain Science and Industry, Cereal Chemist, Agr. Exp. Sta. (1970). BS 1958, PhD 1965, Purdue Univ. (GF)
- SHELLENBERGER, JOHN A.**, Distinguished Univ. Prof. of Grain Science and Industry Emeritus (1944, 1970). BS 1928, Univ. of Washington; MS 1930, Kansas State Univ.; PhD 1934, Univ. of Minnesota.
- SJO, JOHN B.**, Prof. of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1948, 1967). BS 1949, MS 1952, Kansas State Univ.; PhD 1960, Michigan State Univ. (GF)
- SKIDMORE, EDWARD L.**, Assoc. Prof. of Agronomy; Soil Scientist, U.S.D.A., Agricultural Research Service (1963). BS 1958, Utah State Univ.; PhD 1963, Oklahoma State Univ. (GF)
- SLOAN, ROBERT F.**, Assoc. Prof. of Agronomy; Assoc. Agronomist, Cornbelt Agricultural Experiment Field (1936, 1967). BS 1938, MS 1941, Kansas State Univ.

SMITH, EDGAR FITZHUGH, Prof. of Animal Science and Industry; Animal Scientist, Agr. Exp. Sta. (1946, 1961). BS 1941, Texas A and M Col.; MS 1947, Kansas State Univ.; PhD 1956, Texas A and M Col. (GF)

SMITH, FLOYD W., Prof., Director, Agr. Exp. Sta. (1946, 1965). BS 1942, Kansas State Univ.; MS 1946, PhD 1949, Michigan State Univ. (GF)

SMITH, ROGER CLETUS, Prof. of Entomology Emeritus (1920, 1958). AB 1911, Miami Univ.; AM 1915, Ohio State Univ.; PhD 1917, Cornell Univ.

SMITH, WALTER H., Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1948, 1965). BS 1943, MS 1949, Kansas State Univ. (GF)

SORENSEN, EDGAR LAVELL, Prof. of Agronomy; Research Agronomist, U.S.D.A., Agricultural Research Service (1955, 1970). BS 1941, MS 1952, Utah Agricultural Col.; PhD 1955, Univ. of Wisconsin. (GF)

SORENSEN, LEONARD ORLO, Professor of Agricultural Economics; Agricultural Economist, Agr. Exp. Sta. (1955, 1968). BA 1951, MS 1953, PhD 1963, Univ. of Minnesota. (GF)

STEGMEIER, WILLIAM D., Assoc. Prof.; Assoc. Agronomist, Fort Hays Branch Agr. Exp. Sta. (1958, 1971). BS 1956, MS 1959, Colorado State Univ.; PhD 1971, South Dakota State Univ.

STINSON, T. BRUCE, Asst. Prof. Emeritus, Tribune Branch Agr. Exp. Sta. (1924, 1970). BS 1924, Kansas State Univ.

STUTEVILLE, DONALD L., Assoc. Prof. of Plant Pathology; Assoc. Plant Pathologist, Agr. Exp. Sta. (1964, 1969). BS 1959, MS 1961, Kansas State Univ.; PhD 1964, Univ. of Wisconsin. (GF)

SWALLOW, CLARENCE W., Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1954, 1964). BS 1951, MS 1955, Kansas State Univ.

TEARE, IWAN D., Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1969). BS 1953, Univ. of Idaho; MS 1959, Washington State Univ.; PhD 1963, Purdue Univ. (GF)

THIEN, STEPHEN J., Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1970). BS 1966, Iowa State Univ.; MS 1968, PhD 1971, Purdue Univ.

THOMPSON, CARLYLE A., Asst. Prof.; Asst. Agronomist, Fort Hays Branch Agr. Exp. Sta. (1964). BS 1958, MS 1959, Kansas State Univ.

THOMPSON, HUGH E., Assoc. Prof. of Entomology; Assoc. Entomologist, Agr. Exp. Sta. (1956, 1963). BS 1941, Univ. of Rhode Island; PhD 1953, Cornell Univ. (GF)

THROCKMORTON, RAY IAMS, Dean and Director Emeritus, Agriculture (1911, 1952). BS 1911, Pennsylvania State Univ.; MS 1922, Kansas State Univ. (GF)

TSEN, CHO C., Prof. of Grain Science and Industry; Cereal Chemist, Agr. Exp. Sta. (1969). BS 1944, MS 1946, National Chekiang University; PhD 1958, Univ. of California. (GF)

TUMA, HAROLD J., Assoc. Prof. of Animal Science and Industry; Assoc. Animal Scientist, Agr. Exp. Sta. (1965). BS 1955, MS 1958, Kansas State Univ.; PhD 1961, Oklahoma State Univ. (GF)

VANDERLIP, RICHARD L., Assoc. Prof. of Agronomy, Assoc. Agronomist, Agr. Exp. Sta. (1964, 1969). BS 1960, Kansas State Univ.; MS 1962, PhD 1965, Iowa State Univ. (GF)

WALTER, TED L., Asst. Prof. of Agronomy; Asst. Agronomist, Agr. Exp. Sta. (1951). BS 1949, Univ. of Nebraska; MS 1951, Colorado State Univ.

WARD, ARLIN B., Prof. of Grain Science and Industry; Milling Technologist; Agr. Exp. Sta. (1961, 1967). BS 1942, MS 1951, Kansas State Univ. (GF)

WARD, GEORGE M., Prof. of Dairy and Poultry Science; Dairy Scientist, Agr. Exp. Sta. (1955, 1966). BS 1941, Univ. of Vermont; MS 1947, Rutgers Univ.; PhD 1950, Michigan State Univ. (GF)

WASSON, CLYDE E., Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1954, 1962). BS 1949, MS 1951, PhD 1953, Iowa State Univ. (GF)

WATSON, CLIFFORD A., Prof. of Grain Science and Industry; Investigations Leader, U.S.D.A., (1968). BS 1956, Montana State Univ.; MS 1958, PhD 1963, Kansas State Univ. (GF)

WHEAT, JOHN D., Prof. of Animal Science and Industry; Animal Scientist, Agr. Exp. Sta. (1954, 1969). BS 1942, MS 1951, Texas A and M Col.; PhD 1954, Iowa State Univ. (GF)

WHITNAH, CARRELL HENRY, Prof. of Biochemistry Emeritus (1929, 1962). BA 1913, Univ. of Nebraska; MS 1917, Univ. of Chicago; PhD 1925, Univ. of Nebraska.

WILBUR, DONALD A., Prof. of Entomology Emeritus (1928, 1970). BS 1925, Oregon State Col.; AM 1928, Ohio State Univ. (GF)

WILDE, GERALD E., Asst. Prof. of Entomology; Asst. Entomologist, Agr. Exp. Sta. (1966). BS 1962, Texas Technological College; PhD 1966, Cornell Univ. (GF)

WILLIS, WILLIAM WAYNE, Asst. Prof. of Horticulture and Forestry Emeritus (1944, 1961). AB 1912, Col. of Emporia.

WINZER, JACK W., Asst. Prof. of Horticulture and Forestry; Southeast Kansas Experiment Field (1963, 1966). BS 1957, MS 1959, Texas A and M Col.

WITHEE, LAURESTON VAN, Assoc. Prof. of Agronomy; Assoc. Agronomist, Agr. Exp. Sta. (1953, 1965). BS 1947, Kansas State Univ.; MS 1952, Univ. of Nebraska; PhD 1963, Kansas State Univ. (GF)

WITT, MERLE D., Asst. Prof.; Asst. Agronomist, Garden City Branch Agr. Exp. Sta. (1969). BS 1967, Fort Hays State Col.; MS 1969, Kansas State Univ.

WOODRUFF, NEIL PARKER, Prof. of Agronomy; Research Investigations Leader, U.S.D.A., Agricultural Research Service (1949, 1970). BS 1949, MS 1953, Kansas State Univ. (GF)

ZAHNLEY, JAMES WALTER, Prof. of Agronomy Emeritus (1915, 1954). BS 1909, BS in Agric 1918, MS 1926, Kansas State Univ.

College of Architecture and Design

BARTLETT, LARRY E., Asst. Prof. (temporary) Landscape Architecture (1971). BSLA 1964, Kansas State Univ.

BELL, KEITH L., Asst. Prof. (temporary) (1970). BS 1959. Professional Engineer — Kansas; Registered Land Surveyor — Kansas.

BISSEY, CHARLES R., Assoc. Prof. of Construction Science. BS 1957, Colorado State Univ.; MS (Architecture) 1961, Kansas State Univ. (GF)

BLACKMAN, MERRILL EMMETT, Assoc. Prof. of Construction Science (1971). BS 1949, Kansas State Univ. Registered Architect, 1955. Professional Engineer, 1949.

BURTON, CHARLES L., Instr. of Construction Science (1970). BS 1963, Kansas State Univ. Registered Professional Engineer.

BUTKE, WALTER J., Asst. Prof. of Architecture (1966, 1970). BArch 1963, Columbia Univ.; MArch 1970, Kansas State Univ.

CHADWICK, THEODORE AVERY, Prof. of Architecture (1927, 1947). BS 1927, North Dakota Agriculture Col.; MArch 1954, Massachusetts Institute of Technology. Registered Architect in New York, 1936; In Kansas, 1953. (GF)

CHANG, AMOS I. T., Assoc. Prof. Architecture (1966) BS Civil Engg. 1939, National Chung King Univ.; MFA in Arch. 1949, PhD in Arch. 1951, Princeton Univ. Registered Architect. (GF)

CHRISTENSEN, KEITH H., Assoc. Prof. of Architecture (1966). BArch 1950, Univ. of Nebraska; MArch 1957, Univ. of Michigan. Registered Architect, 1960. (GF)

DAY, DENNIS J., Asst. Prof. of Landscape Architecture (1966). BS 1964, Michigan State Univ.; MLA 1966, Univ. of Michigan. Registered Landscape Architect. (GF)

DEINES, VERNON PHILIP, Prof. of Planning (1957, 1966, 1970); Head, Department of Regional and Community Planning (1969). Director of the Center for Community Planning (1966). BS 1952, MRP 1961, Kansas State Univ., Registered Professional Engineer, 1952. (GF)

DURGAN, JACK CLYDE, Prof. of Interior Architecture (1954, 1962, 1967); Head, Department of Interior Architecture (1969). BArch 1951, Oklahoma State Univ.; MS 1958, Kansas State Univ. Registered Architect in Texas, 1951; In Kansas, 1954. (GF)

EALY, ROBERT P., Prof. of Landscape Architecture; Assoc. Dean of Col. of Architecture and Design (1967); Head, Department of Landscape Architecture (1969); Director of the Curriculum in Landscape Architecture (1961). BS 1941, Oklahoma State Univ.; MS 1946, Kansas State Univ.; PhD 1955, Louisiana State Univ. Registered Landscape Architect. (GF)

EDMONDS, LELAND R., Assoc. Prof. of Planning (1967, 1969). BA 1949, Univ. of Kansas; MA 1952, Univ. of Kansas. (GF)

ERNST, F. GENE, Asst. Prof. (1967); Head, Department of Architecture 1971. BArch 1953, Kansas State Univ., MArch (Urban Design) 1971, Univ. of Washington; Registered Architect in Kansas, 1953; In Louisiana, 1957. (GF)

FISCHER, EMIL C., Prof. of Architecture (1955, 1963). AB 1930, Columbia Col.; BS 1932, MS 1933, Columbia Univ. Registered Architect in New Jersey, 1935; In Ohio, 1946, In Kansas, 1955. (GF)

FOERSTER, BERND, Prof., Dean, Col. of Architecture and Design (1971). BS in Arch. 1954, Univ. of Cincinnati; MArch 1957, Rensselaer Polytechnic Institute. (GF)

HALL, CHARLES L., Assoc. Prof. of Architecture (1964, 1968). BArch 1953, Pennsylvania State Univ.; MArch 1967, Kansas Univ. Registered Architect in Kansas, 1953; In Minnesota, 1961; In North Dakota, 1962; In South Dakota, 1962. NCARB, 1961. (GF)

HEINTZELMAN, JOHN CRANSTON, Prof. of Architecture (1947, 1954); Assoc. Institute of Environmental Research. BArch 1938, Massachusetts Institute of Technology; MArch 1941, Columbia Univ. Registered Architect, 1953. (GF)

HOGUE, SAMUEL R., Instr. (temporary) Landscape Architecture (1971). BSLA (1966), Kansas State Univ.

JAHNKE, WILLIAM R., Assoc. Prof. of Architecture (1968). Asst. Dean, Col. of Architecture and Design (1970). BS 1948, Duke Univ. Registered Prof. Engineer in Missouri, Pennsylvania, Ohio, Nevada, Puerto Rico, West Virginia, 1951. (GF)

KEITHLEY, CLAUDE A., Instr. in Planning (1970). BArch 1965, Kansas State Univ.

KRIDER, ALDEN, Prof. of Architecture (1949, 1962). BS 1933, MS 1955, Kansas State Univ. Registered Architect in Missouri, 1945; In Kansas, 1949. (GF)

LIPPENBERGER, RAY E., Asst. Prof. of Architecture (1964). BS 1936, Kansas State Univ. Registered Architect in Kansas, 1949, In Nebraska, 1955.

MCGRAW, EUGENE THOMAS, Assoc. Prof., Architecture & Planning (1958, 1964, 1968). BArch 1957, Oklahoma State Univ., MRP 1963, Kansas State Univ. (GF)

MARTIN, WILLIAM MICHAEL, Asst. Prof. of Architecture (1971). BArch 1969, Univ. of Colorado; MArch 1971, Univ. of Washington.

MILES, FREDERICK D., Prof. of Architecture (1967); BS 1936, Univ. of Illinois. Registered Architect in Illinois, 1952; In Arizona, 1965. (GF)

MURPHY, STEPHEN M., Instr. in Interior Architecture (1968). BS 1968, Kansas State Univ.

OBLINGER, WARREN J., Assoc. Prof. of Landscape Architecture (1969, 1970). BSLA 1950, Iowa State Univ. Registered Landscape Architect. (GF)

PAGE, ROBERT L., Asst. Prof. of Landscape Architecture (1971). BSLA 1963, Kansas State Univ.; MLA 1965, Harvard Univ. Registered Landscape Architect.

PARKS, CHARLES ELWOOD, Prof. of Landscape Architecture (1949, 1965). Extension Specialist in Landscape Architecture (1949, 1950). BS 1949, Univ. of Illinois; MS 1957, Kansas State Univ. Registered Landscape Architect. (GF)

QUINLAN, LEON REED, Prof. of Landscape Architecture Emeritus; Ornamental Horticulturist and Landscape Architect, Agr. Exp. Sta. (1927, 1931, 1964). BS 1921, Colorado State Univ.; MLA 1925, Harvard Univ. Registered Landscape Architect. (GF)

REID, RONALD L., Asst. Prof. in Architecture and Planning (1969). BArch 1962, Kansas State Univ.; MArch 1968, Univ. of California. Registered Architect, 1965. (GF)

SANNER, ALBERT E., Assoc. Prof. of Architecture (1963). BSArch 1947, BSArch Engg 1948, Univ. of Illinois; MArch 1966, Univ. of Nebraska. Registered Architect in Illinois, 1950; in Indiana, 1959. (GF)

SELFREDGE, O. JOHN, Asst. Prof. in Architecture and Planning (1969). BArch 1959, Kansas Univ.; MCP 1964, Yale Univ.

SHEPARD, JIM B., Asst. Prof. (1967). BA 1959, Kansas State Univ. Registered Architect in Kansas, Missouri and Nebraska.

SIMCOX, DONALD L., Instructor (temporary) (1971) BSCE. 1952, Kansas State Univ.

SLACK, EARL REX, Assoc. Prof. of Architecture (1965, 1969) BArch 1952, Univ. of Oklahoma. Registered Architect in Oklahoma, 1957.

THORSON, INGOLF EUGENE, Prof. of Architectural Engineering (1948, 1951, 1964). Head, Department of Construction Science (1969). BS 1940, Univ. of Washington, Prof. Engineer in Washington, 1947; in Kansas. (GF)

WEIGEL, PAUL, Prof. of Architecture Emeritus (1921, 1924, 1959). BArch 1912, Cornell Univ. Registered Architect in New York, 1917; in Kansas, 1950. (GF)

WEISENBURGER, RAY B., Assoc. Prof. of Planning (1964, 1970). BArch 1959, Univ. of Illinois; MCP 1971, Cornell Univ. Registered Architect, 1962.

WENDT, EUGENE G., Asst. Prof. of Architecture (1962, 1969). BArch 1959, Kansas State Univ.; MArch 1970 Kansas State Univ.

WILLIS, RAY G., Asst. Prof. of Planning (1971). BA 1968, MRCP 1971, Kansas State Univ.

College of Arts and Sciences

ABERLE, NELLIE, Prof. of English Emerita (1921, 1959). BS 1912, MS 1914, Kansas State Univ. (GF)

ABRAHAM, JUDY, Instr. of Art (1970). A of A 1961, Cottey Col.; BFA 1964, Kansas City Art Institute; MFA 1967, Univ. of Nebraska.

ADAMS, MARJORIE, Asst. Dean; Assoc. Prof. of English (1954, 1961). BA 1941, Louisiana Polytechnic; MA 1948, PhD 1951, Univ. of Texas (GF)

AHMED, NASIR, Assoc. Prof. of Electrical Engineering (1968), Assoc. Prof. of Computer Science (1971). BS 1961, Univ. Col. of Engineering, Bangalore, India; MS 1962, PhD 1966, Univ. of New Mexico. (GF)

AKERS, JUDY A., Instr. in Physical Education (1970). BS 1967, MS 1970, Kansas State Univ.

AKKINA, KRISHNA RAO, Asst. Prof. of Economics (1972). BA 1963, Univ. of Andhra, MA 1965, Delhi School of Economics, PhD 1972, Univ. of Minnesota.

ALEXANDER, LROEN R., Asst. Prof. of Modern Languages (1965, 1971). BM 1951, Southwestern College; MA 1954, Colorado State College of Education; MA 1965, Michigan State Univ.; PhD 1971, Michigan State Univ.

ALM, OSCAR WILLIAM, Prof. of Psychology Emeritus (1929, 1957). AB 1917, Univ. of Nebraska; MA 1918, Columbia Univ.; PhD 1920, Univ. of Minnesota.

ALSOP, INEZ, Assoc. Prof. of History Emerita (1923, 1960). BS 1916, Kansas State Teachers Col. (Emporia); MS 1920, Univ. of Kansas. (GF)

ALTHOFF, PHILLIP STANLEY, Asst. Prof. of Political Science (1970). BA 1963, Illinois State Univ.; MA 1966; PhD 1970, Univ. of Iowa. (GF)

AMEEL, DONALD JULES, Prof. of Biology Emeritus (1937, 1972). AB 1928, Wayne Univ.; MA 1930, DSc 1933, Univ. of Michigan. (GF)

AMOS, EDGAR McCALL, Assoc. Prof., Journalism Emeritus (1921, 1950). BS 1902, Kansas State Univ.

ANDERSON, LORAN C., Assoc. Prof. of Biology; Plant Anatomist, Agr. Exp. Sta. (1963, 1970). BS 1958, MS 1959, Utah State Univ.; PhD 1962, Claremont Graduate School. (GF)

ANDREWS, ARTHUR CLINTON, Prof. of Chemistry Emeritus (1926, 1970). BS 1924, Univ. of Wisconsin; MS 1929, Kansas State Univ.; PhD 1938, Univ. of Wisconsin. (GF)

ANSDALL, ORA JOYE, Assoc. Prof. of English (1946, 1957). BS 1932, Kansas State Univ.; MA 1939, Univ. of Michigan; BLS 1946, Univ. of Chicago; PhD 1956, Univ. of Colorado. (GF)

APPLEGATE, ROBERTA G., Asst. Prof. of Journalism and Mass Communications. (1964). AB 1940, Michigan State Univ.; MS 1942, Northwestern Univ.

ASENETA, LYDIA, Instr. in Speech (1967). BS 1949, MA 1958, The National Teachers' College of the Philippines; MA 1968, Kansas State Univ.

AVERY, MADALYN, Assoc. Prof. of Physics Emerita (1924, 1946). BS 1924, MS 1932, Kansas State Univ.

AZIM, ABDUL, Acting Asst. Prof. of Modern Languages (1971). BA 1955, Aligarh Muslim Univ. (India); MA 1960, Aligarh Muslim Univ. (India); MA 1963, Univ. of California.

BABCOCK, RODNEY WHITTEMORE, Prof. of Mathematics Emeritus; Dean Emeritus (1930, 1960). AB 1912, Univ. of Missouri; MA 1915, PhD 1924, Univ. of Wisconsin. (GF)

BAGLEY, EDGAR SIDNEY, Prof.; Asst. Head of Economics, Teaching and Graduate Studies; Economist, Agr. Exp. Sta. (1940, 1950). BA 1935, MA 1936, Univ. of California at Los Angeles; PhD 1950, State Univ. of Iowa. (GF)

BARFOOT, DOROTHY, Prof. of Art Emerita (1930, 1962). BA, State Univ. of Iowa, MA 1928, Columbia Univ. (GF)

BARK, LAURENCE DEAN, Prof. of Physics, Assoc. Meteorologist, Agr. Exp. Sta. (1956, 1967). BS 1948, MS 1950, Univ. of Chicago; PhD 1954, Rutgers Univ. (GF)

BARKLEY, THEODORE M., Assoc. Prof. and Assoc. Director, Division of Biology; Curator of the Herbarium; Taxonomist, Agr. Exp. Sta. (1961, 1967). BS 1955, Kansas State Univ.; MS 1957, Oregon State Univ.; PhD 1960, Columbia Univ. (GF)

BARNES, VERNON L., Instr. of Speech (1969). BA 1957, Ottawa Univ.; MA 1964, Kansas State Univ.

BARRETT, ERNIE D., Athletic Director (1969). BS 1951, MS 1956, Kansas State Univ.

BASS, LOUIS R., Asst. Prof. of Military Science (1969). BS 1961, Kansas State Univ.; 1969, Infantry Officers Career Course.

BATES, GYLL C., Instructor in Physical Education (1970). BS 1966, Youngstown Univ.

BECK, HENRY VOORHEES, Prof. of Geology. (1946, 1961). BS 1946, MS 1949, Kansas State Univ.; PhD 1951, Univ. of Kansas. (GF)

BEESON, MARGARET E., Assoc. Prof. of Modern Languages (1960, 1968). AB 1948, Wesleyan Col.; MA 1949, Emory Univ.; PhD 1954, Univ. of Texas. (GF)

BHALLA, CHANDER P., Assoc. Prof. of Physics (1966). BS 1952, BSc 1954, MS 1955, Punjab Univ.; PhD 1960, Univ. of Tennessee. (GF)

BIRD, RICHARD P., Research Assoc. of Physics (1971). BS 1960, Univ. of Colorado; MS 1962, Univ. of Colorado; MS Biophysics 1968, Univ. of California at Berkeley; PhD 1971, Univ. of California at Berkeley.

BODE, VERNON C., Prof. of Biology; (1970). BS 1955, Univ. of Missouri; PhD 1961, Univ. of Illinois.

BOLAN, JOHN ELDON, Instr. in Physical Education (1967). BA 1952, Ottawa Univ.; MS 1970, Kansas State Univ.

BONTRAGER, ROBERT D., Assoc. Prof. of Journalism and Mass Communications. (1970). BA 1945, Taylor Univ.; STB 1948, New York Theological Seminary; BS 1950, Taylor Univ.; MA 1950, Syracuse Univ.; PhD 1969, Syracuse Univ. (GF)

BRADLEY, DOROTHY GOUGH, Instr. in Economics (1947). BS 1932, Northwestern Univ.; MS 1950, Kansas State Univ.

BRADY, DAVID WILLIAM, Asst. Prof. of Political Science (1969). BS 1963, Western Illinois Univ.; MA 1967, PhD 1970, Univ. of Iowa. (GF)

BRANCH, JESSE O., Asst. Football Coach (1967). BSE 1963, Univ. of Arkansas.

BRASHER, BOB, Instr. in Athletics and Head Baseball Coach (1965). BS 1960, Bradley Univ.; MS 1963, Univ. of Colorado.

BREDE, RICHARD M., Asst. Prof. of Sociology (1971). BA 1962, Univ. of Oregon, MS 1964, Univ. of Oregon, PhD 1971, Univ. of Illinois.

BREWER, RICHARD KEMP, Asst. Prof. of Computer Science (1970). BS 1959, Univ. of Wisconsin; MS 1964, Univ. of Wisconsin.

BRONDELL, WILLIAM JOHN, Asst. Prof. of English (1964). AB 1959, MA 1964, PhD 1964, Univ. of Missouri. (GF)

BROWN, MATT D., Research Assoc. of Physics (1972). BS 1961, MS 1964, PhD 1972, Univ. of Tennessee.

BROWN, MERLE, Asst. Prof. of Physics (1964). (State Climatologist). BS 1942, Kansas State Col. at Pittsburg.

BROWN, SAM C., Prof. of Psychology (1963, 1971). BBA 1957, City Col. of New York; MA 1961, PhD 1963, Univ. of Virginia. (GF)

BROWN, WILBUR E., Asst. Prof. of Journalism (1970). BS 1949, Kansas State Univ.

BUCK, CLAYTON A., Assoc. Prof. of Biology; Virologist, Agr. Exp. Sta. (1970). BS 1959, Kansas State Univ.; PhD 1964, Montana State Univ. (GF)

BUNCH, WILLIAM A., Asst. Prof. of Modern Languages (1972). BA 1965, Hanover Col.; MA 1966, Univ. of Wisconsin.

BUNTON, NORMA D., Prof.; Head, Department of Speech (1954, 1960). BS 1939, Southwest Texas State Col.; MED 1947, Univ. of Texas; PhD 1954, State Univ. of Iowa. (GF)

BURCKEL, ROBERT B., Assoc. Prof. of Mathematics (1971). BS 1961, Univ. of Notre Dame; MA 1963, Yale Univ.; PhD 1968, Yale Univ. (GF)

BURKE, WILLIAM L., Assoc. Prof. of Speech (1964). BS 1959, MA 1960, PhD 1965, Northwestern Univ. (GF)

BURNS, KENNETH R., Asst. Prof. of Military Science (1971). BS 1966, Univ. of Houston.

BUSSING, CHARLES EARL, Asst. Prof. of Geography (1954, 1966). AB 1959, Colorado State Col.; MA 1961, Univ. of Colorado; PhD 1968, Univ. of Nebraska.

CAINE, HOMER D., Asst. Prof. of Music (1966). BM 1940, Drake Univ.; MS 1957, Kansas State Univ. (GF)

CALHOUN, MYRON AMMON, Asst. Prof. of Computer Science (1971). BS 1963, Univ. of Kansas; MS 1964, Colorado State Univ.; PhD 1967, Arizona State Univ. (GF)

CAMP, HENRY J., Asst. Prof. of Sociology (1971). BS 1966, Illinois State Univ.; MA 1969, Univ. of Nebraska, PhD 1972, Univ. of Nebraska.

CARDWELL, ALVIN BOYD, Prof. of Physics (1936, 1955). Physicist in charge, Agr. Exp. Sta.; Physicist in charge, Eng. Exp. Sta., BS 1925, DSc 1961, Univ. of Chattanooga; MS 1927, PhD 1930, Univ. of Wisconsin. (GF)

CAREY, JAMES CHARLES, Prof. of History (1948, 1954). BA 1937, Nebraska State Teachers Col. (Wayne); MA 1940, PhD 1948, Univ. of Colorado. (GF)

CARLSON, NANCY B., Asst. Prof. of Speech (1968). BA 1953, MS 1950, West Michigan Univ.

CENTER, MELVIN S., Asst. Prof. of Biology (1970). BS 1962, Univ. of Georgia; MS 1964, PhD 1967, Medical Col. of Georgia. (GF)

CHALMERS, JOHN, Vice President of Academic Affairs; Prof. of Economics (1963, 1969). AB 1938, Middlebury Col.; PhD 1943, Cornell Univ. (GF)

CHAPIN, ERNEST KNIGHT, Assoc. Prof. of Physics Emeritus (1923, 1968). AB 1918, MS 1923, Univ. of Michigan. (GF)

CHAUDHURI, SAMBHUDAS, Asst. Prof. of Geology (1966). BS 1956, Calcutta Univ., India; MS 1958, Jadavpur Univ., India; MS 1961, Univ. of Indiana; PhD 1966, Ohio State Univ. (GF)

CHAWLA, LAL M., Prof. of Mathematics; (1970). BA 1937, MS 1939, Panjab Univ., Lahore; PhD 1955, Oxford Univ. (GF)

CHELIKOWSKY, JOSEPH RUDOLPH, Prof. of Geology (1937, 1955). BA 1931, MA 1932, PhD 1935, Cornell Univ. (GF)

CLARK, WILLIAM KLINE, Instr. in Geology (1949, 1956). BS 1947, Univ. of Notre Dame; MS 1950, Kansas State Univ.

- CLEARY, ELIZABETH**, Asst. Prof. of Speech (1961, 1968). BS 1934, Boston Univ.; MS 1961, Kansas State Univ.
- CLELAND, MARJORIE V.**, Instr.; Asst. to the Dean (1970). BA 1968, Kansas State Univ.; MS 1970, Kansas State Univ.
- CLIMENHAGA, JOEL**, Assoc. Prof. of Speech (1968). BA 1953, MA 1958, Univ. of California at Los Angeles. (GF)
- CLORE, ROBERT ALVIN**, Instr. of Art (1970). AA 1966, Casper Col.; BA 1968, Univ. of Northern Colorado; MA 1970, Univ. of Northern Colorado.
- COATES, WILLIAM A.**, Assoc. Prof. of Modern Languages (1966). BA 1937, Harvard Col.; MA 1939, PhD 1950, Harvard Univ. (GF)
- COCKE, CHARLES L.**, Asst. Prof. of Physics (1969). AB 1962, Haverford Col.; PhD 1967, California Institute of Technology. (GF)
- COHEN, PETER Z.**, Instr. in English (1961). BS 1953, MA 1961, Univ. of Wyoming.
- CONOVER, WILLIAM JAY**, Assoc. Prof. of Statistics; Statistical Consultant, Agr. Exp. Sta. (1964, 1967). BS 1958, Iowa State Univ.; MA 1962, PhD 1964, The Catholic Univ. of America. (GF)
- CONRAD, ABIGAIL H.**, Asst. Prof. of Biology (1970, 1971). BA 1963, Wheaton Col.; MS 1965, PhD 1969, Yale Univ. (GF)
- CONRAD, GARY W.**, Asst. Prof. of Biology (1970). BS 1963, Union Col.; MS 1965, PhD 1968, Yale Univ. (GF)
- CONROW, KENNETH**, Assoc. Prof. of Computer Science (1961, 1964). BA 1954, Swarthmore Col.; MA 1955, PhD 1962, Univ. of Illinois. (GF)
- CONROW, MARGARET E.**, Asst. Prof. of English (1964, 1969). BA, Swarthmore Col.; MA 1955, PhD 1962, Univ. of Illinois.
- CONSIGLI, RICHARD ALBERT**, Prof. of Biology (1963, 1969). BS 1954, Brooklyn Col.; MA 1956, PhD 1960, Univ. of Kansas. (GF)
- COON, ROBERT L.**, Prof. and Head of Modern Languages (1971). BA 1951, Dartmouth Col.; MA 1953, PhD 1961, Princeton Univ. (GF)
- COPELAND, JAMES L.**, Assoc. Prof. of Chemistry (1962, 1968). BS 1952, Univ. of Illinois; PhD 1962, Indiana Univ. (GF)
- CORBIN, CHARLES B.**, Prof. and Head of Physical Education (1971). BS 1960, Univ. of New Mexico; MS 1962, Univ. of Illinois; PhD 1965, Univ. of New Mexico. (GF)
- CONSTANZI, FRANK A.**, Research Assoc. of Physics (1971). BS 1966, Univ. of Santa Clara; PhD 1971, Northwestern Univ.
- COWAN THADDEUS M.**, Assoc. Prof. of Psychology (1970). BA 1957, Centre Col. of Kentucky; MS 1959, Univ. of Connecticut; PhD 1964, Univ. of Connecticut. (GF)
- CRAWFORD, GOLDA MILDRED**, Assoc. Prof. of History (1946, 1964). BS 1928, MS 1940, Kansas State Univ.; PhD 1963, Syracuse Univ. (GF)
- CRAWFORD, FRANCIS W.**, Assoc. Prof. of Physics Emeritus (1960, 1972). AB 1924, Phillips Univ.; MS 1929, Univ. of Oklahoma. (GF)
- CRAWFORD, NAOMI Z.**, Instr. in Chemistry Emeritus (1922, 1963). BS 1919, MS 1922, Univ. of Nebraska.
- CULLERS, ROBERT L.**, Asst. Prof. of Geology (1971). BS 1959, Indiana Univ.; MA in Chemistry 1962, Indiana Univ.; PhD 1971, Univ. of Wisconsin.
- CULLEY, LOUANN F.**, Asst. Prof. of Art (1971). BFA 1957, Univ. of New Mexico; MA 1967, Univ. of New Mexico; PhD 1971, Stanford Univ.
- CUNNINGHAM, FRANK R.**, Asst. Prof. of English (1971). AB 1959, MA 1962, Villanova Univ.; PhD 1970, Lehigh Univ. (GF)
- CURNUTTE, JR., BASIL**, Prof. of Physics; Assoc. Physicist, Agr. Exp. Sta. (1954, 1964). BS 1945, U.S. Naval Academy; PhD 1953, Ohio State Univ. (GF)
- CURTIS, NANCY MARGARET**, Asst. Instr. of Political Science (1971). BS, Washington State Univ.; MA 1971, Kansas State Univ.
- CURTIS, W. D.**, Asst. Prof. of Mathematics (1970). BA 1966, Univ. of Florida; PhD 1970, Univ. of Massachusetts. (GF)
- DACE, WALLACE**, Prof. of Speech (1963, 1968). AB 1943, Illinois Wesleyan Univ.; MFA 1948, Yale Univ.; PhD 1952, Denver Univ. (GF)
- DALE, E. BROCK**, Prof. of Physics (1957, 1967). BS 1940, MS 1944, Univ. of Oklahoma; PhD 1953, Ohio State Univ. (GF)
- DANEN, WAYNE C.**, Asst. Prof. of Chemistry (1967). BA 1964, St. Norbert Col.; PhD 1967, Iowa State Univ. (GF)
- DAVIS, EARLE ROSCO**, Prof. of English (1949). AB 1927, BM 1929, Monmouth Col.; MA 1928, Univ. of Illinois; PhD 1935, Princeton Univ. (GF)
- DAVIS, GEORGE LEE**, Instr. in Art (1971). BFA 1966, Atlanta School of Arts; MFA 1971, Indiana Univ.
- DAVIS, MARJORIE M.**, Instr. of Biology (1971). BS 1959, Panhandle A & M Col.; MA 1962, Kansas Univ.; PhD 1970, Kansas State Univ.
- DAYTON, ARTHUR D.**, Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1966). BS 1960, Berea Col.; MS 1964, PhD 1967, Michigan State Univ. (GF)
- DeCOU, DONALD FRANK**, Assoc. Prof. of Economics (1947). BS 1929, Kansas State Teachers Col. of Pittsburg; MBA 1934, Northwestern Univ.; 1966, Univ. of Wisconsin. (GF)
- DEHON, CLAIRE LOUISE**, Asst. Prof. of Modern Languages (1972). BA 1962, Royal Art Institute of Brussels; MA 1964; MA 1969, Univ. of Kansas; M. Phil. 1971, Univ. of Kansas.
- DEIBLER, GERALD WILLIAM**, Assoc. Prof. of Art (1956, 1963). BA 1951, Univ. of Nebraska; MFA 1955, Univ. of Colorado. (GF)
- DELEHANTY, JOHN A.**, Assoc. Prof. of Economics (1966). BBA 1952, MA 1956, Univ. of Miami; PhD 1962, Indiana Univ.
- DENNIS, JR., EVERETTE E.**, Acting Head; Asst. Prof. of Journalism and Mass Communications (1968). BS 1964, Univ. of Oregon; MA 1966, Syracuse Univ. (GF)
- DESMARTEAU, DARRYL D.**, Asst. Prof. of Chemistry (1971). BS 1963, Washington State Univ.; PhD 1966, Univ. of Washington. (GF)
- DIXON, LYLE J.**, Prof. of Mathematics (1963). BS 1948, MS 1950, Oklahoma State Univ.; PhD 1963, Univ. of Kansas. (GF)
- DILLMAN, LAURIE E.**, Assoc. Prof. of Aerospace Studies (1970). BS 1957, Brigham Young; MS 1968, Univ. of Oklahoma.
- DODDS, DARRELL DeLOSS**, Asst. Prof. of Athletics (1963). BS 1959, MS 1960, Kansas State Univ.
- DOEZEMA, C. PHILIP**, Asst. Prof. of Biology (1970). BS 1961, Michigan State Univ.; PhD 1967, Stanford Univ. (GF)
- DONOVAN, ROBERT KENT**, Asst. Prof. of History (1964). BA 1954, Harvard Univ.; BA 1958, MA 1963, Cambridge Univ.; PhD 1965, Harvard Univ. (GF)
- DOUGLAS, LOUIS HARTWELL**, Prof. of Political Science (1949). AB 1931, Hastings Col.; MA 1937, PhD 1949, Univ. of Nebraska. (GF)
- DRAGSDORF, R. DEAN**, Prof. of Physics (1948, 1956). SB 1944, PhD 1948, Massachusetts Institute of Technology. (GF)
- DRESSLER, ROBERT E.**, Asst. Prof. of Mathematics (1970). BA 1965, Univ. of Rochester; MA 1966, Univ. of Oregon; PhD 1969, Univ. of Oregon. (GF)
- DRISS, ANN**, Instr. in Modern Languages (1967). AB 1952, Washburn Univ.; MS 1966, Kansas State Teachers Col.
- DUSHKIN, LELAH**, Asst. Prof. of Sociology (1968). AB 1953, Smith Col.; MS 1956, Univ. of Pennsylvania.
- EASTWOOD, BRUCE S.**, Assoc. Prof. of History (1970). AB 1959, MA 1960, Emory Univ.; PhD 1964, Univ. of Wisconsin. (GF)
- EATON, GEORGE R.**, Director of KSU Printing Service, Asst. Prof. of Journalism and Mass Communications (1955). BS 1947, South Dakota State Col.
- EBBERTS, GEORGE ORVAL**, Asst. Dean; Asst. Prof. (1946, 1956). BS 1949, MS 1951, Kansas State Univ.
- ECK, JOHN S.**, Asst. Prof. of Physics (1969). BS 1962; PhD 1967, The Johns Hopkins Univ. (GF)
- EITNER, WALTER HUGO**, Assoc. Prof. of English (1954, 1959). AB 1948, Univ. of Denver; AM 1949, Univ. of Michigan; PhD 1959, Univ. of Denver. (GF)
- ELLIS, BYRON ELBRIDGE**, Prof. of Journalism Emeritus (1949, 1950). AB 1927, Pacific Union Col.; AM in Ed 1933, Univ. of Southern California. (GF)
- ELLSWORTH, LOUIS DANIEL**, Prof. of Physics (1946, 1954). BS 1937, Case Institute of Technology; MS 1938, PhD 1941, Ohio State Univ. (GF)
- EMERSON, M. JARVIN**, Prof. of Economics (1962, 1969). BA 1957, Luther Col.; MA 1960, PhD 1963, Univ. of Iowa. (GF)
- ENGLER, LEO F.**, Prof. of Speech (1962). BA 1952, Univ. of Iowa, MA 1953, PhD 1962, Univ. of Texas. (GF)
- EVANS, JOHN C.**, Asst. Prof. of Physics (1966). BS 1960, Univ. of Oklahoma; MS 1962, Rensselaer Polytechnic Institute; MS 1964, PhD 1966, Univ. of Michigan. (GF)
- EVANS, THOMAS MARION**, Prof. of Physical Education (1942, 1950). BS 1930, Kansas State Univ.; MS 1942, Univ. of Michigan; PEDir 1958, Indiana Univ. (GF)
- EVANS, WILLIAM E.**, Asst. Prof. of English (1969). BA 1963, Wayne State Univ.; MA 1965, Univ. of Michigan.
- FALKS, FRANKLIN C.**, Asst. Football Coach (1971). BA 1967, Parsons Col.
- FAULKNER, JACOB OLIN**, Prof. of English Emeritus (1922, 1955). BA 1907, Washington and Lee Univ.; MA 1920, Pennsylvania State Univ. (GF)
- FAVROW, WILLIAM**, Asst. Track Coach (1965). BS 1960, Emporia State Teachers Col.
- FEDDER, NORMAN J.**, Assoc. Prof. of Speech (1970). BA 1955, Brooklyn Col.; MA 1956, Columbia Univ.; PhD 1962, New York Univ. (GF)
- FERGUSON, CLYDE RANDOLPH**, Asst. Prof. of History (1960, 1963). BA 1955, Univ. of Oklahoma; MA 1957, PhD 1960, Duke Univ. (GF)
- FERGUSON, GARY W.**, Asst. Prof. of Biology (1969). BS 1963, Tulane Univ.; MS 1965, Texas Technological Col.; PhD 1968, Univ. of Michigan. (GF)
- FEYERHERM, ARLIN M.**, Prof. of Statistics; Statistical Consultant, Agr. Exp. Sta. (1953, 1964). BS 1946, Univ. of Minnesota; MS 1948, Univ. of Iowa; PhD 1952, Iowa State Univ. (GF)
- FIELDEN, LARRY E.**, Asst. Prof. of Military Science (1970). BS 1965, Southwestern Missouri State Col.; 1968, Air Defense Officers Career Course.
- FINA, LOUIS R.**, Prof. of Biology; Microbiologist, Agr. Exp. Sta. (1954, 1962). AB 1942, MS 1948, PhD 1950, Univ. of Illinois. (GF)
- FISHER, PAUL S.**, Asst. Prof. of Computer Science; Consultant, Agr. Exp. Sta. (1967). BA 1963, MA 1964, Univ. of Utah; PhD 1969, Arizona State Univ. (GF)
- FLANAGAN, BRUCE**, Prof. of Speech (1966). BS 1953, Western Michigan Univ.; MS 1958, Southern Illinois Univ.; PhD 1966, Univ. of Florida. (GF)
- FLORA, CORNELIA BUTLER**, Asst. Prof. of Sociology (1970). BA 1965, Univ. of California; MS 1966, PhD 1970, Cornell Univ. (GF)
- FLORA, JAN L.**, Asst. Prof. of Sociology (1970). BA, Univ. of Kansas; MS 1967, PhD 1970, Cornell Univ. (GF)
- FLOUER, JACK**, Assoc. Prof. of Music (1971). BME 1960, Marshall Univ.; MM 1962, Eastman School of Music; DM 1971, Indiana Univ.
- FLOYD, LON KEITH**, Asst. Track Coach (1969). BS 1967, Kansas State Univ.
- FOLLAND, NATHAN O.**, Asst. Prof. of Physics (1966). BA 1959, Concordia Col.; PhD 1965, Iowa State Univ. (GF)
- FRANKLIN, ALBERT B.**, Director, South Asia Center; Prof. Political Science (1968). AB 1930, Univ. of Miami; AM 1936, PhD 1938, Harvard Univ. (GF)
- FRAZIER, JOHN CARROLL**, Prof. of Biology Emeritus (1926, 1970). AB 1925, DePauw Univ.; MA 1926, Univ. of Nebraska; PhD 1930, Univ. of Chicago. (GF)
- FRAZIER, ROBERT H.**, Asst. Football Coach (1967). BS 1965, Univ. of Tennessee.
- FRETWELL, STEPHEN D.**, Asst. Prof. of Biology (1969). BS 1964, Bucknell Univ.; PhD 1968, North Carolina State Univ. (GF)
- FRIEDMANN, EUGENE ALVIN**, Prof., Head, Department of Sociology and Anthropology (1965). AB 1947, MA 1949, PhD 1953, Univ. of Chicago. (GF)
- FRIEMAN, JEROME**, Asst. Prof. of Psychology (1968). BA 1963, MS 1965, Western Reserve Univ.; PhD 1968, Kent State Univ. (GF)
- FROILAND, THOMAS G.**, Instr. of Biology (1970). BA 1965, Augustana Col.; MS 1967, PhD 1970, Univ. of Nebraska.

- FRYER, HOLLY CLAIRE**, Prof.; Head, Department of Statistics; Director, Statistical Laboratory, Agr. Exp. Sta. (1940, 1959). BS 1931, Univ. of Oregon; MS 1933, Oregon State Univ.; PhD 1940, Iowa State Univ. (GF)
- FULLER, LEONARD EUGENE**, Prof. of Mathematics (1952, 1959). BA 1941, Univ. of Wyoming; MS 1947, PhD 1950, Univ. of Wisconsin. (GF)
- GAINEY, PERCY LEIGH**, Prof. of Biology Emeritus (1914, 1957). BS 1908, MS 1910, North Carolina State Univ.; PhD 1926, Washington Univ. (GF)
- GALE, HENRIETTA ANN**, Instr. of Computer Science (1970). BS 1964, Univ. of Missouri; MS 1968, St. Cloud State Col.
- GALLAGHER, TOM L.**, Director, Computing Center, Assoc. Prof. of Computer Science (1970). BA 1953, MS 1954, North Texas State Col.; DSc 1967, Washington Univ. (GF)
- GARRETT, CHARLES ROY**, Asst. Basketball Coach (1970). BA 1965, McKendree Col.; MS 1969, Southern Illinois Univ.
- GARZIO, ANGELO C.**, Prof. of Art (1957). BA 1949, BS 1949, Syracuse Univ.; Diploma di Profitto, 1950, Univ. of Florence, Italy; MA 1954, MFA 1955, State Univ. of Iowa. (GF)
- GEIGER, ALICE LOUISE**, Asst. Prof. of Art Emerita (1945). AB 1922, BFA 1933, Univ. of Kansas; MA 1939, Colorado State Col. of Education. (GF)
- GEISSLER, WINNIFRED J.**, Instr. in English (1954). B Music Ed 1940, Bethany Col.; MS 1954, Kansas State Univ.
- GENCH, BARBARA E.**, Asst. Prof. in Physical Education (1968, 1970). BS 1962, MS 1967, Kansas State Univ.
- GEYER, KATHERINE**, Prof. of Physical Education (1927, 1945). BS 1927, Ohio State Univ.; MA 1934, Columbia Univ. (GF)
- GIBSON, HAROLD VINCE**, Head Football Coach (1967). BS 1955, MA 1956, Florida State Univ.
- GIER, HERSCHEL THOMAS**, Prof. of Biology, Embryologist, Agr. Exp. Sta. (1947, 1960). AB 1931, Kansas State Col. of Pittsburg; PhD 1936, Indiana Univ. (GF)
- GILLESPIE, VINCENT E.**, Asst. Prof. of English (1966). BA 1952, Sterling Col.; MA 1956, Univ. of Kansas, PhD 1970, Univ. of Kansas.
- GIVEN, CHARLES H.**, Assoc. Prof. of Aerospace Studies (1968). BS 1950, Wesleyan Col.; BS 1958, Texas A & M; MS 1965, Univ. of Michigan.
- GIVEN, KINGSLEY WALTON**, Prof. of Speech Emeritus (1920, 1950). BS 1926, Park Col.; MA 1929, State Univ. of Iowa. (GF)
- GLENN, ESTHER BEACHEL**, Asst. Prof. of English (1948, 1954). AB 1930, Kansas Wesleyan Univ.; MS 1938, Kansas State Univ. (GF)
- GONZALEZ-DEL-VALLE, LOUIS T.**, Asst. Prof. of Modern Languages (1972). BA 1968, Univ. of North Carolina; MA 1971, Univ. of Massachusetts.
- GOODRICH, ARTHUR LEONARD**, Prof. of Biology Emeritus (1929, 1970). BS 1928, Col. of Idaho; MS 1929, Univ. of Idaho; PhD 1938, Cornell Univ. (GF)
- GORMELY, PATRICK JOSEPH**, Asst. Prof. of Economics (1967). AB 1963, Catholic Univ. of America; PhD 1967, Duke Univ. (GF)
- GOSS, JAMES ARTHUR**, Assoc. Prof. of Biology; Plant Physiologist, Agr. Exp. Sta. (1956, 1967). BS 1951, Utah State Univ.; PhD 1957, Univ. of California at Los Angeles. (GF)
- GOTTLIEB, BOB H.**, Asst. Basketball Coach (1971). BA 1962, Ohio State Univ.; MA 1969, Columbia Univ.
- GRAY, JR., MARION WILSON**, Asst. Prof. of History (1969). BA 1964, Texas Christian Univ.; MA 1966, Univ. of Wisconsin.
- GREECHIE, RICHARD J.**, Assoc. Prof. of Mathematics (1967, 1970). BS 1962, Boston Col.; PhD 1966, Univ. of Florida. (GF)
- GREEN, RALPH EMERSON**, Instr. in Physics Emeritus (1961, 1972). BS 1939, Tri-State Col.; MS 1954, Univ. of Alabama.
- GREENBERG, ARTHUR R.**, Asst. Prof. of Philosophy (1969). BS 1960, Lehigh Univ.
- GREENWOOD, MICHAEL JAMES**, Assoc. Prof. of Economics (1965). BS 1962, DePaul Univ.; MA 1965, PhD 1967, Northwestern Univ. (GF)
- GRIFFITT, COYE ANNETTE**, Instr. of Computer Science (1970). BS 1964, Kansas State Univ.
- GRIFFITT, WILLIAM**, Assoc. Prof. of Psychology (1968). BA 1964, Kansas State Univ.; PhD 1967, Univ. of Texas. (GF)
- GRILLET, MIREILLE P.**, Asst. Prof. of Mathematics (1969). Licence, 1961, Univ. of Paris, PhD 1968, Kansas State Univ. (GF)
- GRILLET, PIERRE ANTOINE**, Assoc. Prof. of Mathematics (1967, 1970). Licence, 1960, PhD 1965, Univ. of Paris. (GF)
- GUHL, ALPHAEUS MATTHEW**, Prof. of Biology Emeritus (1943, 1968). AB 1922, North Central Col.; MS 1939, PhD 1943, Univ. of Chicago. (GF)
- GUSTAFSON, MERLIN DWAYNE**, Assoc. Prof. of Political Science (1960, 1968). BS 1943, MS 1947, Kansas State Univ.; PhD 1956, Univ. of Nebraska. (GF)
- HAGAN, KENNETH JAMES**, Asst. Prof. of History (1969). AB 1955, MA 1964, Univ. of California, Berkeley. (GF)
- HAJDA, JOSEPH**, Director, International Activities (1965), Assoc. Prof. of Political Science (1960). AB 1951, Miami Univ.; MA, PhD 1955, Indiana Univ. (GF)
- HAMILTON, JAMES R.**, Instr. of Philosophy (1971). BA 1964, Pfeiffer Col.; MA 1967, Emory Univ.; BD 1968, Union Theological Seminary.
- HAMMAKER, GENEVA**, Lecturer in Physics (1961, 1969). AB 1957, Drury Col.; PhD 1961, Northwestern Univ.
- HAMMAKER, ROBERT M.**, Assoc. Prof. of Chemistry (1961, 1967). BS 1956, Trinity Col.; PhD 1960, Northwestern Univ. (GF)
- HANSEN, MERLE FREDERICK**, Prof. of Biology; Parasitologist, Agr. Exp. Sta. (1950, 1963). AB 1939, MA 1941, Univ. of Minnesota; PhD 1948, Univ. of Nebraska. (GF)
- HARRIS, JOHN ORVILLE**, Prof. of Biology; Bacterial Physiologist, Agr. Exp. Sta. (1941, 1952). BS 1939, Kansas State Univ.; MS 1941, Univ. of Hawaii; PhD 1943, Kansas State Univ. (GF)
- HARRIS, OSCAR L.**, Instr. in Aerospace Studies (1970).
- HARRIS, VIDA AGNES**, Assoc. Prof. of Art Emerita (1924, 1963). BS 1914, Kansas State Univ.; AM 1927, Univ. of Chicago. (GF)
- HARRISS, STELLA**, Asst. Prof. of Chemistry Emeritus (1919, 1953). BS 1917, Kansas State Univ.; MS 1919, Kansas State Univ.
- HARTMAN, JOHN HOWARD**, Head Basketball Coach (1970). BS 1950, Oklahoma State Univ.; MS 1954, Oklahoma State Univ.
- HATHAWAY, CHARLES**, Assoc. Prof. and Head of Physics (1964, 1969). BS 1958, Texas A & M Col.; PhD, 1964, Univ. of Oklahoma. (GF)
- HAWES, JOSEPH M.**, Asst. Prof. of History (1971). BA 1960, Rice Univ.; MA 1962, Oklahoma State Univ.; PhD 1969, Univ. of Texas at Austin. (GF)
- HAWLEY, M. DALE**, Assoc. Prof. of Chemistry (1966, 1970). BA 1960, MA 1962, Univ. of Northern Iowa; PhD 1965, Univ. of Kansas. (GF)
- HAZLETT, EMERSON L.**, Instr. of Economics (1969). BS 1949, MS 1964, Univ. of Kansas.
- HEAD, EDWARD C.**, Asst. Athletics Director (1967). BS 1952, MS 1954, Kansas State Univ.
- HEATH, THEODORE**, Asst. Football Coach (1972). BS 1964, MA 1966, Western State Col.
- HEBERT, JR., JOSEPH P.**, Prof. and Head of Department of Aerospace Studies (1971). BS 1952, Univ. of Southwestern Louisiana; MS 1959, St. Louis Univ.; MS 1969, Univ. of Southern California; 1966 Air War Col.
- HERMAN, LOUIS M.**, Asst. Prof. of Mathematics (1970). BS 1963, Univ. of Florida; MS 1965, Univ. of Florida; PhD 1970, Univ. of Massachusetts. (GF)
- HERZON, FREDERICK DAVID**, Asst. Prof. of Political Science (1968). BA 1964, PhD 1971, Univ. of Illinois.
- HEWETT, PHILLIP WILLIAM**, Asst. Prof. of Music (1969). BME 1959, Texas Christian Univ. MS 1970, Kansas State Univ.
- HIEBERT, PAUL G.**, Assoc. Prof. of Anthropology (1966). BA 1954, Tabor Col.; MA 1958, PhD 1967, Univ. of Minnesota. (GF)
- HIGGINSON, FRED H.**, Prof. and Head of English (1950, 1969). AB 1942, MA 1947, Univ. of Wichita; PhD 1953, Univ. of Minnesota. (GF)
- HIGHAM, ROBIN DAVID STEWARD**, Prof. of History (1963, 1966). AB 1950, Harvard Col.; MA, Claremont Graduate School; PhD 1957, Harvard Univ. (GF)
- HILL OPAL BROWN**, Assoc. Prof. of Art Emerita (1944, 1954). BS 1944, MS 1950, Kansas State Univ. (GF)
- HILL, RANDALL CONRAD**, Prof. of Sociology Emeritus (1929, 1970). BS 1924, MS 1927, Kansas State Univ.; PhD 1929, Univ. of Missouri. (GF)
- HINRICHS, CARL**, Asst. Prof. of Speech (1964). AB 1959, MA 1960, Univ. of North Carolina. (GF)
- HOFFMAN, MICHAEL K.**, Asst. Prof. of Chemistry (1971). BS 1963, Univ. of Pennsylvania; PhD 1968, Bryn Mawr Col. (GF)
- HOOK, PATRICIA W.**, Instr. of Biology (1970). BA 1963, MS 1965, Kansas State Univ.; PhD 1970, Oregon State Univ.
- HOSTETTER, HELEN PANSY**, Prof. of Journalism Emerita (1926, 1964). AB 1917, Univ. of Nebraska; BS 1940, Kansas State Univ.; MS 1926, Northwestern Univ. (GF)
- HOUSER, DAVID J.**, Asst. Prof. of English (1969). BS 1964, Iowa State Univ.; MS 1966, PhD 1970, Univ. of Wisconsin. (GF)
- HOWARD, DAN**, Prof. and Head of Art Department (1971). BA 1953, MFA 1958, Univ. of Iowa. (GF)
- HOWE, F. VIRGINIA**, Prof. of Journalism and Mass Communications (1947, 1959). AB 1935, Elmira Col.; MS 1949, EdD 1958, Boston Univ. (GF)
- HSU, CHEN-JUNG**, Prof. of Mathematics (1965). BS 1937, DS 1961, Tohoku Univ. (Japan). (GF)
- HUFF, GEORGE A.**, Asst. Prof. of Mathematics (1971). BA 1966, Kenyon Col.; MA 1968, Lehigh Univ.; PhD 1972, Stanford Univ.
- HULBERT, LLOYD C.**, Assoc. Prof. of Biology; Ecologist, Agr. Exp. Sta. (1955, 1964). BS 1940, Michigan State Univ.; PhD 1953, Washington State Univ. (GF)
- HUMMEL, WILLIAM CASTLE**, Prof. of English (1950). AB 1939, Allegheny Col.; MA 1940, PhD 1946, Univ. of Pittsburgh. (GF)
- HYLE, ARCHIE R.**, Prof. of Military Science (1970). BS 1943, Kansas State Univ.; 1957, Command and General Staff Col.; MBA 1960, Univ. of Alabama; MS 1965, George Washington Univ.; 1965, National War Col.; 1966, Stanford Research Institute.
- IANDOLO, JOHN J.**, Asst. Prof. of Biology; Microbiologist, Agr. Exp. Sta. (1967). BS 1961, Loyola Univ. (Chicago); MS 1963, PhD 1965, Univ. of Illinois. (GF)
- ILES, IVOR VICTOR**, Prof. of Political Science Emeritus (1911, 1949). BA 1904, MA 1905, Univ. of Kansas. (GF)
- IMAN, RONALD L.**, Instr. of Statistics (1970). BS 1962, Kansas State Univ.; MA 1965, Kansas State Teachers Col. (Emporia).
- JACK, HULAN E., JR.**, Asst. Prof. of Physics (1971). BS 1960, New York Univ.; MS 1964, New York Univ.; PhD 1971, New York Univ. (GF)
- JACKSON, ROBERT L.**, Asst. Football Coach (1970). BS 1963, Howard Col. of Stanford Univ.; MA 1963, George Peabody Col.
- JACKSON, T. HANLEY**, Asst. Prof. of Music (1968). BA 1965, San Fernando Valley State Col.; MA 1968, California State Col. at Long Beach. (GF)
- JANES, WILLIAM CHARLES**, Assoc. Prof. of Mathematics Emeritus (1922, 1968). BS 1919, Northwestern Univ.; MA 1922, Univ. of Nebraska.
- JOHNSON, GEORGE DANA**, Assoc. Prof. of Chemistry (1952, 1967). AB 1940, MA 1941, Oberlin Col.; PhD 1946, Univ. of Michigan. (GF)
- JOHNSTON, KENNETH GORDON**, Asst. Prof. of English (1966). BA 1948, Univ. of California, Berkeley; MA 1951, Univ. of California, Los Angeles; PhD 1966, Univ. of Minnesota. (GF)
- JONES, DALE VINCENT**, Assoc. Prof. of English (1946, 1951). BS 1931, MS 1941, Kansas State Univ. (GF)
- JONES, KENNETH W.**, Assoc. Prof. of History (1965, 1970). AB 1958, MA 1959, PhD 1966, Univ. of California. (GF)
- KAY, KENNETH G.**, Asst. Prof. of Chemistry (1971). BS 1965, Polytechnic Institute of Brooklyn; MS 1965, Polytechnic Institute of Brooklyn; PhD 1970, John Hopkins Univ. (GF)
- KEMP KENNETH E.**, Assoc. Prof. of Computer Science; Consultant, Agr. Exp. Sta. (1968). BS 1963, MS 1965, PhD 1967, Michigan State Univ. (GF)
- KHALIL, M. SHOUKRY**, Visiting Assoc. Prof. of Biology (1969). BS 1941, MS 1952, Cairo Univ.; PhD 1956, Wageningen.
- KIPP, JACOB J.**, Asst. Prof. of History (1971). BS 1964, Shippensburg State Col.; MA 1967, Pennsylvania State Univ.; PhD 1970, Pennsylvania State Univ. (GF)

- KLAASSEN, HAROLD E.**, Asst. Prof. of Biology (1967). AB 1957, Tabor Col.; MS 1959, Kansas State Univ.; PhD 1967, Univ. of Washington. (GF)
- KNORR, FRITZ GUSTAVE**, Head Wrestling Coach, Asst. Prof. of Athletics (1942, 1952). BS 1932, MS 1945, Kansas State Univ.
- KNOWLES, HAROLD R.**, Instr. of Speech (1970). BS 1967, MS 1970, Kansas State Univ.
- KOCH, WILLIAM E.**, Asst. Prof. of English (1946, 1947). BS 1938, North Dakota State Teachers Col.; MS 1949, Kansas State Univ. (GF)
- KRAMER, CHARLES LAWRENCE**, Assoc. Prof. of Biology, Mycologist, Agr. Exp. Sta. (1958, 1966). AB 1950, MA 1953, PhD 1957, Univ. of Kansas. (GF)
- KREN, GEORGE M.**, Assoc. Prof. of History (1965). BA 1948, Colby Col.; MA 1949, PhD 1960, Univ. of Wisconsin. (GF)
- KRIEGER, EDWARD W.**, Assoc. Prof. of Aerospace Studies (1971). BS 1956, St. Louis Univ.; MS 1968, Rensselaer Polytechnic Institute.
- KROMM, DAVID**, Assoc. Prof. of Geography (1966). BS 1960, Eastern Michigan Univ.; MA 1964, PhD 1966, Michigan State Univ. (GF)
- LANAN, RUSSELL**, Asst. Prof. Emeritus of English (1935, 1972). BS 1932, Kansas State Univ.; MA 1933, State Univ. of Iowa. (GF)
- LAMBERT, JACK L.**, Prof. of Chemistry (1950, 1958). AB 1947, MS 1947, Kansas State Col. of Pittsburg; PhD 1950, Oklahoma State Univ. (GF)
- LANGENKAMP, JERRY REESE**, Assoc. Prof. of Music; BM 1953, Univ. of Oklahoma; MM 1958, Univ. of Michigan; A Music D 1970, Univ. of Michigan. (GF)
- LANGFORD, ROY CLINTON**, Prof. of Psychology (1925, 1941). BS 1925, MS, Kansas State Univ.; PhD 1934, Leland Stanford Junior Univ. (GF)
- LANNING, FRANCIS C.**, Assoc. Prof. of Chemistry (1942, 1961). BS 1930, MS 1931, Univ. of Denver; PhD 1936, Univ. of Minnesota. (GF)
- LARMER, OSCAR VANCE**, Prof. of Art (1950, 1970). BFA 1949, Univ. of Kansas; MFA 1955, Wichita Univ. (GF)
- LARSON, SARA CHARLOTTE**, Instr. in Geography Emerita (1946, 1964). AB 1917, Know Col.; BE 1927, Illinois State Normal Univ.; MS 1942, Univ. of Chicago.
- LASH, MENDEL ELMER**, Prof. of Chemistry Emeritus (1922, 1966). AB 1920, MS 1922, PhD 1928, Ohio State Univ. (GF)
- LASHBROOK, RALPH RICHARD**, Prof. and Head Emeritus, Department of Journalism (1934, 1944). BS 1929, Kansas State Univ.; MS 1942, Univ. of Wisconsin. (GF)
- LAUMER, HELMUT W.**, Research Assoc. of Physics (1971). BS 1965, Univ. of Chicago; MS 1967, Michigan State Univ.; PhD 1971, Michigan State Univ.
- LAURIE, DAVID R.**, Instr. in Physical Education (1968). BS 1963, MS 1966, Kansas State Univ.
- LEACHMAN, ROBERT B.**, Prof. of Physics; Director, Nuclear Science Laboratories (1967). BS 1942, Case Institute of Technology; PhD 1950, Iowa State Univ. (GF)
- LEAVENGOOD, LUTHER OMAR**, Prof. of Music, BM 1929, Univ. of Kansas; MM 1936, Univ. of Michigan. (GF)
- LEE, KENNETH**, Instr. in Aerospace Studies (1970).
- LEE, RONALD S.**, Asst. Prof. of Physics (1967). BA 1961, Luther Col.; PhD 1967, Iowa State Univ. (GF)
- LEE, YU-LEE**, Assoc. Prof. of Mathematics (1967). BS 1955, MA 1959, National Taiwan Univ.; PhD 1964, Univ. of Oregon. (GF)
- LEGG, JAMES C.**, Assoc. Prof. of Physics (1967). BS 1958, Indiana Univ.; MA 1960, PhD 1962, Princeton Univ. (GF)
- LENHART, ANNE G.**, Asst. Prof. of Chemistry (1967). BA 1958, Hollins Col.; MS 1963, PhD 1965, The Univ. of New Mexico. (GF)
- LEWIS, JOHN TIMOTHY**, Asst. Prof. of English (1970). AB 1962, AM 1968, Univ. of Texas.
- LIGHTFOOT, MICHAEL F.**, Asst. Prof. of Military Science (1970). BS 1965, Seattle Univ.; 1969 Armor Officers Career Course.
- LIMPER, LOUIS HENRY**, Prof. of Modern Languages Emeritus (1914, 1944). AB 1907, Baldwin-Wallace Col.; AM 1914, Univ. of Wisconsin; PhD 1931, State Univ. of Iowa. (GF)
- LINDER, ROBERT D.**, Assoc. Prof. of History (1965, 1967). BS 1956, Kansas State Teachers Col.; BDMRE 1958, Central Baptist Theological Seminary; MA 1960, PhD 1963, Univ. of Iowa. (GF)
- LINFORD, ORMA**, Asst. Prof. of Political Science (1966). BS 1956, Utah State Univ.; MS 1958, PhD 1964, Univ. of Wisconsin. (GF)
- LOCKHART, CHARLES HOWARD**, Asst. Prof. of Biology (1940, 1947). BS 1934, MS 1938, Kansas State Univ. (GF)
- LONG, GLENN WESLEY**, Asst. Prof. of Sociology Emeritus (1938, 1970). AB 1926, Baker Univ.; MS 1940, Kansas State Univ. (GF)
- LONGHURST, THOMAS M.**, Asst. Prof. of Speech (1971). BS 1966, MS 1968, PhD 1970, Univ. of Minnesota. (GF)
- LOWE, JOHN III**, Asst. Prof. of Speech (1969). BS in Ed 1964, Eastern Illinois Univ.; MA 1966, PhD 1969, Univ. of Illinois. (GF)
- LYNN, NAOMI B.**, Asst. Prof. of Political Science (1970). BA 1954, Maryville Col.; MA 1958, Univ. of Illinois, PhD 1970, Univ. of Kansas.
- MacDONALD, JAMES ROBERT**, Assoc. Prof. of Physics (1968). BA 1958, Univ. of Toronto; MS 1964, PhD 1966, McMaster Univ. (GF)
- MACY, ELBERT BONEBRAKE**, Assoc. Prof. of Journalism and Mass Communications (1946, 1951). BS 1930, MS 1939, Kansas State Univ.
- MALONE, JOSEPH J.**, Prof. and Head of History (1971). BA 1949, MA 1950, Univ. of Washington; PhD 1956, Univ. of London. (GF)
- MANNEY, THOMAS R.**, Assoc. Prof. of Physics (1971). BA 1958, Western Washington State Col.; PhD 1964, Univ. of California. (GF)
- MARCHIN, GEORGE L.**, Asst. Prof. of Biology (1970). BA 1962, Rockhurst Col.; PhD 1967, Univ. of Kansas. (GF)
- MARR, JOHN MAURICE**, Prof. of Mathematics (1953, 1958). BS 1941, Central Missouri State Col.; MA 1949, Univ. of Missouri; PhD 1953, Univ. of Tennessee. (GF)
- MARZOLF, G. RICHARD**, Assoc. Prof. of Biology (1962, 1968). AB 1957, Wittenberg Univ.; PhD 1962, Univ. of Michigan. (GF)
- MAXFIELD, JOHN E.**, Prof. and Head, Department of Mathematics (1967). BS 1947, Massachusetts Institute of Technology; MS 1949, Univ. of Wisconsin; PhD 1951, Univ. of Oregon. (GF)
- MAXWELL, GEORGE WILLARD**, Asst. Prof. of Physics Emeritus (1927, 1960). AB 1912, MS 1920, Univ. of Michigan.
- MCCARTHY, PAUL E.**, Assoc. Prof. of English (1967). BA 1948, MFA 1951, State Univ. of Iowa; PhD 1958, Univ. of Texas. (GF)
- MCCRACKEN, ELIZABETH UNGER**, Assoc. Prof. of Biology Emerita (1938, 1970). AB 1929, MA 1932, Wellesley Col.; PhD 1937, Univ. of California. (GF)
- MCDONALD, LYMAN L.**, Asst. Prof. of Statistics (1971). BS 1963, MS 1964, Oklahoma State Univ.; PhD 1970, Colorado State Univ. (GF)
- MCDONALD, RICHARD N.**, Prof. of Chemistry (1960, 1968). BS 1954, MS 1955, Wayne State Univ.; PhD 1957, Univ. of Washington. (GF)
- MCDOWELL, EPHRIAM E.**, Asst. Football Coach (1970). BS 1963, Florida State Univ.
- McGHEE, RICHARD D.**, Assoc. Prof. of English (1967). BA 1962, Univ. of Missouri at Kansas City; MA 1964, PhD 1967, Univ. of Oklahoma. (GF)
- McGRAW, BETTY R.**, Asst. Prof. in Modern Languages (1963, 1970). Licence es Lettres, 1961, De l'Université de Paris, La Sorbonne.
- McKINNEY, KATHERYN ANN**, Asst. Prof. of Physical Education (1946). BS 1934, Kansas State Univ.; MA 1935, George Peabody Col. for Teachers. (GF)
- MELOAN, CLIFTON E.**, Prof. of Chemistry (1959, 1968). BS 1953, Iowa State Univ.; PhD 1959, Purdue Univ. (GF)
- MERRIMAN, JOHN W.**, Asst. Prof. in Physical Education (1968). BS 1957, Univ. of Kansas; MA 1967, Univ. of Northern Colorado, EdD 1971, Univ. of Northern Colorado.
- MEYERS, FRANK L.**, Administrative Asst. (1926-1962). BM 1925, Kansas State Univ.
- MILEY, JAMES D.**, Asst. Prof. of Sociology (1970). BA 1959, Millsaps Col.; MA 1963, Louisiana State Univ.; PhD 1970, Tulane Univ. (GF)
- MILLER, CAROL LYNN**, Asst. Prof. of Modern Languages (1968). BA 1958, MA 1959, Vanderbilt Univ.; PhD 1963, Washington Univ. (GF)
- MILLER, CECIL H.**, Prof. of Philosophy Emeritus (1945, 1972). AB 1930, Univ. of Kansas; MA 1939, Univ. of California. (GF)
- MILLER, FORREST R.**, Asst. Prof. of Mathematics (1968). BS 1962, Univ. of Oklahoma; MA 1968, PhD 1968, Univ. of Massachusetts. (GF)
- MILLER, MICHAEL A.**, Asst. Prof. of Computer Science (1971). Asst. Prof. of Mathematics (1960-65). Asst. Director, Computing Center (1964, 1966). BS 1958, MS 1960, Iowa State Univ.
- MILLIKEN, GEORGE A.**, Asst. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1969). BS 1965, MS 1968, PhD 1969, Colorado State Univ. (GF)
- MITCHELL, JAMES C.**, Assoc. Prof. of Psychology (1966). BS 1957, MA 1959, PhD 1962, Ohio State Univ. (GF)
- MOLINEUX, BARRY R.**, Instr. of Speech (1970). BS 1966, Kansas State Univ.; MA 1968, Kansas State Univ.
- MONTGOMERY, LEROY**, Asst. Football Coach (1967). BS 1950, MA 1960, Midwestern Univ.
- MOORE, FRITZ**, Prof. of Modern Languages Emeritus (1934, 1971). AB 1927, Univ. of Akron; MA 1930, PhD 1932, Univ. of Illinois. (GF)
- MORGAN, LAURENCE**, Instr. in Athletics, Athletic Trainer (1951, 1957). BS 1949, St. Ambrose Col.
- MORRIS, JIM R.**, Asst. Prof. of Journalism and Mass Communications (1968). AA 1957, Kilgore Col.; B Journ. 1959, Univ. of Texas; MA 1964, Univ. of Georgia; EdD 1969, North Texas State Univ. (GF)
- MOSER, HERBERT CHARLES**, Prof. of Chemistry (1957, 1967). BA 1952, San Jose State Col.; PhD 1957, Iowa State Univ. (GF)
- MOSES, WILLIAM R.**, Prof. of English (1950, 1954). BA 1932, MA 1933, PhD 1939, Vanderbilt Univ. (GF)
- MOSSMAN, THIRZA ADELINE**, Assoc. Prof. of Mathematics Emerita (1922, 1965). BA 1916, Univ. of Nebraska; MA 1922, Univ. of Chicago. (GF)
- MULHOLLAN, PAIGE E.**, Assoc. Dean; Assoc. Prof. of History (1970). BSBA 1956, MA 1961, Univ. of Arkansas, PhD 1966, Univ. of Texas. (GF)
- MUNRO, DONALD FARNHAM**, Assoc. Prof. of Modern Languages Emeritus (1940). BS 1926, MA 1927, Acadia Univ. (Canada); PhD 1933, Univ. of Illinois. (GF)
- NAFZIGER, ESTEL WAYNE**, Asst. Prof. of Economics (1966). BA 1960, Goshen Col.; MA 1962, Univ. of Michigan; PhD 1967, Univ. of Illinois. (GF)
- NASSAR, RAJA F.**, Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1966, 1968). BS 1958, American Univ., Beirut, Lebanon; MS 1960, Univ. of Idaho; PhD 1963, Univ. of California, Davis. (GF)
- NELSON, DEVERE V.**, Asst. Prof. of Athletics, Director of Sports Information (1966). BS 1949, Kansas State Univ.
- NESLER, JOHN**, Instr. of Military Science (1971).
- NEWCOMB, MARGARET ALICE**, Assoc. Prof. of Biology Emerita (1925, 1970). BS 1925, MS 1927, Kansas State Univ. (GF)
- NICHOLS, DUANE**, Assoc. Prof. of English (1964, 1969). BS 1952, ME 1957, Univ. of South Dakota; PhD 1964, Univ. of Kansas. (GF)
- NICHOLS, HAROLD J.**, Asst. Prof. of Speech (1971). BS 1967, Iowa State Univ.; MA 1969, Indiana State Univ.; PhD 1971, Indiana State Univ.
- NOONAN, JOHN P.**, Assoc. Dean of Graduate School; Assoc. Prof. of English (1947, 1966). BS 1947, Rockhurst Col.; MS 1950, Kansas State Univ.; PhD 1955, Denver Univ. (GF)
- NORDIN, JOHN A.**, Prof. of Economics (1961). BA 1935, MA 1937, PhD 1941, Univ. of Minnesota. (GF)
- NUSHAWG, MICHAEL A.**, Instr. of Art (1970). BFA 1966, Miami Univ.; MA 1969, MFA 1970, Univ. of Iowa.
- NYBERG, BENJAMIN M.**, Asst. Prof. of English (1965). BA 1955, Univ. of Wichita; MA 1958, Univ. of Arizona; PhD 1965, Univ. of Colorado. (GF)
- O'BRIEN, PATRICIA J.**, Asst. Prof. of Anthropology (1967). BA 1962, BMA 1966, PhD 1969, Univ. of Illinois. (GF)
- OGG, ROSELLA A.**, Instr. of Art (1965). BA 1958, Kansas State Univ.; MA 1963, Kansas State Univ.

- OLLINGTON, MARCUS H.**, Asst. Prof. of Speech and Auditorium Manager (1969). Diploma, 1940, Conservatorium of Music; BA 1964, MA 1967, Univ. of North Carolina.
- OLSON, EDWIN G.**, Asst. Prof. of Economics (1969). BA 1956, MA 1960, Univ. of California; PhD 1971, Univ. of Washington.
- ORBACH, HAROLD L.**, Lecturer in Sociology (1969). BSS 1959, The City Col. of New York; PhD 1970, The Univ. of Minnesota.
- O'SHEA, JOHN WILLIAM**, Asst. Prof. of Art (1956, 1968). BFA 1954, Denver Univ.; MFA 1956, State Univ. of Iowa. (GF)
- OSSAR, MICHAEL**, Instr. in Modern Languages (1971). AB 1961, Cornell Univ.; MS 1963, Univ. of Pennsylvania; MA 1967, Univ. of Pennsylvania.
- OTTENHEIMER, HARRIET J.**, Asst. Prof. (temporary) of Anthropology (1969). BA 1962, Bennington Col.
- OTTENHEIMER, MARTIN**, Asst. Prof. of Anthropology (1969). BS 1962, Rensselaer Polytechnic Institute; MA 1965, Tulane Univ.; PhD 1971, Tulane Univ.
- OUKROP, CAROL E.**, Asst. Prof. of Journalism and Mass Communications (1969). BA 1956, Univ. of North Dakota; MA 1965, PhD 1969, Univ. of Iowa. (GF)
- PADY, STUART MCGREGOR**, Prof. of Biology; Mycologist, Agr. Exp. Sta. (1945, 1952). AB 1928, MA 1929, McMaster Univ.; PhD 1933, Univ. of Toronto. (GF)
- PAGE, LEROY EARL**, Assoc. Prof. of History (1969). BS 1951, Univ. of Arkansas; BS 1955, M.Chem Eng 1958, PhD 1963, Univ. of Oklahoma. (GF)
- PARKER, S. THOMAS**, Prof. of Mathematics (1947, 1951). BA 1931, MA 1934, Univ. of British Columbia (Canada); PhD 1947, Univ. of Cincinnati. (GF)
- PARKER, WILLARD A.**, Asst. Prof. of Mathematics (1970). BA 1960, Univ. of Oregon; BD 1964, Fuller Theological Seminary; MA 1966, Univ. of Oregon; PhD 1970, Univ. of Oregon. (GF)
- PARRISH, FRED LOUIS**, Prof. of History Emeritus (1927, 1963). AB 1917, MA 1927, Northwestern Univ.; BD 1920, Garnett Biblical Institute; PhD 1927, Yale Univ. (GF)
- PAUKSTELIS, JOSEPH V.**, Asst. Prof. of Chemistry (1966). BS 1960, Univ. of Wisconsin; PhD 1964, Univ. of Illinois. (GF)
- PELISCHEK, MILTON Z.**, Instr. in English (1965). BS 1948, MA 1950, Kansas State Univ.
- PELTON, MARION HERFORD**, Assoc. Prof. of Music (1928, 1958). BM 1927, Univ. of Wisconsin; BS 1932, Kansas State Univ.; MA 1957, Columbia Univ. (GF)
- PERKINS, JR., CHARLES C.**, Prof. of Psychology (1969). BA 1941, Harvard; MA 1942, PhD 1946, State Univ. of Iowa. (GF)
- PERNG, SHIAN-KOONG**, Asst. Prof. of Statistics (1968). BS, Chung-Hsien Univ., Taiwan; MS 1961, Virginia Polytechnic Institute; PhD 1967, Michigan State Univ. (GF)
- PETERS, GEORGE R.**, Asst. Prof. of Sociology; Assoc., Institute for Environmental Research (1967, 1970). BA 1962, MA 1964, PhD 1968, Univ. of Nebraska. (GF)
- PETTIS, DOROTHY BRADFORD**, Assoc. Prof. of Modern Languages Emerita (1927, 1966). BA 1919, MA 1924, Univ. of Nebraska; 1922, Middlebury Col.; Certificate, 1939, Univ. of Paris. (GF)
- PHARES, E. JERRY**, Prof. and Head, Department of Psychology (1955, 1964). BA 1951, Univ. of Cincinnati; MA 1953, PhD 1955, Ohio State Univ. (GF)
- PIGNO, LOUIS**, Asst. Prof. of Mathematics (1969). BS 1961, Polytechnic Institute of Brooklyn; MA 1965, Univ. of Connecticut; PhD 1969, SUNY at Stony Brook. (GF)
- PITTENGER, THAD H.**, Prof. of Biology; Geneticist, Agr. Exp. Sta. (1959). BS 1947, PhD 1951, Univ. of Nebraska. (GF)
- POLICH, GERALD**, Asst. Prof. of Music (1966). BME 1961, Univ. of Colorado. MME 1966, Univ. of Colorado.
- POOLE, MIRIAM PICK**, Instr. in Physical Education (1961). BS 1943, Savage School for Physical Education and Columbia Univ.; MA 1945, Columbia Univ.
- POWELL, DONALD G.**, Asst. Football Coach (1967). BS 1956, MS 1958, Florida State Univ.
- PRESS, ALLAN N.**, Asst. Prof. of Psychology (1970). BS 1964, Massachusetts Institute of Technology; MA 1967, Clark Univ.; PhD 1972, Clark Univ.
- PSILOS, PAUL D.**, Asst. Prof. of English (1970). BA 1966, Boston Univ.; MA 1967, PhD 1970, Northwestern Univ.
- PURCELL, KEITH F.**, Assoc. Prof. of Chemistry (1967, 1970). BA 1961, Central College; PhD 1965, Univ. of Illinois. (GF)
- RAINBOLT, HARRY R.**, Assoc. Prof. of Speech (1966). BS 1960, Southern Illinois Univ.; MS 1962, PhD 1965, Univ. of Indiana. (GF)
- RAPPOPORT, LEON H.**, Assoc. Prof. of Psychology (1964, 1968). BA 1953, New York Univ.; MA 1962, PhD 1963, Univ. of Colorado. (GF)
- RATCLIFFE, LAMAR CECIL**, Instr. in Mathematics (1964). BS 1933, United States Military Academy; MAT 1964, Duke Univ.
- REAGAN, CHARLES E.**, Asst. Prof. of Philosophy (1967). AB 1964, Holy Cross Col.; MA 1966, PhD 1967, Univ. of Kansas. (GF)
- REED, MERWYN J.**, Instr. of Military Science (1971).
- REES, JOHN O.**, Asst. Prof. of English (1965). BA 1947, Dartmouth Col.; PhD 1965, State Univ. of Iowa. (GF)
- REPLOGLE, RENATA JULIA**, Instr. in Art (1966). BA 1963, MA 1964, Colorado State Col.
- REPLOGLE, REX WAYNE**, Asst. Prof. in Art (1966, 1970). BFA 1964, MFA 1967, Univ. of Kansas. (GF)
- RICHTER, WILLIAM LOUIS**, Asst. Prof. of Political Science (1966). BA 1961, Willamette Univ.; MA 1964, PhD 1968, Univ. of Chicago. (GF)
- RIGGS, HAZEL M.**, Assoc. Prof. of History Emerita (1945, 1952). AB 1920, MA 1923, Univ. of Kansas. (GF)
- RISEMAN, LOUIS**, Asst. Prof. of Geology (1946, 1947). BS 1934, MS 1936, Tufts Col. (GF)
- ROBEL, ROBERT JOSEPH**, Prof. of Biology; Wildlife Conservationist, Agr. Exp. Sta. (1961, 1966). BS 1956, Michigan State Univ.; BMS 1959, Univ. of Idaho; PhD 1961, Utah State Univ. (GF)
- ROBERTSON, JR., CHARLES W.**, Research Assoc. in Department of Physics (1970). BS 1965, Southwestern at Memphis; PhD 1969, Florida State Univ.
- ROBERTSON, SAMUEL A.**, Asst. Football Coach (1967). BS 1966, Univ. of Tennessee.
- ROBINSON, LILA W.**, Asst. Prof. of Speech (1969). BA 1966, MA 1968, PhD 1969, Univ. of Texas. (GF)
- ROBY, PAUL E.**, Asst. Prof. of Music (1966). BM 1958, Oberlin Conservatory; MM 1961, Catholic Univ. of America. (GF)
- RODKEY, L. SCOTT**, Asst. Prof. of Biology; Immunologist, Agr. Exp. Sta. (1970). BA 1964, PhD 1968, Univ. of Kansas. (GF)
- ROGERSON, BREWSTER**, Prof. of English (1953, 1967). AB 1941, Univ. of North Carolina; PhD 1946, Princeton Univ. (FD)
- ROHLES, FREDERICK H.**, Prof. of Psychology (1963, 1966). BS 1942, Roosevelt Univ.; MA 1950, PhD 1956, Univ. of Texas. (GF)
- ROHRER, WAYNE C.**, Prof. of Sociology; Rural Sociologist, Agr. Exp. Sta. (1959, 1965). BS 1946, MS 1948, Texas A and M Col.; PhD 1955, Michigan State Univ. (GF)
- ROMAINE, GILBERT LEWIS**, Asst. Football Coach (1971). BS 1966, East Stroudsburg State Col.; MS 1970, Kansas State Univ.
- ROSENKILDE, CARL EDWARD**, Asst. Prof. of Physics (1970). BS 1959, Washington State Univ.; MS 1960, Univ. of Chicago; PhD 1966, Univ. of Chicago. (GF)
- ROTH, L. EVANS**, Prof. and Director of the Division of Biology (1967). AB 1950, Indiana Univ.; MS 1955, Northwestern Univ.; PhD 1957, Univ. of Chicago. (GF)
- RUDY, JR., CLIFFORD R.**, Postdoctoral Research Assoc. in Department of Physics (1970). BS 1964, Univ. of Arizona; PhD 1970, Univ. of Washington.
- RUSH, RAMONA R.**, Asst. Prof. of Journalism and Mass Communications (1969). BS 1959, MS 1963, Univ. of Kansas; PhD 1969, Univ. of Wisconsin. (GF)
- SACKMAN, HAROLD**, Prof. and Head of Computer Science (1971). BS 1948, City Col. of New York; MA 1949, Columbia Univ.; PhD 1953, Fordham Univ. (GF)
- SAGESER, ADELBERT BOWER**, Prof. of History (1938, 1941). AB 1925, Nebraska State Teachers College (Wayne); MA 1930, PhD 1934, Univ. of Nebraska. (GF)
- SAMELSON, FRANZ**, Prof. of Psychology (1957, 1969). Diploma in Psychology, 1952, Univ. of Munich (Germany); PhD 1956, Univ. of Michigan. (GF)
- SASAKI, CHESTER N.**, Asst. Prof. of Aerospace Studies (1971). BS 1964, University of Illinois; MS 1969, Arizona State University.
- SCHEER, RICHARD K.**, Assoc. Prof. of Philosophy (1968). AB 1950, Univ. of Nebraska; MA 1951, Univ. of Florida; PhD 1958, Univ. of Nebraska. (GF)
- SCHNEIDER, HAROLD WILLIAM**, Asst. Prof. of English (1961, 1969). BA 1950, Univ. of Minnesota.
- SCHNEIDER, MARY W.**, Asst. Prof. of English (1966). BA 1949, MA 1952, State Univ. of Iowa; PhD 1964, Univ. of Minnesota. (GF)
- SCHNUR, ALFRED C.**, Prof. of Sociology (1970). BA 1941, Univ. of Pittsburgh; PhM 1944, PhD 1949, Univ. of Wisconsin. (GF)
- SCHRENK, WILLIAM G.**, Prof. of Chemistry (1938, 1951). AB 1932, Westmar Col.; MS 1936, PhD 1945, Kansas State Univ. (GF)
- SCHWAB, JR., CHARLES M.**, Instr. in Aerospace Studies (1972).
- SEAMAN, GREGORY**, Assoc. Prof. of Physics (1968, 1969). BA 1958, Col. of Wooster; MS 1960, PhD 1965, Yale Univ. (GF)
- SECHER, HERBERT PIERRE**, Prof. and Head of Political Science (1969). BA 1947, MA 1949, PhD 1954, Univ. of Wisconsin. (GF)
- SELF, HUBER**, Asst. Prof. of Geography (1947, 1953). BS 1941, Central Oklahoma State Col.; MS 1947, Oklahoma State Univ. (GF)
- SETSER, DONALD W.**, Prof. of Chemistry (1963, 1970). BS 1956, MS 1958, Kansas State Univ.; PhD 1961, Univ. of Washington. (GF)
- SEYLER, H. L.**, Asst. Prof. of Geography (1970). BA 1963, MA 1967, Kansas State Univ.; PhD 1971, Indiana Univ.
- SHANLINE, RIX D.**, Lecturer in Sociology (1969). BS 1951, MSW 1953, Univ. of Kansas.
- SHANTEAU, JAMES C.**, Asst. Prof. of Psychology (1971). BA 1966, San Jose State Col.; PhD 1970, Univ. of California, San Diego. (GF)
- SHENKEL, JR., CLAUDE WESLEY**, Prof. of Geology (1949, 1958). BS 1941, Kansas State Univ.; MS 1947, PhD 1952, Univ. of Colorado. (GF)
- SHOPMAKER, STANTON N.**, Instr. in Modern Languages (1967). BS 1960, Univ. of Kansas; MA 1964, Univ. of Southern California.
- SHORE, BRUCE W.**, Assoc. Prof. of Physics (1968). BS 1956, Col. of Pacific; PhD 1960, M.I.T. (GF)
- SHOWALTER, DONALD FOX**, Prof. of Psychology Emeritus (1928, 1961). AB 1916, MA 1917, Univ. of Nebraska; PhD 1931, Univ. of Kansas.
- SHULL, PAUL**, Assoc. Prof. of Music (1960). BME 1950, MME 1951, Univ. of Colorado; DMA 1966, Eastman School of Music (Univ. of Rochester).
- SIDDALL, WILLIAM R.**, Assoc. Prof. of Geography; Head, Department of Geography (1962, 1965). AB 1950, Harvard Univ.; MA 1955, PhD 1959, Univ. of Washington. (GF)
- SIDORFSKY, FRANK M.**, Asst. Prof. of Music (1965). BME 1952, Kansas State Teachers Col. of Emporia; MM 1957, Eastman Conservatory of Music (Univ. of Rochester). (GF)
- SILKER, RALPH**, Prof. of Chemistry Emeritus (1941, 1970). BA 1927, Univ. of Dubuque; MS 1931, PhD 1934, State Univ. of Iowa. (GF)
- SINCOVE, R. F.**, Asst. Prof. of Computer Science (1970). BS 1964, Univ. of Colorado; MS 1967, Iowa State Univ.; PhD 1968, Iowa State Univ.
- SIOTANI, MINORU**, Prof. of Statistics (1971). BA 1950, Univ. of Tokyo; DSc 1962, Kyushu Univ. (GF)
- SLESINSKI, RONALD S.**, Asst. Prof. of Biology; Cell Biologist, Agr. Exp. Sta. (1971). BS 1965, PhD 1969, Michigan State Univ. (GF)
- SLISHMAN, ILSE**, Asst. Prof. of Modern Languages (1959, 1969). BS 1958, Kansas State Univ.; MA 1963, Univ. of Kansas. (GF)
- SLOAT, FLOYD B.**, Assoc. Prof. of Mathematics (1946, 1947). BA 1938, Ouachita Col.; MA 1941, Univ. of Arkansas.

SLOOP, JEAN C., Asst. Prof. of Music (1959). BA 1953, Gettysburg Col.; MA 1956, Eastman School of Music (Univ. of Rochester).

SMITH, CHRISTOPHER C., Assoc. Prof. of Biology; (1970). BA 1960, Univ. of Colorado; MA 1963, PhD 1965, Univ. of Washington (GF)

SNYDER, VERTLE E., Asst. Prof. of Physical Education (1954). BS 1942, MS 1950, Kansas State Univ. (GF)

SOCOLOFSKY, HOMER E., Prof. of History (1946, 1963). BS 1944, MS 1947, Kansas State Univ.; PhD 1954, Univ. of Missouri. (GF)

SOLEM, KNUST ERIK, Research Assoc. of Political Science (1970). BA 1964, Univ. of Manitoba, Canada; MA 1966, Univ. of Leicester, England; D. Phil. 1970, Univ. of Alberta, Canada.

SPANGLER, JOHN D., Assoc. Prof. of Physics (1965, 1969). BS 1958, Kansas State Univ.; PhD 1961, Duke Univ. (GF)

SPEARS, JANINA L., Asst. Prof. of Mathematics (1970). BS 1961, Univ. of Florida; MA 1964, Univ. of Florida; PhD 1970, Kansas State Univ. (GF)

SPEARS, WILLIAM, Asst. Prof. of Mathematics (1968). BS 1964, MS 1966, Univ. of Florida. (GF)

SPERRY, ARTHUR BRADLEY, Prof. of Geology Emeritus (1921, 1953). BS 1919, Univ. of Chicago. (GF)

SPIKER, STEVEN L., Instr. of Biology (1970). BS 1964, MS 1967, PhD 1970, Univ. of Iowa.

SPOONER, BRIAN S., Asst. Prof. of Biology (1971). BS 1963, Quincy Col.; PhD 1969, Temple Univ. (GF)

STACEY, KARL, Prof. of Geography (1943, 1959). BA 1936, MA 1937, Univ. of Colorado; PhD 1955, Clark Univ. (GF)

STAMEY, WILLIAM L., Dean; Prof. of Mathematics; Acting Director of Bureau of General Research (1953, 1970). AB 1947, Univ. of North Colorado; MA 1949, PhD 1952, Univ. of Missouri. (GF)

STEINBAUER, ROBERT ANDRUS, Prof. and Head, Department of Music (1970). BM 1950, Univ. of Michigan; MM 1951, Univ. of Michigan; Doc of Music 1959, Indiana Univ. (GF)

STEUNENBERG, THOMAS BERNARD, Prof. of Music (1947). BME 1933, Northwestern Univ.; MM 1938, Univ. of Michigan; PhD 1947, Eastman School of Music (Univ. of Rochester). (GF)

STEWART, DONALD C., Asst. Prof. of English (1968). BA 1952, MA 1955, Univ. of Kansas; PhD 1962, Univ. of Wisconsin. (GF)

STOVER, STEPHEN L., Assoc. Prof. of Geography (1964, 1969). AB 1940, McPherson Col.; MA 1941, Univ. of Kansas; MS 1955, PhD 1960, Univ. of Wisconsin (GF)

STRECKER, GEORGE E., Assoc. Prof. of Mathematics (1972). BS 1961, Univ. of Colorado; PhD 1966, Tulane Univ.

STROMBERG, KARL ROBERT, Prof. of Mathematics (1968). BA 1953, MA 1954, Univ. of Oregon; PhD 1959, Univ. of Washington. (GF)

SULEIMAN, MICHAEL WADIE, Assoc. Prof. of Political Science (1965, 1968). BA 1960, Bradley Univ.; MS 1962, PhD 1965, Univ. of Wisconsin. (GF)

SWEEDLUN, VERNE SEBASTIAN, Prof. of History Emeritus (1941, 1970). AB 1923, Bethany Col.; MA 1928, Univ. of Kansas; PhD 1940, Univ. of Nebraska. (GF)

SWIETLICKI, ALAIN, Instr. in Modern Languages (1968). BA 1962, Kansas State Univ.; MA 1965, Univ. of Texas.

SWILER, JAMES P., Instr. of Art (1970). BSE 1966, Kansas State Teachers Col.; MFA 1970, Wichita State Univ.

TATSCHL, ANNEHARA K., Instr. of Biology (1970). BS 1964, MS 1966, Univ. of New Mexico; PhD 1970, Univ. of Kansas.

TAYLOR, ROBERT BARTLEY, Assoc. Prof. of Anthropology (1957, 1969). BS 1949, Wheaton Col.; MA 1956, PhD 1960, Univ. of Oregon. (GF)

TERRILL, HAROLD JAMES, Asst. Prof. in Modern Languages (1967, 1970). BA 1953, Kansas Univ.; MA 1960, Phillips Univ. (Germany); PhD 1969, Univ. of California. (GF)

THOMAS, LLOYD B., Asst. Prof. of Economics (1968). AB 1963, AM 1964, Univ. of Missouri; PhD 1971, Northwestern Univ.

THOMPSON, CHARLES P., Assoc. Prof. of Psychology (1965, 1967). BS 1958, Wisconsin State Col.; MS 1960, PhD 1962, Univ. of Wisconsin. (GF)

THOMPSON, FRANK JAMES, Asst. Prof. of Physical Education (1937, 1949). BED 1934, Minnesota State Teachers Col. (Mankato); MEd 1936, Springfield Col. (Massachusetts). (GF)

THOMS, JANICE L., Instr. of Speech (1969). BA 1964, Augustana Col.; MA 1969, Kansas State Univ.

TIDD, CHARLES KIM, Asst. Athletic Director and Business Manager of Athletics (1969). BS 1954, Iowa State Univ.

TIEMEIER, OTTO WILLIAM, Prof. of Biology; Wildlife Conservationist, Agr. Exp. Sta. (1947, 1964). AB 1937, MA 1939, Univ. of Kansas; PhD 1947, Univ. of Illinois. (GF)

TILGHMAN, BENJAMIN R., Prof. of Philosophy and Head of Department of Philosophy (1967). AB 1950, MA 1954, Washington Univ.; PhD 1959, Univ. of Washington. (GF)

TOMASCH, ELMER JOHN, Assoc. Prof. of Art (1947, 1959). BS 1935, Western Reserve Univ.; MS 1956, Kansas State Univ. (GF)

TUBBS, LEVARD, Instr. in Aerospace Studies (1970). (GF)

TWISS, PAGE CHARLES, Prof. and Head of Geology (1953, 1969). BS 1950, MS 1955, Kansas State Univ.; PhD 1959, Univ. of Texas. (GF)

UHLARIK, JOHN JEFFERY, Asst. Prof. of Psychology (1970). BS 1965, Univ. of Wisconsin; MS 1967, Univ. of Washington; PhD 1970, Univ. of Washington. (GF)

UNGER, ELIZABETH A., Asst. Prof. of Computer Science; Assoc. Director, Computing Center (1966, 1969). BS 1961, MS 1963, Michigan State Univ.

URBAN, JAMES E., Asst. Prof. of Biology (1970). BA 1965, PhD 1968, Univ. of Texas. (GF)

VANCE, DARLINE, Instr. in English Emerita (1963, 1971). BS 1927, Kansas State Univ.

VAN SWAAY, MAARTEN, Assoc. Prof. of Chemistry (1963, 1968). BBS 1951, Leiden Univ., Netherlands; PhD 1956, Princeton Univ.; 'Drs' 1956, Leiden Univ., Netherlands. (GF)

VAN TASSEL, WESLEY HARVEY, Asst. Prof. of Speech (1969). BS 1960, Moorhead State Col.; MA 1963, Univ. of North Carolina; PhD 1969, Univ. of Denver. (GF)

VAZQUEZ, BURNEY L., Asst. Prof. of Modern Languages (1965). BA 1950, Washburn Univ.; MS 1953, Kansas State Teachers Col.; PhD 1964, Univ. of Kansas. (GF)

VOGT, JOHN L., Assoc. Prof. of Art (1963). BFA 1960, Kansas City Art Institute; MFA 1963, Univ. of Illinois. (GF)

WALKER, MARGARET Y., Instr. of Music (1971). BM 1970, Kansas State Univ.

WALKER, RODNEY G., Asst. Prof. of Music (1966). BME 1959, Univ. of Nebraska; MME 1961, Wichita State Univ. (GF)

WALKER, WARREN VINCENT, Prof. of Music (1948, 1959). BA 1946, Univ. of Washington; MM 1948, Cincinnati Conservatory of Music. (GF)

WALL, HINDMAN P., Administrative Asst., Athletics (1967). BS 1958, Auburn Univ.

WALLER, RAY A., Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1967). BA 1959, Southwestern Col.; MS 1963, Kansas State Univ.; PhD 1967, The Johns Hopkins Univ. (GF)

WALTERS, CHARLES P., Assoc. Prof. of Geology (1936, 1958). BS 1936, MS 1937, Kansas State Univ.; PhD 1957, Cornell Univ. (GF)

WARDELL, DAVID B., Instr. in Physical Education (1969). BS 1963, Univ. of Colorado; MS 1969, Kansas State Univ.

WAUTHIER, RAYMOND AUGUST, Assoc. Prof. of Physical Education (1949). BS 1945, Albion Col.; MS 1947, Drake Univ. (GF)

WEAVER, OLIVER LAURENCE, Asst. Prof. of Physics (1970). BS 1965, California Institute of Technology; PhD 1970, Duke Univ.

WEINBERG, ROGER, Assoc. Prof. of Computer Science (1970). BS 1951, Tulane Univ.; PhD 1954, Univ. of Texas; PhD 1970, Univ. of Michigan. (GF)

WEIS, JERRY S., Asst. Prof. and Asst. Director, Division of Biology; Plant Physiologist, Agr. Exp. Sta. (1966). AB 1958, Kansas Wesleyan Univ.; MA 1960, PhD 1964, Univ. of Kansas. (GF)

WEST, RONALD R., Asst. Prof. of Geology (1969). AA 1955, Centralia Junior Col.; BS 1958, Univ. of Missouri at Rolla; MS 1962, Univ. of Kansas; PhD 1970, Univ. of Oklahoma. (GF)

WHITE, ALFRED EVERETT, Prof. of Mathematics Emeritus (1909, 1950). BS 1904, MS 1909, Purdue Univ. (GF)

WHITE, MARY FRANCES, Assoc. Prof. of English (1947, 1951). BS 1928, MS 1930, Kansas State Univ.; PhD 1955, Denver Univ. (GF)

WILCOXON, GEORGE DENT, Prof. of History (1946, 1948). AB 1936, MA 1938, PhD 1941, Univ. of California at Los Angeles. (GF)

WILLIAMS, DUDLEY, Distinguished Regents Prof. of Physics (1964). AB 1933, MA 1934, PhD 1936, Univ. of North Carolina. (GF)

WILLIAMS, LARRY G., Asst. Prof. of Biology (1970). BS 1961, MS 1963, Univ. of Nebraska; PhD 1968, California Institute of Technology. (GF)

WILLIAMS, NETA C., Instr. of Speech (1970). BA 1958, MA 1970, Kansas State Univ.

WILLIAMS, ROBERT E., Asst. Prof. of Mathematics (1965). BS 1959, MA 1961, PhD 1965, Univ. of Missouri. (GF)

WILLIAMS, TIMOTHY ALDEN, Assoc. Prof. of Political Science (1967). AB 1954, Davidson Col.; PhD 1964, Univ. of North Carolina. (GF)

WILSON, FRED E., Assoc. Prof. of Biology; Physiologist, Agr. Exp. Sta. (1965). AB 1958, MA 1960, Univ. of Kansas; PhD 1965, Washington State Univ. (GF)

WIMMER, EDWARD JOSEPH, Prof. of Biology Emeritus (1928, 1971). AB 1925, MA 1927, PhD 1928, Univ. of Wisconsin. (GF)

WINEGARDNER, CARROLL, Instr. in Art (1966). BFA 1960, Kansas City Art Institute; MFA 1963, Univ. of Oklahoma.

WOLDT, GRACE S., Instr. in Mathematics Emerita (1946). AB 1927, Ohio Wesleyan Univ.

WOODWARD, GARY L., Instr. in Art (1971). AB 1961, Northern Colorado Univ.; MA 1964, Univ. of Iowa; MFA 1969, Univ. of Washington.

YEE, KANE, Assoc. Prof. of Mathematics (1968). BS 1957, MS 1958, PhD 1963, Univ. of California, Berkeley. (GF)

YOUNG, PAUL M., Prof. of Mathematics, Vice President for Univ. Development (1970). AB 1937, Miami Univ.; MA 1939, Ohio State Univ.; PhD 1941, Ohio State Univ. (GF)

ZIMMERMAN, JOHN L., Assoc. Prof. of Biology (1963, 1968). BS 1953, MS 1958, Michigan State Univ.; PhD 1963, Univ. of Illinois. (GF)

ZOLLMAN, DEAN ALVIN, Asst. Prof. of Physics (1970). BS 1964, Indiana Univ.; MS 1965, Indiana Univ.; PhD 1970, Univ. of Maryland.

College of Business Administration

ALLEN, JR., A. DALE, Assoc. Prof. of Business Administration (1967, 1968). BS 1959, MBA 1960, Indiana Univ.; DBA 1966, Univ. of Colorado. (GF)

BARTON-DOBENIN, JOSEPH, Director of Management Services, Assoc. Prof. of Business Administration (1958, 1967). BS 1956, MA 1958, PhD 1966, Univ. of Nebraska. (GF)

BUZENBERG, MILDRED E., Asst. Dean; Asst. Prof. of Business Administration (1964, 1968). BA 1938, Michigan State Univ.; MS 1951, Kansas State Univ.

CLARK, WILLIAM J., Prof. of Business Administration (1946, 1961). BS 1929, Kansas State Teachers Col. (Pittsburg); MA 1940, State Univ. of Iowa; CPA 1954, Kansas. (GF)

COLEMAN, RAYMOND J., Assoc. Prof. of Business Administration (1965, 1969). BS 1948, Univ. of Kansas; MA 1963, Central Missouri State Col.; PhD 1967, Univ. of Arkansas. (GF)

DONNELLY, JOHN T., Asst. Prof. of Business Administration (1972). BBA 1963, MA 1966, PhD 1970, Univ. of Iowa.

FINLEY, ROBERT L., Asst. Prof. of Business Administration (1971). BBA 1965, MA 1970, Univ. of Oklahoma.

FOX, KENNETH L., Assoc. Prof. of Business Administration (1969). BA 1953, MA 1960, Baylor Univ.; CPA 1958, Texas, Louisiana, and Kansas; CPA 1971, Kansas; PhD 1966, Univ. of Illinois. (GF)

GILKISON, PAUL D., Assoc. Prof. of Business Administration (1962, 1967). BS 1959, MBA 1960, Univ. of Kansas; DBA 1964, Univ. of Colorado. (GF)

GRAHAM, JOHN, Asst. Prof. of Business Administration (1970). BA 1967, Kansas State Univ.; MBA 1968, PhD 1970, Univ. of Arkansas.

GUDGELL, DOROTHY B., Asst. Prof. of Business Administration (1943, 1954). BS 1938, MS 1946, Kansas State Univ.

GUGLER, MERLE E., Assoc. Prof. of Business Administration (1947, 1959). BS 1940, Kansas State Teachers Col. (Emporia); MS 1948, Kansas State Univ.; CPA 1956, Kansas. (GF)

HOLLINGER, ROBERT D., Instr. in Business Administration (1966). BS 1964, MS 1968, Kansas State Univ.

JONES, C. CLYDE, Prof. of Business Administration (1960). AB 1944, Marshall Univ.; MA 1950, PhD 1954, Northwestern Univ. (GF)

KING, ALBERT S., Asst. Prof. of Business Administration (1969). BBA 1962, MBA 1966, West Texas State Univ.; DBA 1970, Texas Technological Univ. (GF)

LANGE, MARITA K., Instr. in Business Administration (1972). BS 1971, MS 1972, Kansas State Univ.

LAUGHLIN, EUGENE J., Assoc. Dean; Prof. of Business Administration (1955, 1970). BS 1951, Rockhurst Col.; MS 1959, Kansas State Univ.; CPA 1960, Kansas; PhD 1965, Univ. of Illinois. (GF)

LYNN, ROBERT A., Dean, Prof. of Business Administration (1968). BS 1951, Maryville Col. MS 1955, Univ. of Tennessee; PhD 1958, Univ. of Illinois. (GF)

McMANIS, DONALD L., Asst. Prof. of Business Administration (1970). BS 1949, MBA 1968, Univ. of Iowa, PhD 1971, Univ. of Nebraska.

MAY, CAROLYN A., Instr. in Business Administration (1971). BS 1968, MS 1969, Oklahoma State Univ.

MULANAX, ALVIN E., Assoc. Prof. of Business Administration (1947, 1966). BS 1946, MS 1951, Kansas State Univ. (GF)

NIX, HAROLD M., Asst. Prof. of Business Administration (1972). BA 1967, MA 1969, Western State Col.

RAPP, CHARLES W., Asst. Prof. of Business Administration (1955, 1968). BS 1931, MS 1946, Kansas State Teachers Col. (Emporia).

RICHARDS, VERLYN D., Assoc. Prof. of Business Administration (1965, 1969). BS 1956, MS 1960, Kansas State Univ.; CPA 1961, Kansas; PhD 1967, Univ. of Illinois.

RILEY, MERRILL J., Asst. Prof. of Business Administration (1966). BS 1951, John Brown Univ.; MBA 1955, Univ. of Arkansas.

STOCKARD, JANE B., Instr. in Business Administration (1971). BS 1969, MS 1971, Kansas State Univ.; CPA 1971, Kansas.

THIESSEN, EMIL A., Asst. Prof. of Business Administration (1968). AB 1948, Tabor Col.; MS 1951, Kansas State Teachers Col. (Emporia); EdD 1959, Colorado State Col.

TUXBURY, WILLIAM D., Asst. Prof. of Business Administration (1961). BBA 1946, Southern Methodist Univ.; MBA 1949, Northwestern Univ.; CPA 1954, Texas.

VADEN, RICHARD E., Asst. Prof. of Business Administration (1969). BBA 1960, The Univ. of Texas at Austin; MBA 1965, DBA 1970, Texas Technological Univ. (GF)

College of Education

ALBRACHT, JAMES J., Assoc. Prof. of Education (1966, 1970). BS 1948, MS 1954, Univ. of Nebraska; PhD 1966, Michigan State Univ. (GF)

ALEXANDER, LOREN R., Asst. Prof. of Education and Modern Languages (1972). BM 1951, Southwestern College; MA 1954, Colorado State Col. of Education; MA 1965, Michigan State Univ.

APEL, J. DALE, Assoc. Prof.; Assoc. State Club Leader (1962, 1967). BS 1950, Kansas State Univ.; MS 1961, The American Univ.; PhD 1966, Univ. of Chicago. (GF)

BAKER, HARRY LEIGH, Prof. of Education Emeritus (1946, 1963). AB 1920, LLD 1951, Baker Univ.; BS 1922, Kansas State Univ.; AM 1928, Univ. of Chicago; PhD 1934, Yale Univ. (GF)

BARTEL, ROY A., Assoc. Prof. of Education and Coordinator of Student Teaching (1963, 1970). AB 1942, Bethel Col.; MSE 1949, EdD 1959, Univ. of Kansas. (GF)

BLOOMQUIST, MARGARET CHRISTINE, Instr. in Education and Director of Student Personnel Services (1967). AB 1941, Bethany Col.; MBA 1949, Univ. of Denver.

BOYER, JAMES BUCHANAN, Assoc. Prof. of Education (1971). BS 1956, Bethune-Cookman Col., Daytona Beach, Florida; MEd 1964, Florida A & M Univ.; PhD 1969, Ohio State Univ. (GF)

BRADLEY, HOWARD RALEY, Assoc. Prof. of Education (1951, 1963). BS 1930, MS 1937, Kansas State Univ. (GF)

BYARS, JACKSON A., Asst. Prof. (1969). BA 1959, Municipal Univ. of Omaha; MA 1964, Colorado State Col.; 1970; PhD 1970, Univ. of Nebraska. (GF)

CAINE, HOMER D., Asst. Prof. of Education and Music (1966). BM 1940, Drake Univ.; MS 1957, Kansas State Univ. (GF)

CAMPBELL, ALBERT B., Asst. Prof. (1970). BS 1956, Fort Hays Kansas State Col.; MA 1963, Western State (Colorado); EdD 1970, Arizona State Univ. (GF)

CLORE, ROBERT, Instr. (1970). BA 1968, MA 1970, Univ. of Northern Colorado.

CRAIG, M. DOROTHY, Asst. Prof. of Education (1959). BS 1931, Bethany Col.; BS 1941, Kansas State Teachers Col. (Emporia); MA 1944, Columbia Univ.

DE MAND, JOHN WESLEY, Prof. of Education (1940, 1959). AB 1937, Univ. of Kansas; MS 1940, Kansas State Univ.; EdD 1953, Univ. of Colorado. (GF)

DICKINSON, JAY, Asst. Prof. (1970). BS 1966, Southern Illinois Univ.; MS 1970, Indiana Univ.

DIXON, LYLE, Prof. of Mathematics (1963, 1969). BS 1948, MS 1950, Oklahoma State Univ.; PhD 1963, Univ. of Kansas. (GF)

FIELD, RALPH G., Assoc. Prof. of Education (1972). BS 1950, MS 1966, Kansas State Univ.; PhD 1970, Purdue Univ.

FLANAGAN, BRUCE, Prof. of Speech (1966). BS 1953, Western Michigan Univ.; MS 1958, Southern Illinois Univ.; PhD 1966, Univ. of Florida. (GF)

GOODENOW, PHILIP E., Asst. Instr. in Education (1967). BA 1953, Kansas Wesleyan (Salina).

GREEN, FINIS MCGRADY, Prof. of Education Emeritus (1948, 1967). BS 1922, Kansas State Teachers Col. (Pittsburg); MS 1929, Univ. of Kansas; EdD 1949, Univ. of Colorado. (GF)

GRIFFITH, MARY EVAN, Assoc. Prof. (1969). BS 1950, Kansas State Univ.; MS 1957, Iowa State Univ.; PhD 1966, Ohio State Univ.

HALL, LAWRENCE FENOR, Assoc. Prof. of Education Emeritus (1926, 1966). BS 1923, MS 1927, Kansas State Univ. (GF)

HARLOW, STEVEN D., Assoc. Prof. of Education (1971). AA 1960, Pueblo Col.; BA 1962 and MA 1963, Adams State Col.; PhD 1967, Univ. of Nebraska. (GF)

HARRIS, JAMES L., Asst. Prof. of Education (1971). BS 1961, MS 1968, EdD 1970, Oklahoma State Univ.

HAUSE, RICHARD G., Assoc. Prof. of Education (1966, 1970). AB 1954, MA 1955, Colorado State Col.; EdD 1966, Univ. of Colorado. (GF)

HAZLETT, EMERSON L., Instr. in Education, Economics and Commerce (1969). BS 1948, MS 1964, Univ. of Kansas.

HOLEN, MICHAEL C., Asst. Prof. of Education (1971). BA 1967, Stanford Univ.; MA 1968 and PhD 1971, Univ. of Oregon.

HOYT, DONALD P., Prof. and Director of Office of Educational Research (1968). BS 1948, Univ. of Illinois; MA 1950, PhD 1954, Univ. of Minnesota. (GF)

HUDSON, WANDA L., Instr. in Education (1966). BS 1949, MEd 1957, Univ. of Texas.

JAMES, ROBERT K., Asst. Prof. (1969). BS 1959, Northwest Missouri State; MA 1962, Univ. of Northern Iowa; PhD 1969, Univ. of Iowa. (GF)

JOHNSON, ROBERT L., Prof. and Coordinator of Extension Personnel Training (1965). BS 1951, Univ. of Nebraska; MS 1956, PhD 1958, Univ. of Wisconsin. (GF)

JULIAN, ROBERT E., Asst. Prof. of Education (1971). BS 1955, Kansas State Univ.; MS 1967, Univ. of Arizona.

KAISER, HERBERT EMIL, Assoc. Prof. of Education (1961, 1969). BS 1941, Concordia Teachers Col.; MS 1943, Oklahoma State Univ.; PhD 1959, Univ. of Nebraska. (GF)

KASPER, EUGENE C., Dean of Students, Assoc. Prof. of Education (1968). BS 1956, MS 1956, Kansas State Teachers Col.; EdD 1963, Univ. of North Dakota. (GF)

KEYS, SAMUEL R., Prof. and Dean of Col. of Education (1969). AB 1948, Olivet Col., Kankakee, Illinois; MA 1949, Univ. of Missouri-Kansas City; PhD 1959, Univ. of Minnesota. (GF)

KING, KENNETH L., Asst. Prof. of Education (1969). AA 1962, Sayre Junior Col., Sayre, Oklahoma; BA 1964, Southwestern State Col., Weatherford, Oklahoma; MEd 1968, EdD 1969, Univ. of Oklahoma. (GF)

KITTLESON, HOWARD M., Asst. Prof. of Education (1969). BS 1965, MA 1966, PhD 1969, Univ. of Minnesota. (GF)

KURTZ, VERNON RAY, Assoc. Prof. of Education (1970, 1971). BS 1955 and MS 1959, Fort Hays Kansas State Col.; EdD 1967, Univ. of Nebraska. (GF)

LAUGHERY, WAYNE W., Assoc. Prof. of Education (1967). BS 1948, MA 1955, San Diego State Col.; EdD 1958, Teachers Col., Columbia Univ. (GF)

LITRELL, J. HARVEY, Prof. of Education (1954, 1966). BA 1935, Iowa State Teachers Col.; MA 1939, State Univ. of Iowa; EdD 1950, Univ. of Missouri. (GF)

LITZ, CHARLES E., Asst. Prof. of Education (1971). BA 1963, Ohio Univ.; MA 1967, Univ. of Michigan; PhD 1970, Univ. of Michigan. (GF)

LOEB, JOE HENRY, Asst. Prof. of Education (1956). BA 1948, Northeastern State Col.; MS 1951, Kansas State Teachers Col. (Pittsburg); EdD 1957, Univ. of Arkansas. (GF)

McANARNEY, HARRY EDWARD, Assoc. Prof. of Education (1957, 1966). BS 1943, Kansas State Teachers Col. (Emporia); MS 1947, EdD 1958, Univ. of Kansas. (GF)

McCAIN, JAMES ALLEN, President (1950). Prof. of Higher Education (1970). AB 1926, LLD 1951, Wofford Col.; MA 1929, Duke Univ.; EdD 1948, Stanford Univ.; LLD 1965, Montana State Univ.; LLD 1965, Colorado State Univ.; DSc 1967, Andhra Pradesh State Univ. (India). (GF)

McILVAINE, JOSEPH, Asst. Prof. (1970). BS 1961, Pennsylvania State Univ.; MS 1967, Central Missouri State Col.; PhD 1970, Ohio Univ. (GF)

MEISNER, ROBERT G., Assoc. Prof. and Head, Department of Adult and Occupational Education (1969). BS 1948, Oklahoma A & M Col.; MS 1957, Oklahoma State Univ.; EdD 1967, Univ. of California, Berkeley. (GF)

MOGGIE, MAURICE CHARLES, Prof. of Education (1930, 1945). BS 1929, MS 1931, Kansas State Univ.; PhD 1941, Ohio State Univ. (GF)

MOORE, ARNOLD J., Prof. of Education and Head, Department of Curriculum and Instruction (1967). BA 1949, State Col. of Iowa; MA 1955, PhD 1961, State Univ. of Iowa. (GF)

NELSON, WILLARD J., Instr. in Education (1971). AA 1952, Luther Junior Col.; BA 1954, Bethany Col.

NORDIN, MARGARET N., Assoc. Dean of Students and Dean of Women, Assoc. Prof. (1957). BS 1941, MA 1953, PhD 1962, Univ. of Minnesota.

OLSON, GEORGE ARTHUR, Prof. of Education Emeritus (1949, 1969). AB 1928, AM 1931, Univ. of Kansas; PhD 1953, Northwestern Univ. (GF)

OWENS, RICHARD E., Assoc. Prof. of Education (1964, 1969). AB and BS 1949, Northwest Missouri State Col.; MA 1953, EdD 1964, Univ. of Northern Colorado. (GF)

PAUL, WARREN I., Asst. Prof. of Education (1969). AB 1954, Rutgers, the State Univ.; AM 1966, Newark State Col., Union, N.J.

PRICE, FLOYD HAMILTON, Assoc. Prof. of Education (1963, 1965). AB 1951, Friends Univ.; MEd 1957, Wichita State Univ.; EdS 1960, George Peabody Col.; EdD 1965, Univ. of Oklahoma. (GF)

RANKIN, CHARLES L., Instr. of Education (1971). BA 1964, Wichita Univ.; ME 1968, Wichita State Univ.

REPLOGLE, RENATA J., Instr. in Education and Art (1966). AB 1963, AM 1964, Colorado State Col.

RUST, LUCILE OSBORN, Prof. of Education Emerita (1924, 1960). BS 1921, Kansas State Teachers Col. (Pittsburg); MS 1922, Kansas State Univ. (GF)

SARTHORY, JOSEPH A., Assoc. Prof. of Education (1969). BA 1961, MA 1964, PhD 1967, Univ. of New Mexico. (GF)

SCHILL, LEO M., Assoc. Prof. of Education (1966, 1969). AB 1955, Bethany Col.; MS 1962, Univ. of Kansas; PhD 1964, Univ. of Iowa. (GF)

SCOTT, ROBERT, Assoc. Prof. of Education (1970). AA 1951, Independence, Kansas Junior Col.; BS 1953, MS 1956, Kansas State Teachers Col.; EdD 1965, Univ. of Missouri. (GF)

SMETHERS, HOWARD DEWIGHT, Asst. Prof. of Education (1947, 1951). BS 1927, Kansas State Teachers Col. (Emporia); MS 1935, Kansas State Univ.

STEFFEN, JOHN D., Asst. Prof., Center for Student Development (1967). BA 1956, Hamline Univ.; PhD 1968, Univ. of Minnesota.

STRICKLAND, VIVAN LEWIS, Prof. of Education Emeritus (1917, 1950). AB 1906, MS 1915, PhD 1925, Univ. of Nebraska. (GF)

SULLIVAN, RITA J., Instr. in Education (1966). BS 1956, Kansas State Teachers Col. (Pittsburg); MS 1964, Univ. of Kansas.

TRENNEPOHL, HARLAN JEAN, Assoc. Prof. of Education (1956, 1963). BS 1947, MS 1951, Kansas State Teachers Col. (Emporia); EdD 1956, Univ. of Colorado. (GF)

UTSEY, JORDAN, Assoc. Prof. of Education (1969). BA 1952, Col. of Idaho; MEd 1958, EdD 1963, Univ. of Oregon. (GF)

VAN METER, EDDY J., Asst. Prof. of Education (1971). BA 1968, Univ. of New Mexico; MA 1969 and EdD 1971, New Mexico State Univ.

WILSON, ALFRED P., Assoc. Prof. of Education and Head, Dept. of Administration and Foundations of Education (1972). BS 1961, MEd 1965, EdD 1969, Utah State University.

WISSMAN, JANICE R., Instr. in Education (1968). BS 1963, MS 1968, Kansas State Univ.

College of Engineering

AHMED, NASIR, Assoc. Prof. of Electrical Engineering (1968). BS 1961, Univ. Col. of Engineering, Bangalore, India; MS 1963, PhD 1966, Univ. of New Mexico. (GF)

ALNEMA, MUDHAFAR AHMED, Instr. in Electrical Engineering (1971). BS 1960, Baghdad Univ.; MS 1969, Univ. of Kansas.

AKINS, RICHARD GLENN, Assoc. Prof. of Chemical Engineering (1963, 1967). BS 1957, MS 1958, Univ. of Louisville; PhD 1962, Northwestern Univ. (GF)

ANDERSON, CARL ELMER, Instr. in Agricultural Engineering, Agricultural Experiment Station (1967). BS 1962, Pennsylvania State Univ.; MS 1965, Univ. of Arizona. Professional Engineer, 1967.

ANNIS, JASON CARL, Asst. Prof. of Mechanical Engineering, Assoc., Institute for Environmental Research (1959, 1969). BS 1953, Univ. of Minnesota; MS 1956, Michigan Col. of Mining and Technology; PhD 1969, Kansas State Univ. (GF)

APPL, FREDRIC CARL, Jennings Distinguished Prof. of Mechanical Engineering (1960, 1964, 1967). BS 1954, MS 1955, PhD 1958, Carnegie Institute of Technology. (GF)

AXTHELM, LARRY SPENCER, Instr. in Agricultural Engineering; Ag. Exp. Sta. (1971). BS 1965, MS 1967, Univ. of Nebraska.

AZER, NAIM ZAKE, Assoc. Prof. of Mechanical Engineering; Assoc., Institute for Environmental Research (1958, 1964). BS 1950, MS 1954, Univ. of Alexandria, Egypt; PhD 1959, Univ. of Illinois. (GF)

BALL, HERBERT DEAN, Asst. Prof. of Mechanical Engineering (1958, 1972). BS 1956, MS 1958, Univ. of Nebraska; PhD 1972, Kansas State Univ.

BATES, HERBERT TEMPLETON, Prof. of Chemical Engineering (1958, 1960). BS 1935, Iowa State Univ.; MS 1938, Virginia Polytechnic Institute; PhD 1941, Iowa State Univ. Professional Engineer, 1959. (GF)

BAUGHER, EARL EUGENE, Asst. Prof. of Agricultural Engineering (1967). BS 1958, MS 1964, Kansas State Univ.

BENNETT, CORWIN A., Prof. of Industrial Engineering; Assoc., Institute for Environmental Research (1970). BS 1950, Iowa State Univ.; MA 1951, PhD 1954, Univ. of Nebraska. (GF)

BEST, CECIL HAMILTON, Prof. of Applied Mechanics; Assoc. Dean (1961, 1964, 1968). BS 1955, MS 1956, PhD 1960, Univ. of California. Professional Engineer, 1962. (GF)

BLACKBURN, JACK BAILEY, Prof.; Head, Department of Civil Engineering (1963). BS 1947, Oklahoma Univ.; MS 1949, PhD 1955, Purdue Univ. Professional Engineer, 1950. (GF)

BRAINARD, BOYD BERTRAND, Prof. of Mechanical Engineering Emeritus (1923, 1938, 1967). BS 1922, Univ. of Colorado; SM 1931, Massachusetts Institute of Technology. Professional Engineer, 1945.

BUSSEY, LYNN E., Assoc. Prof. of Industrial Engineering (1971). BS 1947, Cornell Univ.; MS 1969, PhD 1970, Oklahoma State Univ. (GF)

BYERS, EARL CONRAD, Asst. Prof. of Industrial Engineering (1946, 1956). AB 1941, Greenville Col.; MS 1954, Kansas State Univ.

CALCOTE, LEE ROY, Prof. of Applied Mechanics (1970). BS 1948, MS 1952, Texas A & M; PhD 1963, Univ. of Illinois. Professional Engineer in Texas, 1953. (GF)

CASEY, JR., KENDALL FRANCIS, Assoc. Prof. of Electrical Engineering (1970). BS 1961, California Institute of Technology; MS 1962, PhD 1965, Univ. of Southern California. (GF)

CHEZEM, CURTIS G., Prof.; Head, Department of Nuclear Engineering (1969). BA 1951, MA 1952, Univ. of Oregon; PhD 1957, Oregon State Univ. (GF)

CHUNG, DO SUP, Assoc. Prof. of Agricultural Engineering (1965, 1966). BS 1958, Purdue Univ.; MS 1960, PhD 1965, Kansas State Univ. (GF)

CLACK, ROBERT WYNANDUS, Asst. Prof. of Nuclear Engineering; Director of Nuclear Reactor Facility (1955, 1959, 1969). BS 1943, U.S. Naval Academy. Professional Engineer, 1956.

CLARK, STANLEY JOE, Assoc. Prof. of Agricultural Engineering; Ag. Exp. Sta. (1966). BS 1954, MS 1959, Kansas State Univ.; PhD 1966, Purdue Univ. Professional Engineer, 1969. (GF)

CLARK, STANLEY R., Instr. in Agricultural Engineering; Ag. Exp. Sta. (1969). BS 1969, MS 1971, Kansas State Univ.

CLIFTON, JOHN PAUL, Assoc. Prof. of Industrial Engineering Emeritus (1947, 1956, 1971). BS 1929, Univ. of Kansas; MS 1956, Kansas State Univ. Professional Engineer, 1956. (GF)

CONVERSE, HARRY H., Assoc. Prof. of Agricultural Engineering (1966). BS 1946, MS 1947, Kansas State Univ. U.S.D.A., Transportation and Facilities Research Division.

COOPER, PETER B., Assoc. Prof. of Civil Engineering (1966, 1968). BS 1957, MS 1960, PhD 1965, Lehigh Univ. Professional Engineer, 1969. (GF)

COTTOM, MELVIN CLYDE, Asst. Prof. of Electrical Engineering (1955). BS 1945, MS 1948, Univ. of Kansas. Professional Engineer in Kansas, 1947; in Missouri, 1952. (GF)

CRANK, ROBERT EUGENE, Prof. of Mechanical Engineering (1947, 1969). BS 1947, MS 1950, Kansas State Univ. Professional Engineer, 1949. (GF)

CRARY, JAMES FRED, Asst. Prof. of Applied Mechanics (1947, 1952). BS 1949, Kansas State Univ.; MS 1969, Oklahoma State Univ. Professional Engineer, 1948.

CRAWFORD, WILLIAM WESLEY, Assoc. Prof. of Civil Engineering Emeritus (1923, 1942, 1949). BDi 1903, MDi 1905, Iowa State Teachers Col.; AB 1912, BS 1917, Iowa State Univ.

DARBY, EARL G., Prof. of Industrial Arts Emeritus (1941, 1952, 1963). BS, 1923, MS 1943, Kansas State Univ.

DIETRICH, HARVEY F., Asst. Prof. of Industrial Arts Emeritus (1948, 1957, 1967). BS 1957, Kansas State Univ.

DOLLAR, JOHN PAUL, Instr. in Electrical Engineering (1960). BS 1956, MS 1966, Kansas State Univ.

DONNERT, HERMANN JAKOB ANTON, Prof. of Nuclear Engineering (1966, 1969). PhD 1951, Leopold-Franzens Univ., Austria. (GF)

DUNCAN, ALLEY H., Prof. of Mechanical Engineering (1942, 1954). BS 1937, Kansas State Univ. Professional Engineer, 1948. (GF)

DURLAND, MERRILL AUGUSTUS, Dean and Director Emeritus; Prof. of Mechanical Engineering Emeritus (1919, 1961, 1967). BS 1918, MS 1923, Kansas State Univ. Professional Engineer, 1935.

ECKHOFF, N. DEAN, Asst. Prof. of Nuclear Engineering; Director of Neutron Activation Analysis Laboratory (1961, 1968). BS 1961, MS 1963, PhD 1968, Kansas State Univ. (GF)

ERICKSON, LARRY EUGENE, Assoc. Prof. of Chemical Engineering (1964, 1968). BS 1960, PhD 1964, Kansas State Univ. (GF)

FAIRBANKS, GUSTAVE EDMUND, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1941, 1957). BS 1941, MS 1950, Kansas State Univ. Professional Engineer, 1948. (GF)

FAN, LIANG-TSENG, Prof.; Head, Department of Chemical Engineering; Director, Institute for Systems Design and Optimization; Kansas Power and Light Distinguished Prof.; Assoc., Institute of Environmental Research (1957, 1963, 1967). BS 1951, National Taiwan Univ.; MS 1954, Kansas State Univ.; MS 1958, PhD 1957, West Virginia Univ. (GF)

FAW, RICHARD EARL, Prof. of Nuclear Engineering; Director of Shielding Facility (1962, 1966, 1968). BS 1959, Univ. of Cincinnati; PhD 1962, Univ. of Minnesota. (GF)

FENTON, FREDERICK CHARLES, Prof. of Agricultural Engineering Emeritus; Ag. Exp. Sta. (1928, 1961). BS 1914, MS 1930, Iowa State Univ. Professional Engineer, 1947.

FLINNER, ARTHUR ORAN, Prof. of Mechanical Engineering (1929, 1947). BS 1929, MS 1934, Kansas State Univ.; SM 1937, Massachusetts Institute of Technology. Professional Engineer, 1937. (GF)

FRAZIER, FORREST FAYE, Prof. of Civil Engineering Emeritus (1911, 1922, 1954). BS 1910, Ohio State Univ. Professional Engineer, 1931.

GALLAGHER, RICHARD RAY, Asst. Prof. of Electrical Engineering; Assoc., Institute for Environmental Research (1968). BS 1964, MS 1966, PhD 1968, Iowa State Univ. (GF)

GERDIS, THOMAS A., Instr.; Engineering News Editor (1970). BA 1963, Evangel College; MS 1970, Kansas State Univ.

GORTON, ROBERT LESTER, Assoc. Prof. of Mechanical Engineering; Assoc., Institute for Environmental Research (1960, 1969). BS 1953, Louisiana Polytechnic Institute; MS 1960, Louisiana State Univ.; PhD 1966, Kansas State Univ. Professional Engineer, 1953. (GF)

GOWDY, KENNETH KING, Assoc. Prof. of Mechanical Engineering; Asst. Dean; Assoc., Institute for Environmental Research (1957, 1965, 1969). BS 1955, MS 1961, Kansas State Univ.; PhD 1965, Oklahoma State Univ. (GF)

GROSH, DORIS LLOYD, Asst. Prof. of Industrial Engineering (1965, 1968). BS 1946, Univ. of Chicago; MS 1949, PhD 1969, Kansas State Univ. (GF)

GROSH, LOUIS E., Assoc. Prof. of Industrial Engineering (1965, 1966). BS 1944, Louisiana State Univ.; BS 1947, MS 1949, PhD 1954, Purdue Univ. (GF)

HAFT, EVERETT EUGENE, Prof. of Applied Mechanics (1961). BS 1947, MS 1951, PhD 1955, Univ. of Wisconsin. Professional Engineer in Wisconsin, 1952. (GF)

HALL, RAYMOND CLARENCE, Asst. Prof. of Chemical Engineering (1950, 1952). BS 1941, Iowa State Univ.; MS 1951, Kansas State Univ. (GF)

- HANSEN, CARL ULLMAN**, Asst. Prof. of Industrial Engineering (1957, 1962). BS 1936, Kansas State Univ.; MS 1961, Univ. of Nebraska. Professional Engineer, 1961.
- HARRIS, FLOYD WAYNE**, Assoc. Prof. of Electrical Engineering (1965, 1969). BS 1956, Univ. of Oklahoma; MS 1962, PhD 1965, Oklahoma State Univ. (GF)
- HAY, DeLYNN RODNEY**, Asst. Prof. of Extension Agricultural Engineering (1971). BS 1966, Univ. of Nebraska; MS 1967, Univ. of Nebraska.
- HEARN, JR., NORVAL KELLY**, Instr. in Electrical Engineering (1969). BA 1957, Kansas State Teachers Col.; MS 1966, Kansas State Univ.
- HELANDER, LINN**, Prof. of Mechanical Engineering Emeritus (1935, 1961). BS 1915, Univ. of Illinois. Professional Engineer, 1941.
- HERPICH, RUSSELL LOUIS**, Prof. of Extension Agricultural Engineering (1951, 1966). BS 1950; MS 1953, Kansas State Univ.
- HEYMACH, GEORGE JOHN**, Asst. Prof. of Chemical Engineering (1969). BS 1964, City Col. of the City Univ. of New York; MS 1966, PhD 1969, Univ. of Pennsylvania.
- HIGHTOWER, RAY E.**, Asst. Prof. of Nuclear Engineering (1961, 1969). BS 1964, Kansas State Univ.
- HOBSON, LELAND STANFORD**, Prof. of Mechanical Engineering (1946, 1968). BS 1927, Kansas State Univ. Professional Engineer, 1946.
- HODGES, TEDDY OMAR**, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1959). BS 1950, Texas A & M; MS 1951, Iowa State Univ.; PhD 1959, Michigan State Univ. Professional Engineer in Iowa, 1952. (GF)
- HOLMES, ELWYN SPRUIELL**, Assoc. Prof. of Extension Agricultural Engineering (1966). BS 1943; MS 1953, Texas A & M Univ.
- HONSTEAD, WILLIAM HENRY**, Prof. of Chemical Engineering; Director, Kansas Industrial Extension Service (1943, 1957, 1970). BS 1939, MS 1946, Kansas State Univ.; PhD 1956, Iowa State Univ. Professional Engineer, 1948. (GF)
- HOSTETTER, ABRAM ELDRED**, Prof. of Industrial Engineering Emeritus (1931, 1952, 1969). BS 1925, McPherson Col.; MS 1932, PhD 1938, Kansas State Univ.
- HU, KUO-KUANG**, Asst. Prof. of Applied Mechanics (1968, 1969). Graduation, 1956, Taiwan Provincial Taipei Institute of Technology; MS 1966, PhD 1969, Kansas State Univ. (GF)
- HUANG, CHI-LUNG**, Assoc. Prof. of Applied Mechanics (1964, 1968). BS 1954, National Taiwan Univ.; MS 1960, Univ. of Illinois; Doctor of Engineering 1964, Yale Univ. (GF)
- HUMMELS, DONALD RAY**, Asst. Prof. of Electrical Engineering (1970). BS 1967, MS 1967, PhD 1969, Arizona State Univ. (GF)
- HUNT, ORVILLE DON**, Prof. of Electrical Engineering Emeritus (1923, 1947, 1970). BS 1923, Washington State Univ.; MS 1930, Kansas State Univ. Professional Engineer, 1947.
- HWANG, CHING-LAI**, Assoc. Prof. of Industrial Engineering (1964, 1968). BS 1953, National Taiwan Univ.; MS 1960, PhD 1962, Kansas State Univ. (GF)
- JEPSEN, RICHARD LOUIS**, Asst. Prof. of Extension Agricultural Engineering (1963, 1965). BS 1950, MS 1963, Kansas State Univ.
- JOHNSON, GARY LEE**, Asst. Prof. of Electrical Engineering (1966). BS 1961, MS 1963, Kansas State Univ.; PhD 1966, Oklahoma State Univ. (GF)
- JOHNSON, WILLIAM H.**, Prof.; Head, Department of Agricultural Engineering (1970). BS Agriculture, BS Agricultural Engineering 1948, MS 1953, Ohio State Univ.; PhD 1960, Michigan State Univ. Professional Engineer in Ohio, 1970. (GF)
- JORGENSEN, LOUIS**, Prof. of Electrical Engineering Emeritus (1925, 1951, 1954). BS 1907, MS 1931, Kansas State Univ.
- KAUFMAN, DALE EDWARD**, Asst. Prof. of Electrical Engineering (1965, 1967). BS 1959, MS 1963, PhD 1967, Kansas State Univ. (GF)
- KERCHNER, RUSSELL MARION**, Prof. of Electrical Engineering Emeritus (1922, 1934, 1965). BS 1922, Univ. of Illinois; MS 1927, Kansas State Univ. Professional Engineer, 1945.
- KIPP, JOHN EDWARD**, Assoc. Prof. of Applied Mechanics; Assoc., Institute for Environmental Research (1956, 1969). BS 1951, MS 1955, Univ. of Kansas; PhD 1968, Oklahoma State Univ. Professional Engineer, 1960. (GF)
- KIRMSEY, PHILIP GEORGE**, Prof. of Mathematics; Prof.; Head, Department of Applied Mechanics (1942, 1958, 1962). BS 1939, MS 1944, PhD 1958, Univ. of Minnesota. Professional Engineer, 1961. (GF)
- KLOEFFLER, ROYCE GERALD**, Prof. of Electrical Engineering Emeritus (1916, 1923, 1960). BS 1913, Univ. of Michigan; MS 1930, Massachusetts Institute of Technology. Registered Engineer, 1945.
- KNOTSMAN, HARRY DANIEL**, Asst. Prof. of Applied Mechanics (1957, 1965). BS 1951, MS 1961, Kansas State Univ.; PhD 1965, Univ. of Colorado. Professional Engineer, 1959. (GF)
- KOEPSSEL, WELLINGTON WESLEY**, Prof.; Head, Department of Electrical Engineering (1964). BS 1944, MS 1951, The Univ. of Texas; PhD 1960, Oklahoma State Univ. Professional Engineer in Texas, 1952. (GF)
- KONZ, STEPHAN ANTHONY**, Prof. of Industrial Engineering; Assoc., Institute of Environmental Research (1964, 1969). BS 1956, MBA 1956, Univ. of Michigan; MS 1960, State Univ. of Iowa; PhD 1964, Univ. of Illinois. (GF)
- KRICK, MERLYN S.**, Asst. Prof. of Nuclear Engineering (1970). BS 1959, Albright Col.; PhD 1966, Univ. of Pennsylvania. (GF)
- KYLE, BENJAMIN GAYLE**, Prof. of Chemical Engineering (1958, 1964). BS 1950, Georgia Institute of Technology; MS 1955, PhD 1958, Univ. of Florida. (GF)
- LARSON, GEORGE HERBERT**, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1939, 1950). BS 1939, MS 1940, Kansas State Univ.; PhD 1955, Michigan State Univ. Prof. Engineer, 1947. (GF)
- LEE, E. STANLEY**, Prof. of Industrial Engineering (1966, 1970). BS 1953, Ordnance Engineering Col., China; MS 1957, North Carolina State Col.; PhD 1962, Princeton Univ. (GF)
- LENHART, DONALD HOWARD**, Assoc. Prof. of Electrical Engineering (1966, 1969). BS 1956, Kansas State Univ.; MS 1958, Syracuse Univ.; PhD 1966, Univ. of New Mexico. (GF)
- LINDHOLM, JOHN C.**, Assoc. Prof. of Mechanical Engineering (1960). BS 1949, Kansas State Univ.; MS 1957, Univ. of Kansas; PhD 1961, Purdue Univ. Professional Engineer, 1954. (GF)
- LINDLY, EDWIN CURGUS**, Assoc. Prof. of Applied Mechanics (1949, 1965). BS 1942, Oklahoma State Univ.; MS 1949, Purdue Univ.; MS 1957, Kansas State Univ.; PhD 1964, Iowa State Univ. Professional Engineer, 1950. (GF)
- LIPPER, RALPH IDEN**, Assoc. Prof. of Agricultural Engineering; Ag. Exp. Sta. (1964, 1957). BS 1946, MS 1950, Kansas State Univ. Professional Engineer, 1953. (GF)
- LUCAS, MICHAEL S.P.**, Prof. of Electrical Engineering (1968, 1970). MS 1962, PhD 1964, Duke Univ. (GF)
- MANGES, HARRY LEO**, Assoc. Prof. of Agricultural Engineering; Ag. Exp. Sta. (1956, 1963). BS 1949, MS 1959, Kansas State Univ.; PhD 1969, Oklahoma State Univ. (GF)
- MATTHEWS, JOHN CARTER**, Assoc. Prof. of Chemical Engineering (1962). BS 1959, DSc 1965, Washington Univ. (GF)
- MCCORMICK, FRANK JAMES**, Prof. of Applied Mechanics (1939, 1947). BS 1927, MS 1931, Iowa State Univ. Professional Engineer, 1944. (GF)
- MCDONALD, CHARLES RICHARD**, Instr. in Applied Mechanics (1969). BS 1960, Kansas State Univ. Professional Engineer in Illinois, 1964, in Indiana, 1966.
- McGINTY, RALPH J.**, Asst. Prof. of Agricultural Engineering (1969). BS 1959, MS 1960, Kansas State Univ. Agricultural Research Service, U.S.D.A., Transportation and Facilities Research Division.
- MERKLIN, JOSEPH FREDERICK**, Assoc. Prof. of Nuclear Engineering (1967). BS 1957, Manhattan College of New York; PhD 1963, Univ. of Minnesota. (GF)
- MESSENHEIMER, ALVA ERNEST**, Assoc. Prof. of Mechanical Engineering Emeritus (1942, 1963, 1971). BS 1924, Kansas State Univ. Professional Engineer, 1948.
- MEYER, WALTER**, Prof. of Nuclear Engineering (1964, 1968). BS 1956, MS 1957, Syracuse Univ.; PhD 1964, Oregon State Univ. (GF)
- MILLER, PAUL LEROY**, Assoc. Prof.; Asst. Head, Department of Mechanical Engineering; Director of Institute for Effective Teaching; Assoc., Institute for Environmental Research (1958, 1968, 1969). BS 1957, MS 1961, Kansas State Univ.; PhD 1966, Oklahoma State Univ. Professional Engineer, 1962. (GF)
- MINGLE, JOHN ORVILLE**, Prof. of Nuclear Engineering; Director, Institute for Computational Research in Engineering (1956, 1965). BS 1953, MS 1958, Kansas State Univ.; PhD 1960, Northwestern Univ. Professional Engineer, 1961. (GF)
- MORSE, REED FRANKLIN**, Prof. of Civil Engineering Emeritus (1923, 1945, 1968). BS 1921, Cornell Col.; BS 1928, Iowa State Univ.; MS 1933, Kansas State Univ.; PhD 1941, Cornell Univ. Professional Engineer, 1939.
- MUNGER, HAROLD HAWLEY**, Assoc. Prof. of Applied Mechanics Emeritus (1939, 1954, 1961). BS 1939, MS 1941, Kansas State Univ. Professional Engineer, 1941.
- MURPHY, JAMES PATRICK**, Asst. Prof. of Extension Agricultural Engineering (1971). BS 1968, MS 1970, Kansas State Univ.
- NELSON, CLARENCE LESLIE**, Instr. in Industrial Engineering Emeritus (1943, 1972).
- NESMITH, DWIGHT ALVIN**, Assoc. Prof. of Engineering; Director, Engineering Exp. Sta. (1948, 1958, 1969). BS 1948, Northwestern Univ.; MS 1952, Kansas State Univ. Professional Engineer, 1962.
- NEVINS, RALPH GRIFFITH**, Director, Institute for Environmental Research; Prof. of Mechanical Engineering; Dean, Col. of Engineering (1948, 1962, 1967). BS 1945, BME 1947, MS 1949, Univ. of Minnesota; PhD 1953, Univ. of Illinois, Professional Engineer, 1948. (GF)
- PAULI, ROSS IRWIN**, Asst. Prof. of Mechanical Engineering (1947, 1954). BA 1941, Westmar Col.; MS 1947, Kansas State Col. of Pittsburg.
- POPE, DAVID LEE**, Asst. Prof. of Extension Agricultural Engineering (1971). BS 1970, MS 1971, Oklahoma State Univ.
- RETZLOFF, DAVID G.**, Asst. Prof. of Chemical Engineering (1969). BS 1963, MS 1965, PhD 1967, Univ. of Pittsburgh. (GF)
- ROBINSON, MARION JOHN**, Assoc. Prof. of Nuclear Engineering (1966, 1969). BS 1960, MS 1962, PhD 1965, Univ. of Michigan. Professional Engineer in Michigan, 1966; in Kansas, 1967. (GF)
- ROHLES, JR., FREDERICK HENRY**, Prof. of Mechanical Engineering; Assoc. Director, Institute for Environmental Research (1963, 1965). BS 1942, Roosevelt Univ., Chicago; MA 1949, PhD 1956, Univ. of Texas. (GF)
- ROSEBRAUGH, VERNON HART**, Assoc. Prof. of Civil Engineering (1953, 1954). BS 1933, Oregon Institute of Technology; BS 1938, Oregon State Univ.; MA 1952, Univ. of Portland; CE 1956, Oregon State Univ. Professional Engineer, 1954. (GF)
- ROSENKRANZ, WILLIAM ALLEN**, Instr. in Electrical Engineering (1971). BS 1967, Kansas State Univ.
- ROTH, THOMAS A.**, Asst. Prof. of Industrial Engineering (1965). BS 1960, MS 1961, PhD 1966, Univ. of Wisconsin. (GF)
- SCHINDLER, DALE EUGENE**, Assoc. Prof. of Extension Agricultural Engineering (1955, 1966). B. Arch. 1953, MS 1960, Kansas State Univ.
- SCHMID, LAWRENCE A.**, Asst. Prof. of Civil Engineering (1968). BS 1962, MS 1963, Iowa State Univ.; PhD 1968, Univ. of Kansas. Professional Engineer, 1969. (GF)
- SELBY, WALTER ELLSWORTH**, Assoc. Prof. of Extension Agricultural Engineering (1944, 1969). BS 1929, Kansas State Univ.; MS 1957, Univ. of Nebraska.
- SHULTIS, J. KENNETH**, Asst. Prof. of Nuclear Engineering (1970). BASc 1964, Univ. of Toronto; MS 1965, PhD 1968, Univ. of Michigan. (GF)
- SITZ, EARL LEROY**, Prof. of Electrical Engineering Emeritus (1927, 1948, 1969). BS 1927, Iowa State Univ.; MS 1932, Kansas State Univ. Professional Engineer, 1947.
- SMALTZ, JACOB JAY**, Prof. of Industrial Engineering (1939, 1952). BS 1939, Bradley Polytechnic Institute; MS 1946, Kansas State Univ. Professional Engineer, 1960. (GF)
- SMITH, BOB LEE**, Prof. of Civil Engineering (1948, 1965). BS 1948, MS 1953, Kansas State Univ.; PhD 1963, Purdue Univ. Professional Engineer, 1953. (GF)

- SMITH, EARL O.**, Adjunct Prof. of Nuclear Engineering (1969). BS 1955, Univ. of Houston. Professional Engineer in Illinois; Professional Engineer in Kansas.
- SMUTZ, FLOYD ALONZO**, Prof. of Machine Design Emeritus (1918, 1934, 1960). BS 1914, Kansas State Univ.
- SNELL, ROBERT ROSS**, Prof. of Civil Engineering (1957, 1968). BS 1954, MS 1961, Kansas State Univ.; PhD 1963, Purdue Univ. Professional Engineer, 1959. (GF)
- SPILLMAN, CHARLES KENNARD**, Asst. Prof. of Agricultural Engineering; Agr. Exp. Sta. (1969). AS 1958, Vincennes Univ.; BS 1960, MS 1963, Univ. of Illinois; PhD 1968, Purdue Univ. (GF)
- SPRAGUE, CLYDE HOWARD**, Assoc. Prof. of Mechanical Engineering; Assoc., Institute for Environmental Research (1963, 1970). BS 1958, MS 1963, Kansas State Univ.; PhD 1968, Purdue Univ. (GF)
- STEVENSON, PAUL NELSON**, Assoc. Prof. of Agricultural Engineering (1957). BS 1948, Univ. of Missouri; MS 1957, Iowa State Univ. (GF)
- SWANSON, EINAR A.**, Adjunct Prof. of Nuclear Engineering (1969). BME 1948, Univ. of Minnesota. Professional Engineer in Minnesota, Oklahoma, Florida, South Dakota, and Kansas.
- SWARTZ, STUART ENDSLEY**, Asst. Prof. of Civil Engineering (1968). BS 1959, MS 1962, PhD 1968, Illinois Institute of Technology. Professional Engineer, 1970. (GF)
- SWEARINGEN, THOMAS BURKE**, Assoc. Prof. of Mechanical Engineering (1965, 1971). BS 1954, Kansas State Univ.; MS 1961, Washington State Univ.; PhD 1966, Univ. of Arizona. Professional Engineer, 1958. (GF)
- TAYLOR, DELOS CLIFTON**, Prof. of Applied Mechanics Emeritus (1931, 1956, 1970). BS 1925, MS 1937, Kansas State Univ. Professional Engineer, 1948
- TENEYCK, GEORGE ROBERT**, Instr. in Agricultural Engineering; Superintendent, Sandyland Experiment Field (1964, 1970). BS 1951, MS 1970, Kansas State Univ.
- THOMPSON, J. GARTH**, Assoc. Prof.; Head, Department of Mechanical Engineering (1971). BS 1960, Brigham Young Univ.; MS 1962, PhD 1967, Purdue Univ. (GF)
- TILLMAN, FRANK AUBREY**, Prof.; Head, Department of Industrial Engineering; Assoc. Director, Institute for Systems Design and Optimization (1965, 1966, 1969). BS 1960, MS 1961, Univ. of Missouri; PhD 1965, State Univ. of Iowa. (GF)
- TRIPP, WILSON**, Prof. of Mechanical Engineering (1936, 1947). BS 1930, MS 1933, Univ. of California; PhD 1956, Univ. of Illinois. Professional Engineer, 1946. (GF)
- TURNQUIST, RALPH OTTO**, Assoc. Prof. of Mechanical Engineering (1959, 1969). BS 1952, MS 1961, Kansas State Univ.; PhD 1965, Case Institute of Technology. (GF)
- VERSER, FORT A.**, Instr. in Nuclear Engineering; Director, Office of Civil Defense, Professional Advisory Service Center (1970). BS 1948, MS 1950, Texas A & M; MS 1960, U.S. Naval Post Graduate School.
- WAKABAYASHI, ISAAC**, Instr. in Electrical Engineering (1955). BS 1954, Univ. of California.
- WALAWENDER, WALTER P.**, Asst. Prof. of Chemical Engineering (1969). BA 1963, Utica Col. of Syracuse Univ.; MS 1967, PhD 1969, Syracuse Univ. (GF)
- WALKER, DUANE ELDON**, Instr. in Electrical Engineering (1970). BS 1961, MS 1962, Kansas State Univ.
- WALKER, HUGH SANDERS**, Assoc. Prof. of Mechanical Engineering; Assoc. Director, Institute for Computational Research in Engineering (1964, 1968). BS 1957, MS 1960, Louisiana State Univ.; PhD 1965, Kansas State Univ. (GF)
- WALLACE, DOUGLAS A.**, Asst. Prof. of Civil Engineering (1971). BS 1960, Univ. of Illinois; MS 1968, PhD 1971, Univ. of Iowa. Professional Engineer, 1965.
- WARD, JR., JOSEPH EVANS**, Prof. of Electrical Engineering (1940, 1961). BS 1937, The Univ. of Texas; MS 1940, Univ. of Illinois. Professional Engineer, 1948. (GF)
- WENDLING, LEO THEODORE**, Prof. of Extension Agricultural Engineering (1947, 1965). State Leader 1969; BS 1947, MS 1956, Kansas State Univ.
- WILLIAMS, WAYNE WATSON**, Assoc. Prof. of Civil Engineering (1965). BS 1951, MS 1953, Iowa State Univ. (GF)
- WOOD, JOE NATE**, Prof. of Mechanical Engineering (1936, 1947). BS 1936, Univ. of Iowa. Professional Engineer, 1948.
- WOODARD, CLAUDE LOWELL**, Assoc. Prof. of Industrial Engineering (1949, 1969). BS 1948, Kansas State Univ.; MS 1961, PhD 1968, Univ. of Missouri. (GF)
- WRIGHT, EARL B.**, Instr. in Agricultural Engineering (1970). BS 1960, Kansas State Univ.; MS 1969, Colorado State Univ.
- ZOVNE, JEROME J.**, Asst. Prof. of Civil Engineering (1970). BS 1965, MS 1966, Univ. of Wisconsin; PhD 1970, Georgia Institute of Technology. (GF)
- BARFOOT, DOROTHY**, Prof. of Art Emerita (1930, 1962, 1966). BSA, State Univ. of Iowa; MA 1928, Columbia Univ. (GF)
- BARNES, JANE WILSON**, Asst. Prof. Emerita (1939, 1963). BS 1912, MS 1932, Kansas State Univ. (GF)
- BERGEN, BETSY**, Instr. of Family and Child Development (1966). AB 1949, Ottawa Univ.; MS 1964, Kansas State Univ.
- BOLLMAN, STEVE RAY**, Assoc. Prof. of Family and Child Development; Agr. Exp. Sta. (1966, 1969). BS 1957, MS 1963, PhD 1966, Iowa State Univ. (GF)
- BOTTGER, JEAN L.**, Asst. Prof. of Institutional Management (1964, 1970). BS 1939, MS 1960, Kansas State Univ.
- BOWERS, JANE RAYMOND**, Assoc. Prof. of Foods and Nutrition; Agr. Exp. Sta. (1966). BS 1962, MS 1963, PhD 1967, Kansas State Univ. (GF)
- BRANSCUM, SHELBA Y.**, Instr. of Family and Child Development (1971). BS 1970, MA 1971, Oklahoma State Univ.
- BRAUN, AUDREY A.**, Instr. of Clothing, Textiles and Interior Design (1969). BS 1967, MS 1969, Univ. of Nebraska.
- BRAWLEY, M. PATRA**, Instr. of Clothing, Textiles and Interior Design (1971). BS 1967, MS 1971, Univ. of Tennessee.
- BROCKMAN, HELEN L.**, Prof. of Clothing, Textiles and Interior Design (1967). BA 1926, Univ. of Iowa. (GF)
- BROWNING, NINA MYRTLE**, Assoc. Prof. of Foods and Nutrition Emerita; (1930, 1943, 1970). BS 1923, MS 1927, Kansas State Univ. (GF)
- CAUL, JEAN FRANCES**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1967). AB 1937, Lake Erie Col.; MA 1938, PhD 1942, Ohio State Univ. (GF)
- COLEMAN, KATHERINE D.**, Instr. of Clothing, Textiles and Interior Design (1969, 1970). BS 1948, Univ. of Kansas; MS 1970, Kansas State Univ.
- CORMANY, ESTHER MARGARET**, Assoc. Prof. of Clothing, Textiles and Interior Design; Agr. Exp. Sta. (1936, 1941). BS 1926, MS 1932, Kansas State Univ. (GF)
- CRAIGIE, BARBARA**, Asst. Prof. of Clothing, Textiles and Interior Design (1954, 1963). BA 1932, Univ. of Minnesota; MA 1942, Univ. of Missouri. (GF)
- DOLLAR, DIANE A.**, Instr. in Clothing, Textiles and Interior Design (1970). BS 1955, MS 1967, Kansas State Univ.
- FASSE, WILLIAM R.**, Instr. of Family Economics; Agr. Exp. Sta. (1969). BS 1968, Washburn Univ.; MS 1970, Kansas State Univ.
- FINKELSTEIN, BEATRICE**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1967). BA 1933, Hunter Col.; MS 1939, Columbia Univ. (GF)
- FRYER, BETH ALSUP**, Assoc. Prof. of Foods and Nutrition; Agr. Exp. Sta. (1959). BS 1945, Univ. of New Mexico; MS 1949, Ohio State Univ.; PhD 1959, Michigan State Univ. (GF)
- GLASSCOCK, MARLENE K.**, Instr. of Family and Child Development (1972). BA 1969, MA 1970, Kansas State Univ.
- HARRISON, DOROTHY LUCILE**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1947, 1963). BS 1938, Dakota Wesleyan Univ.; MS 1943, PhD 1947, Iowa State Univ. (GF)
- HESS, KATHARINE PADDOCK**, Assoc. Prof. of Clothing and Textiles Emerita (1925, 1950, BS 1900, MS 1925, Kansas State Univ. (GF)
- HILL, OPAL BROWN**, Assoc. Prof. of Clothing, Textiles and Interior Design Emerita (1944, 1954, 1965, 1969). BS 1944, MS 1950, Kansas State Univ. (GF)
- HOEFLIN, RUTH**, Assoc. Dean; Prof. of Home Economics (1957, 1960). BS 1940, Iowa State Univ.; MA 1945, Univ. of Michigan; PhD 1950, Ohio State Univ. (GF)
- HOFFMAN, DORETTA**, Dean, Prof. of Home Economics; Assoc. Director, Agr. Exp. Sta. (1954). BS 1941, Univ. of Nebraska; MS 1943, Michigan State Univ.; PhD 1949, Cornell Univ.; DSc 1966, Univ. of Nebraska. (GF)
- HOWE, HAZEL DELL**, Assoc. Prof. of Clothing and Textiles Emerita (1936, 1947, 1967). BS 1921, MS 1935, Kansas State Univ. (GF)
- HUDGINS, CONSTANCE M.**, Instr. of Foods and Nutrition (1971). BS 1969, Auburn Univ.; MS 1971, Univ. of Tennessee.
- KELL, LEONE POWER**, Prof. of Family and Child Development Emerita; Agr. Exp. Sta. (1927, 1947, 1965). BS 1923, MS 1928, Kansas State Univ. (GF)
- KENNEDY, CARROLL E.**, Prof. of Family and Child Development (1970). AB 1949, Wheaton Col.; MS 1953, Kansas State Univ.; EdD 1963, Univ. of Maryland. (GF)
- KRAMER, MARTHA MORRISON**, Prof. of Home Economics Emerita (1922, 1960). BS 1916, Univ. of Chicago; MS 1919, PhD 1922, Columbia Univ. (GF)
- LATZKE, ALPHA CORINNE**, Prof. of Clothing and Textiles Emerita (1927, 1960, 1965). BS 1919, MS 1928, Kansas State Univ. (GF)
- LIENKAEMPER, GERTRUDE ELISE**, Assoc. Prof. of Clothing and Textiles Emerita (1941, 1948, 1966). BS 1921, Oregon State Col.; MA 1938, Univ. of Washington. (GF)
- MCCORD, IVALEE HEDGE**, Prof. of Family and Child Development (1957, 1963). BS 1933, MS 1951, Kansas State Univ.; PhD 1964, Purdue Univ. (GF)
- McMILLAN, EVA M.**, Assoc. Prof. of Foods and Nutrition Emerita (1930, 1937, 1939, 1958). MS 1918, PhD 1929, Univ. of Chicago. (GF)
- MIDDLETON, RAYMONA**, Asst. Prof. of Institutional Management; Agr. Exp. Sta. (1962, 1966). BS 1937, Univ. of Nebraska; MS 1941, Kansas State Univ. (GF)
- MORSE, RICHARD L. D.**, Prof.; Head, Department of Family Economics; Agr. Exp. Sta. (1955). BA 1938, Univ. of Wisconsin; PhD 1942, Iowa State Univ. (GF)
- MOXLEY, VIRGINIA**, Instr. of Family and Child Development (1970). BS 1968, MS 1969, Kansas State Univ.
- MULLEN, IVA MANILLA**, Asst. Prof. of Foods and Nutrition Emerita (1936, 1964). BS 1925, Kansas State Univ.; MS 1928, Iowa State Univ. (GF)
- MUNSON, DEANNA M.**, Instr. of Clothing, Textiles and Interior Design (1967). BS 1966, MS 1967, Kansas State Univ.
- NEWBY, FRANCES ANN**, Asst. Prof. of Clothing, Textiles and Interior Design (1963, 1971). BFA 1961, Kansas City Art Institute; MA 1970, Kansas State Univ.
- NEWELL, KATHLEEN**, Asst. Prof. of Foods and Nutrition (1962). BS 1944, Kansas State Univ.; MS 1951, Univ. of Wisconsin.

College of Home Economics

- AGAN, ANNA TESSIE**, Assoc. Prof. of Family Economics Emerita; Agr. Exp. Sta. (1929, 1944, 1968). BS 1927, Univ. of Nebraska; MS 1930, Kansas State Univ. (GF)
- ALDOUS, CORAL KERR**, Assoc. Prof. of Family and Child Development Emerita (1940, 1958). BS 1911, Utah State Agricultural Col.; MA 1940, Columbia Univ. (GF)
- ANNIS, PATTY SMITH**, Asst. Prof. of Family Economics, Agr. Exp. Sta. (1958, 1961). BS 1955, Mississippi State Col. for Women; MS 1957, Univ. of Tennessee. (GF)

- PARKS, ARDYCE R.**, Instr. of Home Economics (1971). BS 1969, MS 1970, Kansas State Univ.
- PETERSON, MARY D.**, Instr. of Clothing, Textiles and Interior Design (1968). BS 1958, MS 1959, Univ. of Tennessee.
- RAFFINGTON, MARGARET ELIZABETH**, Asst. Prof. of Family and Child Development Emerita (1938, 1939, 1966, 1970). BS 1924, MS 1928, Kansas State Univ.; Professional Diploma, 1954, Columbia Univ.
- RASMUSSEN, ALBIE C.**, Asst. Prof. of Family Economics (1966, 1967). BS 1942, Univ. of Alaska; MS 1964, Kansas State Univ. (GF)
- REEHLING, JEAN ELIZABETH**, Asst. Dean; Asst. Prof. of Home Economics (1964, 1967). BS 1962, Kansas State Univ.; MA 1963, Colorado State Col.
- RIEMANN, NANCY E.**, Instr. of Family Economics (1969). BS 1963, Michigan State Univ.; MS 1968, Kansas State Univ.
- ROACH, FAITH RUSSELL**, Instr. of Institutional Management (1965). BS 1947, MS 1966, Kansas State Univ.
- SEGO, R. JEAN WHEELER**, Asst. to Dean; Instr. of Home Economics (1967). BA 1960, Friends Univ.; MS 1967, Kansas State Univ.
- SHUGART, GRACE SEVERANCE**, Prof.; Head, Department of Institutional Management; Agr. Exp. Sta. (1951, 1961). BS 1931, State Col. of Washington; MS 1938, Iowa State Univ. (GF)
- SISTRUNK, JOAN N.**, Instr. of Family and Child Development (1970). BS 1951, Kansas State Univ.; MS 1956, Univ. of Minnesota.
- STITH, MARJORIE MAY**, Prof.; Head, Department of Family and Child Development; Agr. Exp. Sta. (1961). BS 1943, Alabama State Col. for Women; MS 1958, PhD 1961, Florida State Univ. (GF)
- TINKLIN, GWENDOLYN LAVERNE**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1943, 1956). BS 1940, MS 1944, Kansas State Univ. (GF)
- VADEN, ALLENE G.**, Instr. of Institutional Management (1971). BS 1960, Univ. of Texas; MS 1967, Texas Technological Col.
- WAKEFIELD, LUCILLE MARIAN**, Prof.; Head, Department of Foods and Nutrition; Agr. Exp. Sta. (1966). BS 1949, MS 1956, Univ. of Connecticut; PhD 1965, Ohio State Univ. (GF)
- WARDEN, JESSIE A.**, Prof.; Head, Department of Clothing, Textiles and Interior Design; Agr. Exp. Sta. (1960). BS 1940, Northeast Missouri State Teachers Col.; MA 1946, Columbia Univ.; PhD 1955, Pennsylvania State Univ. (GF)
- WEST, BESSIE BROOKS**, Prof. of Institutional Management Emerita (1928, 1960). AB 1924, Univ. of California; MS 1951, Michigan State Normal Col. (GF)
- WILLIAMS, JENNIE**, Prof. of Family and Child Development Emerita (1932, 1959). BS 1920, MS 1933, Kansas State Univ.; Graduate, 1925, Univ. of Michigan School of Nursing. (GF)

College of Veterinary Medicine

- ANDERSON, HECTOR J.**, Instr. in Surgery and Medicine (1971). BS 1967, DVM 1971, Tuskegee Institute.
- ANDERSON, NEIL V.**, Assoc. Prof. of Comparative Gastroenterology (1967, 1970). BS 1953, Mankato State Col.; BS 1959, DVM 1961, PhD 1968, Univ. of Minnesota. (GF)
- ANTHONY, HARRY D.**, Prof. and Director of Diagnostic Laboratory (1955, 1971). DVM 1952, MS 1957, Kansas State Univ. (GF)
- BAILIE, WAYNE E.**, Asst. Prof. of Infectious Diseases (1972). BS 1967, DVM 1967, PhD, 1969, Kansas State Univ.
- BAUGH, ROBERT C.**, Instr. (1965, 1968). DVM 1965, Kansas State Univ.
- BESCH, EMERSON L.**, Prof. and Head, Department of Physiological Sciences (1967, 1971). Staff Assoc., Institute for Environmental Research. Director, Animal Resource. BS 1952, MA 1955, Southwest Texas State Col.; PhD 1964, Univ. of California. (GF)
- BLAUCH, BRUCE S.**, Instr. of Small Animal Medicine (1965). BS 1949, Pennsylvania State Univ.; DVM 1956, Univ. of Pennsylvania, MS 1969, Kansas State Univ.
- BOZARTH, ANDREW J. III**, Instr. of Pathology (1970). BS 1965, DVM 1967, Kansas State Univ.
- BRANDT, GARY W.**, Asst. Prof. of Equine Medicine (1969). BS 1964, DVM 1966, Univ. of Illinois.
- BURROUGHS, ALBERT L.**, Assoc. Prof. of Virology (1960). BS 1938, Univ. of Wyoming; DVM 1958, Texas A & M Col.; MS 1941, Montana State Col.; PhD 1946, Univ. of California. (GF)
- BUTLER, HUGH C.**, Professor of Surgery (1968). DVM 1954, MS 1968, Washington State Univ. (GF)
- CARDINET, GEORGE H. III**, Assoc. Prof. of Anatomy (1966, 1970). AA 1957, Diablo Valley Col.; BS 1960, DVM 1963, PhD 1966, Univ. of California. (GF)
- CARNAHAN, DAVID L.**, Asst. Prof. of Obstetrics and Gynecology (1961, 1964). BS 1959, DVM 1959, MS 1964, Kansas State Univ.
- CHAPMAN, TOMAS E.**, Asst. Prof. of Physiological Chemistry (1969). BS 1962, DVM 1964, PhD 1969, Univ. of California. (GF)
- CHEN, CHAO L.**, Asst. Prof. of Physiology (1969). Assoc., Institute for Environmental Research. BS 1960, DVM 1960, Nat'l. Taiwan Univ.; MS 1966, Iowa State Univ.; PhD 1969, Michigan State Univ. (GF)
- CLARENBERG, RUDOLF**, Assoc. Prof. of Physiological Chemistry (1966). BS 1954, PhD 1959, State Univ. of Utrecht. (GF)
- COFFEE, E. GUY**, Asst. Prof., Veterinary Medicine Library, (1970). AB 1958, Univ. of Missouri; ML 1970, Kansas State Teachers Col.
- COLES, JR., EMBERT H.**, Prof. and Head, Department of Infectious Diseases (1954, 1968). DVM 1945, PhD 1958, Kansas State Univ.; MS 1948, Iowa State Col. (AID Nigeria, 1970-1972). (GF)
- COOK, JAMES E.**, Prof. of Pathology (1969). Diplomate, 1956, American Col. of Veterinary Pathologists; DVM 1951, Oklahoma State Univ.; PhD 1970, Kansas State Univ. (GF)
- DENNIS, STANLEY M.**, Prof. and Head, Department of Pathology (1966, 1968). FRCVS 1962, BVSc 1949, PhD 1961, Univ. of Sidney. (GF)
- ERICHSEN, DEBORAH**, Instr. of Physiology and Pharmacology (1968). BS 1966, DVM 1968, Kansas State Univ.
- FEDDE, M. ROGER**, Assoc. Prof. of Physiology (1964, 1968). BS 1957, Kansas State Univ.; MS 1959, PhD 1963, Univ. of Minnesota. (GF)
- FRANK, EDWARD R.**, Prof. of Surgery Emeritus (1926, 1935, 1962). BS 1918, DVM 1924, MS 1929, Kansas State Univ.
- FREY, RUSSELL A.**, Assoc. Prof. of Medicine and Physiology (1963, 1970). DVM 1952, PhD 1970, Kansas State Univ. (GF)
- FRICK, EDWIN J.**, Prof., Department of Surgery and Medicine Emeritus (1919, 1935, 1966). DVM 1918, Cornell Univ. (GF)
- GERDIS, THOMAS A.**, Instr. (1970). Veterinary Medicine News Editor. BA 1963, Evangel Col.; MS 1970, Kansas State Univ.
- GRAY, ANDREW P.**, Assoc. Prof. of Pathology (1964, 1971). DVM 1953, MS 1963, PhD 1966, Kansas State Univ.
- GREVE, TORBEN**, Instr. in Surgery and Medicine (1970). DVM 1970, Royal Veterinary Univ.
- GRONWALL, RONALD R.**, Assoc. Prof. of Physiology (1966, 1970). Assoc., Institute for Environmental Research. BS 1960, DVM 1962, PhD 1966, Univ. of California. (GF)
- GUFFY, MARK M.**, Assoc. Prof. of Radiology (1963, 1969). DVM 1949, MS 1966, Colorado State Univ. (GF)
- HARRIS, STANLEY G.**, Asst. Prof. of Comparative Cardiology (1964, 1969). BS 1958, DVM 1960, MS 1967, Kansas State Univ.; PhD 1970, Ohio State Univ.
- HARTKE, GLEN T.**, Instr. in Anatomy (1962, 1970). BS 1958, DVM 1960, MS 1965, Kansas State Univ.
- HULSE, DONALD A.**, Instr. in Surgery and Medicine (1971). BS 1970, DVM 1970, Texas A & M Univ.
- JERNIGAN, LOYCE D.**, Temporary Asst. Prof. of Medicine (1965). DVM 1945, Kansas State Univ.
- KELLEY, DONALD C.**, Prof. of Infectious Diseases (1958, 1969). Diplomate, American Board of Veterinary Public Health. DVM 1935, MS 1952, Kansas State Univ. (GF)
- KENNEDY, GEORGE A.**, Instr. of Equine Medicine (1970). BS 1962, Univ. of New Mexico; DVM 1967, Washington State Univ.
- KIMBALL, ALICE DAY**, Instr. in Pathology, Parasitology and Public Health Emeritus (1934, 1955). BS 1935, Kansas State Univ.
- KITSELMAN, CHARLES H.**, Prof. of Pathology Emeritus (1919, 1933, 1965). VMD 1918, Univ. of Pennsylvania; MS 1927, Kansas State Univ. (GF)
- KLEMM, ROBERT D.**, Assoc. Prof. of Anatomy (1972). BS 1957, Capital Univ.; MS 1959, Ohio Univ.; PhD 1964, Southern Illinois Univ.
- KRUCKENBERG, SAMUEL M.**, Instr. in Surgery (1966, 1967). DVM 1963, Diplomate American Col. of Lab. Animal Med.; MS 1965, Kansas State Univ.
- LEASURE, ELDEN E.**, Dean Emeritus; Prof. of Pathology, Parasitology and Public Health Emeritus (1926, 1948, 1964). DVM 1923, MS 1930, Kansas State Univ. (GF)
- LEIPOLD, HORST W.**, Assoc. Prof. of Pathology (1970). DVM 1963, Justus Liebig Univ.; MS 1967, PhD 1968, Kansas State Univ.
- LELAND, JR., STANLEY E.**, Prof. and Acting Head, Department of Infectious Diseases (1967, 1970). BS 1949, MS 1950, Univ. of Illinois; PhD 1953, Michigan State Univ. (GF)
- LINDQUIST, WILLIAM D.**, Prof. of Infectious Diseases (1968). BS 1940, MS 1942, Univ. of Idaho; ScD 1949, Johns Hopkins Univ. (GF)
- MARTIN, CHARLES L.**, Assoc. Prof. of Ophthalmology (1971). BS 1963, Montana State Univ.; DVM 1965, Washington State Univ.; MS 1968, Ohio State Univ.
- MCGAVIN, MATTHEW D.**, Assoc. Prof. of Pathology (1968). BVSc 1952, Univ. of Queensland; PhD 1964, Michigan State Univ.; Diplomate, American Col. of Veterinary Pathologists, 1963. (GF)
- MILLERET, ROY J.**, Asst. Prof. of Food Animal Medicine (1960, 1964). DVM 1944, MS 1959, Kansas State Univ.
- MINOCHA, HARISH C.**, Assoc. Prof. of Infectious Diseases (1969). BVSc 1955, Indian; MS 1963, PhD 1967, Kansas State Univ. (GF)
- MOORE, WILLIAM E.**, Asst. Prof. of Infectious Diseases (1968). BS 1956, DVM 1958, Cornell Univ.; PhD 1968, Univ. of Minnesota. (GF)
- MOSIER, JACOB E.**, Prof. and Head, Department of Surgery and Medicine (1945, 1961). DVM 1945, MS 1948, Kansas State Univ. (GF)
- MUNGER, LADDIE L.**, Asst. Prof. of Pathology (1968, 1971). BS 1962, DVM 1962, Univ. of Missouri; MS 1971, Kansas State Univ.
- NOORDSY, JOHN L.**, Prof. of Surgery (1960, 1966). BS 1943, South Dakota State Col.; DVM 1946, MS 1962, Kansas State Univ. (GF)
- OEHME, FREDERICK W.**, Assoc. Prof. of Toxicology and Medicine (1959, 1969). BS 1957, DVM 1958, Cornell Univ.; MS 1962, Kansas State Univ.; PhD 1969, Univ. of Missouri. (GF)
- OLSON, JAY R.**, Instr. of Medicine (1970). DVM 1945, Kansas State Univ.
- OSBALDISTON, GEORGE W.**, Assoc. Prof. of Pathology (1967). Assoc., Institute for Environmental Research. BVSc 1956, Queensland Univ.; MRCVS 1960, London; MA 1963, PhD 1965, Cambridge Univ. (GF)
- PURINTON, PAUL T.**, Asst. Prof. of Anatomy (1971). BS 1963, DVM 1965, Kansas State Univ.; PhD 1971, Univ. of Minnesota.
- RAILSBACK, LEE T.**, Asst. Dean and Assoc. Prof. (1961, 1971). BS 1936, DVM 1937, Kansas State Univ.
- REAGOR, STEPHEN G.**, Instr. in Small Animal Medicine (1971). BS 1967, DVM 1971, Univ. of California.
- RIDLEY, ROBERT K.**, Asst. Prof. of Infectious Diseases (1969). AB 1958, Bowdoin Col.; MS 1960, Univ. of Kentucky; PhD 1967, Florida State Univ.
- ROBL, MARTIN G.**, Assoc. Prof. of Pathology (1972). DVM 1964, Kansas State Univ.; MS 1966, PhD 1968, Univ. of Wisconsin.
- SCHNEIDER, JACOB E.**, Assoc. Prof. of Equine Medicine (1972). BS 1958, DVM 1960, Colorado State Univ.

SCHONEWEIS, DAVID A., Instr. of Food Animal Medicine (1966). BS 1956, DVM 1956, Kansas State Univ.

SMITH, JOSEPH E., Assoc. Prof. of Pathology (1969). BS 1959, DVM 1961, Texas A & M Univ.; PhD 1964, Univ. of California. (GF)

ST. OMER, VINCENT V. E., Asst. Prof. of Pharmacology (1972). DVM 1962, PhD 1969, Ontario Veterinary Col.

STRAFUSS, ALBERT C., Assoc. Prof. of Pathology (1968). BS 1952, DVM 1954, MS 1958, Kansas State Univ.; PhD 1963, Univ. of Minnesota. (GF)

TAUSSIG, ROBERT A., Asst. Prof. of Small Animal Medicine (1966, 1970). DVM 1945, Colorado State Univ.; MS 1970, Kansas State Univ.

TROTTER, DONALD M., Dean; Prof. of Anatomy (1956, 1971). Assoc. Director, Ag. Exp. Sta.; Diplomate, 1951, American Col. of Veterinary Pathologists; DVM 1946, MS 1957, Kansas State Univ. (GF)

UNDERBJERG, G. K. L., Prof. Emeritus of Physiology (1948). BS 1926, Royal Veterinary and Agricultural Col., Copenhagen; DVM 1943, PhD 1939, Iowa State Univ. (GF)

UPSON, DAN W., Assoc. Prof. of Pharmacology and Asst. Dean (1959, 1972). DVM 1952, MS 1962, PhD 1969, Kansas State Univ. (GF)

VESTWEBER, JEROME G. E., Instr. of Food Animal Medicine (1967). BS 1962, DVM 1964, Univ. of Minnesota.

WALLACE, LARRY J., Assoc. Prof. of Surgery and Medicine (1966, 1969). BS 1960, DVM 1962, MS 1964, Michigan State Univ. (GF)

WESTFALL, JANE A., Assoc. Prof. of Micro. Anatomy (1967, 1970). AB 1950, Col. of Pacific; MA 1952, Mills Col.; PhD 1965, Univ. of California. (GF)

WILCOX, GRAHAM E., Asst. Prof. of Infectious Diseases (1969). BVSc 1964, PhD 1969, Univ. of Queensland.

WILSON, JAMES W., Instr. (1971). BS 1970, DVM 1970, Michigan State Univ.

Division of Continuing Education

DIECKHOFF, KENNETH L., Temporary Instr. (1969). BA 1965, Fort Hays State Col.; MA 1969, Univ. of Kansas.

FRYE, DAVID W. M., Instr. (1970). BA 1959, Macalester Col.; MA 1962, MA 1964, EdS 1969, Col. of St. Thomas.

HAROLD, E. NORMAN, Director, Instr. (1963). BA 1960, Kansas State Teachers Col. at Emporia; MA 1962, Vanderbilt Univ.

HORTON, MARY, Instr. (1970). BS 1968, MS 1970, Kansas State Univ.

LOCKHART, WILLIAM, Instr. (1970). BS 1957, Kansas State Col. at Pittsburg; MA 1960, Arizona State Univ.

MCCARTHY, MICHAEL J., Instr. (1971). BA 1964, California State Col.; MA 1966, Kansas State Univ.

MIDCAP, LUCILLE E., Temporary Instr. (1971). BS 1965, Colorado State Univ.

MILLER, MAX B., Asst. Prof. (1946). BS 1946, MS 1950, Kansas State Univ.; Junior Col. Credential 1954, Humboldt State Col.

MORDY, LUCILLE E., Asst. Prof. (1947). BS 1928, Emporia State Col.; MS 1951, Kansas State Univ.

REICHOW, RONALD W., Temporary Instr. (1969). AA 1961, Kansas City Junior Col.; BS 1963, MS 1967, Kansas State Univ.

RICHARDSON, ROBERT E., Temporary Instr. (1969). AB 1937, Univ. of Kansas; MA 1965, George Washington Univ.

SWEGLE, WILLIAM F., Asst. Prof. (1966). AA 1948, Kansas City Junior Col.; BA 1950, Univ. of Kansas; MBA 1965, Univ. of Missouri at Kansas City.

WILLIAMSON, MICHAEL M., Asst. Director, Asst. Prof. (1966). BS 1956, MA 1962, Kansas State Univ.

Division of Cooperative Extension

RESIDENCE STAFF

AHLSCHWEDE, GEORGE ALLEN, Asst. Prof.; Extension Specialist, Animal Science and Industry (1965). BS 1962, MS 1965, PhD 1969, Kansas State Univ.

ALLEN, GERTRUDE EDNA, Prof. Emeritus; Extension Specialist in Foods and Nutrition (1929, 1947). BS 1923, Univ. of Minnesota; MS 1936, Kansas State Univ.

AMSTEIN, WILLIAM GERALD, Prof. Emeritus; Extension Specialist, International Participant Training (1929, 1965, 1968). BS 1927, Univ. of Massachusetts; MS 1928, Kansas State Univ.

ANDERSON, ELINOR, Assoc. Prof.; Extension Specialist, Home Management (1957, 1971). BS 1939, MS 1952, Kansas State Univ.

APEL, J. DALE, Prof.; Assoc. State Club Leader (1962, 1967). BS 1950, Kansas State Univ.; MS 1961, The American Univ.; PhD 1966, Univ. of Chicago. (GF)

APPLEBY, MARIELLEN J., Asst. Prof.; Area Extension Home Economist (1955, 1965). BS 1955, Kansas State Univ.; MS 1965, Univ. of Maryland.

APPLEBY, THOMAS E., Instr.; Area Extension Economist in Farm Management (1960). BS 1959, MS 1967, Kansas State Univ.

AREA, MARJORIE JOANN, Asst. Prof.; Extension Specialist, 4-H Club Work (1964). BS 1956, MS 1961, Kansas State Univ.

ATCHISON, FRED DOWNS, Instr.; Area Extension Forester (1964). BS 1954, Univ. of Georgia.

ATKINSON, DAISY ELIENE, Asst. Prof.; Extension Specialist in Foods and Nutrition (1959). BA 1938, Univ. of Iowa; MS 1954, Univ. of Alabama.

BAIRD, HARRY CHARLES, Prof. Emeritus; District Agricultural Agent (1920, 1952). BS 1914, Kansas State Univ.

BAKER, E. KIRK, Asst. Prof.; Extension Economist, Resource Development (1955, 1966). BS 1949, Oklahoma State Univ.; MS 1966, Kansas State Univ.

BALDING, JAMES LEWIS, Extension Asst.; Extension Specialist in Formula Feeds Manufacturing (1965). BS 1960, Kansas State Univ.

BARTLETT, CLARENCE EDWARD, Instr. Emeritus; Extension Economist in Farm Management (1947). BS 1929, Univ. of Nebraska.

BATES, CHARLES THOMAS, Asst. Prof.; Extension Specialist in 4-H Club Work (1956, 1961). BS 1951, Oklahoma A & M; MS 1960, Univ. of Wisconsin.

BAUGHMAN, MELVIN J., Instr.; Area Extension Forester (1971). BS 1970, MS 1971, Michigan State Univ.

BIEBERLY, FRANK GEARHARD, Prof.; Section Leader and Extension Specialist in Crops and Soils (1941, 1949). BS 1938, MS 1949, Kansas State Univ.

BILES, LARRY E., Instr.; Area Extension Forester, Watershed Project (1967). BS 1967, Univ. of Missouri.

BISWELL, CLIFFORD R., Assoc. Prof.; Asst. State Extension Forester (1957, 1971). BS 1954, MS 1965, Univ. of Missouri.

BLANKENHAGEN, ELMER W., Asst. Prof.; Coordinator, Schedules and Reports (1950, 1961). BS 1948, Kansas State Univ.

BLECHA, FRANK OTTO, Prof. Emeritus; District Agricultural Agent (1919, 1948). BS 1918, MS 1924, Kansas State Univ.

BOHANNON, ROBERT ARTHUR, Prof.; Director of Extension (1951, 1965). BS 1949, Michigan State Univ.; MS 1951, Kansas State Univ.; PhD 1957, Univ. of Illinois.

BONEWITZ, EDWIN RALPH, Assoc. Prof.; Extension Specialist in Dairy Science (1943, 1949). BS 1941, MS 1955, Kansas State Univ.

BORST, WILLIAM H., Assoc. Prof.; Extension Specialist, 4-H Nutrition Program (1953, 1970). BS 1950, Kansas State Univ.; MS 1962, Colorado State Univ.

BRANNAN, BETTY J., Prof.; Asst. Director, Quality of Living Programs (1972). BS 1953, Oklahoma Col. of Liberal Arts; MS 1955, EdD 1961, Oklahoma State Univ.

BRATTON, GERALD F., Instr.; Area Extension Forester, Watershed Project (1967). BS 1966, Colorado State Univ.

BREEDEN, LOWELL D., Asst. Prof.; Extension Specialist, Veterinary Medicine (1971). BS, DVM, 1953, Kansas State Univ.

BREWER, DONALD L., Instr.; Extension Specialist, Radio and TV (1967). BA 1953, Univ. of Tulsa.

BRIGGS, VIVIAN BAHR, Asst. Prof. Emeritus; Extension Specialist in Family Life (1946, 1951). BS 1942, Univ. of Nebraska; MS 1952, Kansas State Univ.

BRILL, MARTHA E., Asst. Prof.; Extension Specialist in Health (1946, 1948). BS 1940, Kansas State Univ.; RN 1940, Univ. of Kansas.

BROOKS, HOWARD LEROY, Asst. Prof.; Extension Specialist, Insecticides (1965). BS 1960, MS 1963, Univ. of Arkansas; PhD 1967, Kansas State Univ.

BURKE, JACK M., Assoc. Prof.; Manager of Radio Station KSAC (1958). BA 1953, ME 1963, North Dakota State Univ.

BUSSET, GLENN M., Prof.; Department Head and State Club Leader (1941, 1966). BS 1941, Kansas State Univ.; MS 1957, Cornell Univ.; PhD 1965, Univ. of Wisconsin. (GF)

CALEY, HOMER K., Assoc. Prof.; Section Leader and Extension Specialist in Veterinary Medicine (1965). DVM 1952, Kansas State Univ.

CARLSON, JEAN K., Asst. Prof.; Extension Specialist, Home Management (1950, 1966). BS 1950, Kansas State Univ.; MS 1965, Oklahoma State Univ.

CLEAVINGER, EUGENE A., Prof. Emeritus; Extension Specialist in Crops and Soils (1926, 1947). BS 1925, Kansas State Univ.

COEN, LINDA L., Instr.; Area Extension Specialist, 4-H Nutrition Program (1970). BA 1968, Graceland Col.

COLLINS, BILL D., Instr.; Area Extension Economist, Farm Management (1954). BS 1951, Kansas State Univ.; MS 1962, Univ. of Wisconsin.

COOLIDGE, JOHN H., Prof. Emeritus; Extension Economist in Farm Management (1926, 1948). BS 1925, MS 1932, Kansas State Univ.

COPPERSMITH, ROBERT L., Prof.; Extension Economist, Livestock Marketing (1960). BS 1948, Kentucky State Col.; MS 1950, Univ. of Kentucky; PhD 1953, Univ. of Illinois. (GF)

COX, LAWRENCE J., Prof.; Area Extension Director (1952, 1971). BS 1948, Oklahoma State Univ.; MS 1960, Kansas State Univ.; EdD 1970, North Carolina State Univ.

CRAWFORD, TWILA V., Instr. (1971); Extension Specialist, Communications. BA 1967, MS 1971, Kansas State Univ.

CRIST, ROSEMARY A., Asst. Prof.; Area Extension Home Economist (1950, 1965). BS 1947, Kansas State Univ.; MA 1967, Univ. of Nebraska.

DeLANO, FREDRICK D., Instr.; Area Extension Economist in Farm Management (1964). BS 1961, Kansas State Univ.

DEUTSCH, HENRY, Asst. Prof.; Area Extension Forester (1964). BS 1957, MS 1964, Univ. of Missouri.

DeWEESE, PAUL F., Asst. Prof.; Extension Specialist, Radio and Television (1948, 1966). BS 1947, Kansas State Univ.

DICKEN, D. DEAN, Asst. Prof.; Area Extension Specialist, Crops and Soils (1942, 1963). BS 1937, Kansas State Univ.; MS 1942, Univ. of Illinois.

DICKINSON, ANNABELLE J., Assoc. Prof. Emeritus; Assoc. State Leader Home Economics (1940, 1969). BS 1933, Fort Hays Kansas State Col.; MS 1954, Univ. of Missouri.

DICKSON, WILLIAM M., Instr., Area Extension Economist in Farm Management (1961). BS 1956, MS 1961, Kansas State Univ.

DIERKING, GARY R., Instr., Extension Specialist, Visual Aids (1961). BFA 1958, Univ. of Kansas.

DUNHAM, JAMES R., Asst. Prof.; Extension Specialist, Dairy Science (1969). BS 1959, MS 1967, PhD 1969, Kansas State Univ.

EDELBLUTE, DALE HENRY, Assoc. Prof.; Area Extension Specialist, Crops and Soils (1947, 1971). BS 1934, Kansas State Univ.

ELLING, CARL GEORGE, Prof. Emeritus; Extension Specialist in Animal Husbandry (1907, 1951). BS 1904, Kansas State Univ.

ELLITHORPE, VERA MAY, Assoc. Prof.; Extension Specialist, Home Management (1938, 1947). BS 1935, MS 1939, Kansas State Univ.; PhD 1963, Ohio State Univ.

- ERICKSON, DONALD B.**, Assoc. Prof.; Section Leader and Extension Economist, Resource Development (1966). BS 1955, MS 1960, Univ. of Wyoming; PhD 1964, Purdue Univ. (GF)
- EYESTONE, CECIL L.**, Assoc. Prof.; Extension Specialist in 4-H Club Work (1943, 1958). BS 1944, Kansas State Univ.; MS 1958, Colorado State Univ.
- FAIDLEY, DONALD L.**, Instr.; Area Extension Economist in Farm Management (1956). BS 1953, Kansas State Univ.
- FENWICK, RICHARD S., JR.**, Asst. Prof.; Extension Economist Marketing Information and Agricultural Firm Management (1972). BS 1962, MS 1965, Colorado State Univ.; PhD 1972, Univ. of Missouri.
- FERGUSON, JOHN M.**, Prof. Emeritus; State Leader, Extension Engineering (1937, 1958). BS 1934, Kansas State Univ.
- FIGURSKI, DONALD L.**, Asst. Prof.; Area Extension Economist (1960). BS 1952, MS 1959, Colorado State Univ.
- FINLEY, PHILIP B.**, Instr.; Area Extension Specialist, Rural Development (1972). BS 1951, MS 1956, Kansas State Univ.
- FLINCHBAUGH, BARRY L.**, Asst. Prof.; Extension Economist, Public Affairs (1971). BS 1964, MS 1967, Pennsylvania State Univ.; PhD 1971, Purdue Univ.
- FRANCIS, EUGENE N.**, Assoc. Prof.; Area Extension Specialist, Animal Science (1967). BS 1949, Kansas State Univ.; MS 1953, Iowa State Univ.
- FRAZIER, LESLIE PAUL**, Asst. Prof.; Extension Economist, Resource Development (1943, 1965). BS 1942, Oklahoma State Univ.; MA 1962, Colorado State Univ.
- FREDERICK, ALLAN LEROY**, Asst. Prof.; Extension Economist, Grain Marketing and Agricultural Firm Management (1971). BS 1966, MS 1968, Univ. of Nebraska; PhD 1971, Purdue Univ.
- FREDERICK, HOBART**, Instr.; Extension Economist in Farm Management (1941). BS 1941, Kansas State Univ.
- GALLAHER, HAROLD G.**, Prof.; Asst. Department Head of Horticulture, Extension, and State Extension Forester (1951, 1965). BS 1949, Univ. of Missouri; MS 1959, Kansas State Univ.
- GATES, DELL E.**, Prof.; Extension Specialist in Entomology (1948, 1971). BS 1948, MS 1952, Kansas State Univ.
- GEISLER, JAMES C.**, Instr.; Area Extension Forester (1966). BS 1964, Univ. of Missouri.
- GLOVER, OTIS BENTON**, Assoc. Prof. Emeritus; District Agricultural Agent (1929, 1963). BS 1917, Kansas State Univ.
- GOULD, LEONARD KEITH**, Instr.; Area Extension Forester, Utilization and Marketing (1963). BS 1956, Colorado State Univ.
- GRAHAM, RALF O.**, Assoc. Prof.; Coordinator, Program Communications (1961). AB 1948, Peru State Teachers Col.; MA 1955, Univ. of Minnesota.
- GREENE, LAURENZ S.**, Instr.; Area Extension Economist in Farm Management (1952). BS 1950, Kansas State Univ.
- GREY, GENE W.**, Assoc. Prof.; Asst. State Extension Forester (1962, 1971). BS 1956, Univ. of Missouri; MS 1969, Michigan State Univ.
- GRIFFITH, PAUL W.**, Prof.; Assoc. Director of Extension (1935, 1950). BS 1934, MS 1948, Kansas State Univ.; PhD 1961, Univ. of Wisconsin. (GF)
- GUTHRIE, GERSILDA**, Asst. Prof.; Area Home Management Specialist (1937, 1958). BS 1934, Kansas State Univ.; MA 1949, Columbia Univ.
- GUY, WILLIAM D.**, Instr.; Area Extension Economist in Farm Management (1951). BS 1942, Kansas State Univ.
- HACKLER, RAYMOND F.**, Instr.; Area Extension Economist in Farm Management (1960). BS 1952, MS 1966, Oklahoma State Univ.
- HAGANS, FRANK ALEXANDER**, Assoc. Prof. Emeritus; District Agricultural Agent (1930, 1956). BS 1925, Kansas State Univ.
- HAGEMAN, CHARLES A.**, Instr. Emeritus; Extension Economist in Farm Management (1936). BS 1936, Kansas State Univ.
- HALAZON, GEORGE C.**, Assoc. Prof.; Extension Specialist in Wildlife Management (1954, 1956). PhD 1943, Univ. of Wisconsin.
- HANNA, JOHN B.**, Assoc. Prof.; Extension Specialist in 4-H Club Work (1934, 1960). BS 1932, MS 1954, Kansas State Univ.
- HARPER, HAROLD B.**, Assoc. Prof.; Extension Specialist in Soil Conservation (1932, 1946). BS 1933, MS 1957, Kansas State Univ.
- HAY, DE LYNN R.**, Asst. Prof.; Area Extension Irrigation Engineer (1971). BS 1966, MS 1967, Univ. of Nebraska.
- HENDERSON, F. ROBERT**, Asst. Prof.; Extension Specialist, Wildlife Damage Control (1968). BS, MS 1956, Fort Hays Kansas State Col.
- HEROD, JON C.**, Instr.; Area Extension Economist in Farm Management (1957). BS 1957, Kansas State Univ.
- HERPICH, RUSSELL L.**, Prof.; Extension Irrigation Engineer (1951, 1958). BS 1950, MS 1953, Kansas State Univ.
- HOLMES, ELWYN S.**, Assoc. Prof.; Extension Agricultural Engineer (1966). BS 1943, MS 1953, Texas A & M Univ.
- HONSTEAD, ARLISS E.**, Assoc. Prof.; Extension Specialist in 4-H Club Work (1946, 1961). BS 1937, Kansas State Univ.; MS 1960, Columbia Univ.
- HOSS, RAY M.**, Assoc. Prof.; Area Extension Director (1935, 1958). BS 1930, Kansas State Univ.
- HOWE, JERELENE E.**, Instr.; Extension Specialist, Clothing and Textiles (1965). BS 1951, MS 1965, Kansas State Univ.
- HYDE, ROBERT M.**, Assoc. Prof.; Extension Specialist, Range Management (1966, 1970). BS 1959, MS 1961, Fort Hays Kansas State Col.; PhD 1963, Univ. of Wyoming. (GF)
- JACCARD, CLARENCE ROY**, Prof. Emeritus; Coordinator of Extension Program Planning (1922, 1957). BS 1914, Kansas State Univ.
- JACKSON, MARION E.**, Assoc. Prof.; Extension Economist, Poultry Marketing and Production (1945). BS 1941, Purdue Univ.; MS 1955, Kansas State Univ.
- JEPSEN, RICHARD L.**, Asst. Prof.; Extension Specialist, Rural Civil Defense (1953, 1962). BS 1950, MS 1963, Kansas State Univ.
- JOHNSON, J. HAROLD**, Prof. Emeritus; State 4-H Club Leader (1927, 1958). BS 1927, Kansas State Univ.; MS 1942, George Washington Univ.
- JOHNSON, NAOMI M.**, Assoc. Prof.; Extension Specialist, Clothing and Textiles (1938, 1950). BS 1932, MS 1949, Kansas State Univ.
- JOHNSON, ROBERT L.**, Prof.; Coordinator of Extension Personnel Training (1965). BS 1951, Univ. of Nebraska; MS 1956, PhD 1958, Univ. of Wisconsin. (GF)
- JONES, HAROLD E.**, Prof.; Extension Specialist, Crops and Soils (1946, 1956). BS 1940, Kansas State Univ.; MS 1942, PhD 1949, Purdue Univ. (GF)
- JONES, MILAM T.**, Instr.; Area Extension Specialist, Horticulture (1966). BS 1964, MS 1966, Kansas State Univ.
- KEPLEY, LARRY R.**, Instr.; Area Extension Economist in Farm Management (1954). BS 1961, Kansas State Univ.
- KILGORE, GARY L.**, Asst. Prof.; Area Extension Specialist, Crops and Soils (1972). BS 1964, MS 1966, Kansas State Univ.
- KING, CLAUDE L.**, Prof.; Extension Specialist in Plant Pathology (1934, 1954). BS 1932, MS 1953, Kansas State Univ.
- KING, JR., RICHARD F.**, Assoc. Prof.; Area Extension Director (1938, 1962). BS 1938, MS 1957, Kansas State Univ.
- KINGSLEY, KENNETH K.**, Instr.; Extension Economist, Resource Development (1970). BS 1964, Kansas State Univ.
- KOENIG, MARGARET A.**, Prof. Emeritus; Assoc. Home Economics Leader (1929, 1959). BS 1928, Kansas State Univ.; MS 1958, Univ. of Wisconsin.
- LANGEMEIER, LARRY N.**, Asst. Prof.; Extension Specialist, Farm Management Studies (1968). BS 1963, Univ. of Nebraska; MS 1965, PhD 1968, Univ. of Missouri. (GF)
- LEUTHOLD, LARRY D.**, Instr.; Extension Specialist, Ornamental Horticulture (1966). BS 1959, MS 1966, Kansas State Univ.
- LIND, RUEBEN CARL**, Prof. Emeritus; Extension Specialist in Soil Conservation (1933, 1950). BS 1923, Kansas State Univ.
- LOUCKS, WILLIAM L.**, Instr.; Area Extension Forester (1967). BS 1963, Colorado State Univ.
- MCADAMS, VERL E.**, Assoc. Prof. Emeritus; Extension Specialist, Animal Science (1934, 1952). BS 1928, MS 1957, Kansas State Univ.
- MCCLELLAND, EVERETT L.**, Instr. Emeritus; Extension Economist in Farm Management (1936). BS 1928, Kansas State Univ.
- MCDANIEL, GARY L.**, Asst. Prof.; Extension Specialist, Landscape and Environmental Horticulture (1971). BS 1967, PhD 1971, Iowa State Univ.
- MCMINIMY, MILTON W.**, Instr.; Extension Economist in Farm Management (1970). BS 1969, MS 1970, Kansas State Univ.
- MCREYNOLDS, KENNETH L.**, Asst. Prof.; Extension Economist in Farm Management (1949, 1960). BS 1950, MS 1954, Kansas State Univ.
- MANN, RAY H.**, Assoc. Prof.; Area Extension Director (1956, 1969). BS 1951, Oklahoma State Univ.; MS 1965, Kansas State Univ.
- MARR, CHARLES W.**, Asst. Prof.; Extension Specialist, Vegetable Crops (1970). BS 1963, MS 1967, Southern Illinois Univ.; PhD 1970, Univ. of Tennessee.
- MEANS, EARL T.**, Instr. Emeritus; Extension Economist in Farm Management (1944). BS 1948, Kansas State Univ.
- MEDLIN, ROGER C.**, Asst. Prof.; Asst. Extension Editor (1967). BS 1948, MS 1969, Kansas State Univ.
- MEYER, ELLA MARIE**, Asst. Prof. Emeritus; District Home Economics Agent (1925, 1956). BS 1907, Kansas State Univ.
- MEYER, KATHERINE K.**, Instr.; Extension Specialist, Home Furnishings (1970). BS 1958, Kansas State Univ.
- MILLER, ELSIE LEE**, Asst. Prof.; Extension Specialist, Foods and Nutrition (1941, 1962). BS 1934, MS 1942, Kansas State Univ.
- MORRISON, FRANK D.**, Assoc. Prof.; Extension Specialist, Horticulture (1966). BS 1951, MS 1959, Univ. of Idaho; PhD 1966, Michigan State Univ. (GF)
- MOYER, WENDELL A.**, Prof.; Section Leader and Extension Specialist, Animal Science (1941, 1956). BS 1941, MS 1955, Kansas State Univ.
- MOYER, WILLIAM J.**, Asst. Prof.; Area Extension Forester (1969). BS 1964, Oklahoma State Univ.; MA 1968, Ball State Univ.
- MULLEN, W. GALE**, Instr.; Area Extension Economist in Farm Management (1961). BS 1950, Kansas State Univ.
- MYERS, GLADYS**, Assoc. Prof. Emeritus; Extension Specialist in Home Management (1930, 1947). BS 1923, Kansas State Univ.; MS 1939, Cornell Univ.
- NAGEL, JOHN C.**, Instr.; Extension Television Producer (1967). BS 1967, Kansas State Univ.
- NAUGHTON, GARY G.**, Instr.; Area Extension Forester (1966). BS 1959, Utah State Univ.; MS 1968, Univ. of Missouri.
- NEELY, MARGERY A.**, Assoc. Prof.; Extension Specialist, 4-H Child and Youth Development (1971). AB 1955, Southwest Missouri State Col.; MEd 1968, Univ. of Missouri.
- NEFF, LEONARD FAY**, Assoc. Prof. Emeritus; Coordinator of Extension Personnel Training (1924, 1958). BS 1922, Purdue Univ.
- NEUFELD, DOROTHY H.**, Asst. Prof.; Area Extension Home Economist (1957, 1965). BS 1950, Texas Technological Col.; MS 1964, Kansas State Univ.
- NIGHTSWONGER, JAMES M.**, Asst. Prof.; Extension Specialist, Environmental Forestry (1961, 1970). BS 1960, MS 1970, Kansas State Univ.
- NILSON, ERICK B.**, Assoc. Prof.; Extension Specialist, Herbicides (1965). BS 1950, MS 1955, Univ. of Nebraska; PhD 1963, Kansas State Univ.
- NORBY, OSCAR W.**, Prof.; Area Extension Director (1942, 1961, 1969). BS 1942, Kansas State Univ.; MS 1959, PhD 1961, Univ. of Wisconsin. (GF)
- OLSEN, DUANE A.**, Asst. Prof.; Area Extension Economist, Resource Development (1963, 1966). BS 1961, Univ. of Minnesota; MS 1964, Purdue Univ.
- OLSON, ROSS A.**, Instr.; Area Extension Economist in Farm Management (1968). BS 1965, MS 1968, Kansas State Univ.
- OSBURN, MELVIN W.**, Assoc. Prof. Emeritus; Extension Specialist, Veterinary Medicine (1952, 1954). DVM 1934, Iowa State Univ.
- OVERLEY, FRANK L.**, Asst. Prof.; Area Extension Economist (1960). BS 1950, Kansas State Univ.; MS 1957, Michigan State Univ.
- PARKER, LEONARD C.**, Instr.; Area Extension Economist in Farm Management (1956). BS 1952, Kansas State Univ.

PARRIS, FRED M., Assoc. Prof.; Asst. Extension Editor (1963). BS 1942, Kansas State Univ.; MA 1951, Iowa State Univ.

PATRICK, ABIGAIL K., Asst. Prof.; Extension Specialist, Environmental Housing (1971). BS 1969, California State Polytechnic Col.; MA 1971, California State Col.

PECK, ERNEST G., Asst. Prof.; Extension Specialist, Visual Aids (1955, 1967). BS 1950, MS 1965, Kansas State Univ.

PETERSON, EDMUND J., Administrative Asst. (1966). BS 1959, Kansas State Univ.

PETERSON, GERALD W., Instr.; Extension Specialist, Visual Aids (1968). BA 1962, Kearney State Teachers Col.

PETERSON, VERLIN H., Assoc. Prof.; Extension Specialist, Crops and Soils (1948, 1965). BS 1948, MS 1949, Kansas State Univ.

PINKERTON, LESTER R., Asst. Prof.; Area Extension Forester (1964, 1967). BS 1963, MS 1967, Colorado State Univ.

POPE, DAVID L., Asst. Prof.; Extension Irrigation Engineer (1971). BS 1970, MS 1971, Oklahoma State Univ.

PRAWL, WARREN L., Prof.; Extension Specialist, Personnel Training (1952, 1969). BS 1954, Kansas State Univ.; MS 1958, EdD 1962, Cornell Univ. (GF)

PRETZER, DON D., Instr.; Section Leader and Extension Economist, Farm Management (1958). BS 1955, MS 1970, Kansas State Univ.; PhD 1971, Univ. of Missouri.

REDEKER, NORMA J., Asst. Prof.; Assoc. State Leader Extension Home Economics (1964). BS 1961, Emporia Kansas State Teachers Col.; MS 1964, Kansas State Univ.

REGNIER, ROGER E., Prof. Emeritus; Extension Specialist, Resource Development (1934, 1966). BS 1924, MS 1932, Kansas State Univ.

REIMER, ERVIN C., Instr.; Area Extension Economist in Farm Management (1965). BS 1964, Kansas State Univ.

RINGLER, WILBER E., Prof., Asst. Director of Extension (1957). BS 1948, MS 1949, Univ. of Nebraska; PhD 1958, Univ. of Wisconsin. (GF)

ROWLAND, JACK J., Asst. Prof.; Area Extension Forester (1969). BS 1968, MS 1970, Univ. of Missouri.

SCHINDLER, DALE E., Assoc. Prof.; Extension Architect (1955, 1961). BArch 1953, MS 1960, Kansas State Univ. Registered Architect, MA 1960, Kansas State Univ.

SCHLENDER, JOHN R., Assoc. Prof.; Extension Economist in Farm Management (1951, 1971). BS 1951, Kansas State Univ.; MS 1960, Oregon State Univ.; PhD 1969, Purdue Univ.

SCHOEFF, ROBERT W., Prof.; Section Leader and Extension Economist in Marketing and Utilization of Formula Feeds (1960). BS 1942, MS 1947, PhD 1952, Purdue Univ. (GF)

SCHROEDER, MARY M., Asst. Prof.; Area Extension Home Economist (1961, 1966). BS 1938, MS 1968, Kansas State Univ.

SELBY, WALTER E., Assoc. Prof.; Extension Agricultural Engineer (1944, 1947). BS 1929, Kansas State Univ.; MS 1957, Univ. of Nebraska.

SELF, ETHEL W., Assoc. Prof. Emeritus; Extension Specialist, Home Management (1929, 1953). BS 1926, MS 1952, Kansas State Univ.

SHANKLAND, HAROLD G., Assoc. Prof. Emeritus; Assoc. Extension Editor (1943, 1949). AB 1924, Col. of Emporia.

SHREVE, LOY W., Instr.; Area Extension Forester (1964). BS 1951, West Virginia Univ.

SLINKMAN, ZOE E., Instr.; Extension Specialist, Cultural Resources Development (1967). BS 1947, Greeley Colorado State Col.; MS 1970, Kansas State Univ.

SMURTHWAITE, GEORGIANA HOPE, Prof. Emeritus; Extension Specialist, Home Economics Program Development (1924, 1954). BS 1911, Utah State Col.; MS 1931, Kansas State Univ.

SPOON, DARRELL D., Asst. Prof.; Extension Specialist, Family Life (1970). BA 1965, Univ. of Iowa; MS 1969, Kansas State Univ.

SPRINGER, DONALD M., Asst. Prof.; Extension Television Producer (1957, 1962). BS 1957, MS 1966, Kansas State Univ.; PhD 1971, Ohio Univ.

STARKEY, WINONA M., Asst. Prof. Emeritus; Extension Specialist, Home Furnishings (1944, 1956). BS 1947, MS 1954, Kansas State Univ.

STIEGLER, JAMES H., Asst. Prof.; Extension Specialist, Land Utilization (1971). BS 1964, Texas A & I Col.; MS 1967, Oklahoma State Univ.; PhD 1970, Virginia Polytechnical Institute.

STIELOW, KENNETH L., Instr.; Area Extension Economist in Farm Management (1969). BS 1967, MS 1969, Kansas State Univ.

STOCKARD, JOHN R., Asst. Prof.; Extension Motion Picture Producer (1966). BS 1955, Univ. of North Carolina; MS 1969, Kansas State Univ.

STOVER, HAROLD E., Prof. Emeritus; Extension Agricultural Engineer (1936, 1954). BS 1929, Kansas State Univ.

STRICKLER, JOHN K., Assoc. Prof.; Assoc. State Extension Forester (1961, 1969). BS 1957, Univ. of Missouri; MS 1967, Kansas State Univ.

TEAGARDEN, EARL HICKS, Prof. Emeritus; Coordinator, Extension Studies (1929, 1952). BS 1920, Kansas State Univ.

TENNANT, MARJORIE A., Asst. Prof.; Asst. Extension Editor (1947, 1952). BS 1946, MS 1957, Kansas State Univ.

THOMAS, KENNETH E., Prof.; Head, Department of Extension Information (1951, 1963). AB 1951, Southwestern Col.; MS 1952, Kansas State Univ.; PhD 1961, Univ. of Wisconsin. (GF)

THOMAS, WILTON B., Assoc. Prof.; Section Leader and Extension Economist, Farm Management (1946, 1966). BS 1937, MS 1960, Kansas State Univ.

TITUS, RALPH S., Assoc. Prof.; Asst. Manager, Radio Station KSAC (1951, 1965). BS 1955, Kansas State Univ.

TRAYER, DANNY D., Instr.; Area Extension Economist in Farm Management (1950). BS 1951, MS 1967, Kansas State Univ.

TREAT, JAY L., Asst. Prof.; Area Extension Economist (1960). BS 1949, Univ. of Arkansas; MA 1952, Univ. of Missouri.

UNRUH, CHESTER R., Assoc. Prof.; Asst. Extension Editor (1961). AB 1940, Bethel Col.; MS 1956, Kansas State Univ.

URBAN, KENNETH E., Instr.; Area Extension Economist in Farm Management (1954). BS 1952, MS 1957, Kansas State Univ.

VACIN, GARY L., Asst. Prof.; Extension Economist, Resource Development Information (1966). BS 1960, MS 1964, Kansas State Univ.

WALKER, MILDRED L., Assoc. Prof.; Extension Economist, Consumer Marketing (1956, 1970). BS 1952, Kansas State Univ.; MS 1960, Pennsylvania State Univ.

WARNER, EUGENE D., Prof.; Extension Editor (1935, 1947). BS 1934, Kansas State Univ.

WELLS, RUTH I., Assoc. Prof.; Extension Specialist, Limited Resources Program (1953, 1971). BS 1943, Central Missouri State Col.; MS 1948, Kansas State Univ.

WENDLING, LEO T., Prof.; State Leader, Extension Engineering (1947, 1965). BS 1947, MS 1956, Kansas State Univ.

WESTMEYER, HERMAN W., Asst. Prof.; Extension Specialist, Animal Science (1936, 1961). BS 1936, Univ. of Missouri; MS 1965, Kansas State Univ.

WHIPPS, LOREN E., Asst. Prof.; Area Extension Economist (1946, 1966). BS 1938, Kansas State Univ.; MS 1953, Colorado State Univ.

WHITEHAIR, NORMAN V., Prof.; Asst. Head, Department of Economics and State Leader of Extension Marketing, Management and Public Affairs (1946, 1961). BS 1943, MS 1953, Kansas State Univ.; PhD 1964, Purdue Univ. (GF)

WHITNEY, DAVID A., Assoc. Prof.; Extension Specialist, Soil Testing (1966). BS 1961, MS 1963, Univ. of Nebraska; PhD 1966, Iowa State Univ. (GF)

WIGGINS, M. CHRISTINE, Assoc. Prof. Emeritus; Extension Specialist, Clothing and Textiles (1930, 1947). BS 1929, Kansas State Univ.; MA 1938, Columbia Univ.

WILCOX, ROBERT W., Prof.; Quality Control Specialist, Formula Feeds (1965). BS 1945, MS 1949, PhD 1960, South Dakota State Univ. (GF)

WILLIS, WILLIAM G., Assoc. Prof.; Extension Specialist, Plant Pathology (1951, 1962). BS 1951, MS 1964, PhD 1967, Kansas State Univ. (GF)

WRIGHT, DEANNE D., Instr.; Extension Specialist, Radio and TV (1970). BS 1959, Univ. of Kansas; MS 1970, Kansas State Univ.

ZIMMERMAN, ZELDA, Asst. Prof.; Extension Specialist, Clothing and Textiles (1972). BS 1968, North Dakota State Univ.; MS 1972, Kansas State Univ.

ZOELLNER, KEITH O., Assoc. Prof.; Extension Specialist, Animal Science and Industry (1962). BS 1953, MS 1957, South Dakota State Univ.; PhD 1962, Univ. of Missouri.

COUNTY EXTENSION DIRECTORS

COX, WILLIAM E., Sedgwick County (1957). Wichita.

DUCKERS, JR., HARRY G., Wyandotte County (1943). Kansas City.

GRIGGS, OTIS R., Reno County (1951). Hutchinson.

HALL, C. T., Johnson County (1934). Olathe.

NEWSOME, B. W., Riley County (1955). Manhattan.

VAN METER, EARL L., Douglas County (1960). Lawrence.

COUNTY EXTENSION AGRICULTURAL AGENTS

ADAMS, JAMES P., Atchison County (1971). Effingham.

ALBRIGHT, KENNETH B., Ellis County (1955). Hays.

ALLEN, KENNETH A., Lane County (1969). Dighton.

BARNES, JOHN H., Harvey County (1953). Newton.

BATES, GEORGE A., Clark County (1971). Ashland.

BEAMS, RICHARD L., Scott County (1971). Scott City.

BIBY, VIRGIL H., Rice County (1966). Lyons.

BLAIR, W. LAWRENCE, Linn County (1960). Mound City.

BOZWORTH, ROBERT W., Franklin County (1960). Ottawa.

BRATCHER, STANLEY W., Sedgwick County (1970). Wichita.

BRAZLE, FRANK K., Crawford County (1970). Girard.

BULK, HERBERT W., Shawnee County (1949). Topeka.

BURKHART, PEYTON H., Nemaha County (1962). Seneca.

BUSBY, W. DARRELL, Rush County (1971). LaCrosse.

BYARLAY, LOWELL H., Osborne County (1959). Osborne.

CARSON, JAMES D., Stevens County (1967). Hugoton.

CHISAM, DONALD L., Labette County (1968). Altamont.

DAUBER, DONALD D., Hodgeman County (1959). Jetmore.

DAVIS, DEAN L., Morris County (1968). Council Grove.

DUNAVAN, WILBUR J., Smith County (1960). Smith Center.

ETHERIDGE, RAY W., Barber County (1954). Medicine Lodge.

FISH, G. KEITH, Trego County (1958). WaKeeney.

FISHER, STEVEN D., Rawlins County (1971). Atwood.

FORD, ROY D., Stanton County (1964). Johnson.

FRISBIE, ROBERT L., Edwards County (1971). Kinsley.

FROMM, KENNETH W., Mitchell County (1953). Beloit.

GEBHART, JEWELL O., Sheridan County (1945). Hoxie.

GOLLADAY, RICHARD E., Hamilton County (1957). Syracuse.

GOSCH, JAY W., Clay County (1971). Clay Center.

GOTTLOB, GLENN R., Brown County (1969). Hiawatha.

GOTTSCH, A. HAROLD, Butler County (1954). El Dorado.

GRIFFITH, LESTER E., Marlon County (1949). Marlon.

HARDING, WARREN G., Rooks County (1955). Stockton.

HARRINGTON, MAURICE C., Anderson County (1958). Garnett.

HARRIS, A. EUGENE, Meade County (1938). Meade.

HENDERSHOT, ROGER L., Harper County (1941). Anthony.

HENRY, LARRY G., Finney County (1956). Garden City.
 HOLLINGSWORTH, CLARENCE A., Greenwood County (1937). Eureka.
 HOSIE, DARREL D., Jewell County (1968). Mankato.
 JEFFREY, F. DUANE, Chautauqua County (1965). Sedan.
 JEPSEN, DELBERT D., Russell County (1962). Russell.
 JOHNSON, ARTHUR R., Jefferson County (1958). Oskaloosa.
 KEELER, GARRY L., Washington County (1967). Washington.
 KIVETT, HARRY L., Haskell County (1957). Sublette.
 KRAISINGER, WILBUR S., Pratt County (1951). Pratt.
 KUBIK, RICHARD W., Thomas County (1949). Colby.
 LACKAMP, DONALD R., Osage County (1971). Lyndon.
 LEVALLEY, JR., GERALD E., Doniphan County (1967). Troy.
 LINE, MERLIN E., Kearny County (1946). Lakin.
 LINN, JACK A., Wilson County (1966). Fredonia.
 LOHMANN, VERNON E., Neosho County (1968). Erie.
 LOTZ, WILLIAM R., Edwards County (1964). Kinsley.
 LOYD, DONALD G., Greeley County (1968). Tribune.
 MCKAY, BEN D., Ness County (1954). Ness City.
 MCWILLIAMS, DONALD D., Wallace County (1956). Sharon Springs.
 MALEY, ALVIN E., Lyon County (1953). Emporia.
 MANRY, E. CLIFFORD, Pawnee County (1940). Larned.
 MARLOW, DAROLD D., Wabaunsee County (1950). Alma.
 MAXWELL, THOMAS R., Allen County (1954). Iola.
 MCCAMMON, RONALD W., Lincoln County (1968). Lincoln.
 MEIREIS, CLIFFORD L., Norton County (1955). Norton.
 NEILL, JOE P., Cloud County (1946). Concordia.
 NELSON, ROSS M., Logan County (1959). Oakley.
 NEWCOMER, GLENN R., Bourbon County (1965). Fort Scott.
 NUTTELMAN, R. F., Montgomery County (1941). Independence.
 NYHART, SYLVESTER, Phillips County (1959). Phillipsburg.
 OLTSMANN, PAUL G., Marshall County (1964). Marysville.
 ORR, BRYCE, Stafford County (1952). St. John.
 ORWIG, THOMAS W., Dickinson County (1955). Abilene.
 PROEHL, RICHARD J., Gove County (1971). Gove.
 PURDY, RAY E., Gray County (1971). Cimarron.
 RANDLE, LAWRENCE J., Cheyenne County (1972). St. Francis.
 REINHARDT, N. KENT, Decatur County (1972). Oberlin.
 ROBERTSON, JOHN F., Comanche County (1956). Coldwater.
 ROLPH, RICHARD D., Saline County (1967). Salina.
 ROWE, JR., SAMUEL S., Sumner County (1965). Wellington.
 RUTHERFORD, ROBERT E., Reno County (1969). Hutchinson.
 SCHILLING, DALE R., Sherman County (1958). Goodland.
 SCOTT, JAMES M., Graham County (1969). Hill City.
 SISK, ENSLEY J., Miami County (1960). Paola.
 SMITH, CHARLES W., Cowley County (1955). Winfield.
 SMITH, JOHN F., Leavenworth County (1956). Leavenworth.
 SMITH, JOSEPH M., Woodson County (1967). Yates Center.
 SNAPP, GERALD E., Seward County (1972). Liberal.
 SPENCER, ALBERT E., Pottawatomie County (1960). Westmoreland.
 STAGG, BEVERLY R., McPherson County (1940). McPherson.
 STROADE, RICHARD D., Republic County (1959). Belleville.
 STROUD, NELSON E., Geary County (1952). Junction City.
 TIEMANN, LARRY S., Coffey County (1971). Burlington.
 WALKER, JR., MARSHALL F., Grant County (1951). Ulysses.
 WAREHAM, ROBERT E., Jackson County (1968). Holton.
 WARY, JR., RAYMOND E., Cherokee County (1958). Columbus.
 WEBER, CHARLES W., Kingman County (1971). Kingman.
 WESTFAHL, STEVEN A., Chase County (1971). Cottonwood Falls.
 WHITSON, THOMAS D., Kiowa County (1971). Greensburg.
 WILES, DON K., Ford County (1956). Dodge City.
 WILLIAMS, H. RODMAN, Morton County (1971). Elkhart.
 WILSON, JACK H., Wichita County (1951). Leoti.
 WILSON, PAUL H., Barton County (1946). Great Bend.

COUNTY EXTENSION HOME ECONOMISTS

BARNES, HELEN L., Linn County (1964). Mound City.
 BEARD, MARSHA L., Republic County (1971). Belleville.
 BIEHL, FLORENCE F., Johnson County (1962). Olathe.
 BLACKWOOD, HELEN H., Reno County (1962). Hutchinson.
 BLEVINS, OLETHA L., Douglas County (1959). Lawrence.
 BOWMAN, NANCY J., Seward County (1963). Liberal.
 BRANDEN, ELSIE P., Finney County (1955). Garden City.
 BUSH, SHARON W., Harvey County (1969). Newton.
 BUSSMAN, DERINDA G., Barton County (1971). Great Bend.
 CARLSON, LOIS O., Neosho County (1964). Erie.
 CARR, LINDA J., Montgomery County (1963). Independence.
 CLARKSON, JEAN K., Ness County (1970). Ness City.
 CLINE, LUCILE G., Pawnee County (1951). Larned.
 CONLEY, JOSEPHINE, Johnson County (1955). Olathe.
 CRESS, JEANICE A., Allen County (1955). Iola.
 CULVER, JANET K., Doniphan County (1971). Troy.
 CURRIE, TRELLA, Cloud County (1955). Concordia.

DeGEER, KATHERINE A., Comanche County (1966). Coldwater.
 DOMSCH, L. ANN, Rawlins County (1959). Atwood.
 DUGGAN, MARGARET H., Butler County (1963). El Dorado.
 DUNNING, BEVERLY K., Sedgwick County (1964). Wichita.
 EBERT, ALEXIS L., Osage County (1971). Lyndon.
 EDWARDS, MARY LEE, Woodson County (1961). Yates Center.
 FELBUSH, LINDA K., Wabaunsee County (1971). Alma.
 FISHER, SHARON G., Meade County (1969). Meade.
 FRANKENBERY, JANET K., Greenwood County (1971). Eureka.
 FRANKENBERY, SHARON L., Wilson County (1969). Fredonia.
 FREY, ALICE L., Grant County (1968). Ulysses.
 GAFFORD, NANCY M., Nemaha County (1958). Seneca.
 GASTON, GLORIA J., Marshall County (1960). Marysville.
 GFELLER, LINDA H., Thomas County (1970). Colby.
 GILBER, PAULETTA S., Sherman County (1972). Goodland.
 GLENN, MARILYN S., Kingman County (1971). Kingman.
 GREENSTREET, PATRICIA A., Scott County (1970). Scott City.
 HARZMAN, BARBARA R., Dickinson County (1967). Abilene.
 HAWTHORNE, NADA J., Stevens County (1971). Hugoton.
 HAYES, MARY M., Smith County (1962). Smith Center.
 HEINLY, KAYANN, Riley County (1957). Manhattan.
 HODGES, R. JEAN, Sedgwick County (1964). Wichita.
 HOLDREN, MARY F., Jewell County (1964). Mankato.
 HOLSTEIN, JANICE P., Wichita County (1968). Leoti.
 HOOBLE, NANCY B., Shawnee County (1971). Topeka.
 HOWARD, CHRISTINA M., Logan County (1971). Oakley.
 HOWERTON, LELA JEAN, Rice County (1969). Lyons.
 HOWERTON, PHYLLIS Y., Reno County (1966). Hutchinson.
 HUND, MARGARET A., Jackson County (1960). Holton.
 JACKSON, PRISCILLA K., Ellis County (1969). Hays.
 JACKSON, RUTH A., Rice County (1968). Lyons.
 JOHNS, MARGARET T., Brown County (1971). Hlawatha.
 JOHNSON, JUANITA B., Crawford County (1948). Girard.
 KANDT, BETTY L., Geary County (1964). Junction City.
 KASITZ, NANCY A., Pottawatomie County (1971). Westmoreland.
 KELLOGG, KAROLYN K., Clay County (1969). Clay Center.
 KENT, NANCY JO, Ford County (1958). Dodge City.
 KERNS, GAIL A., Lyon County (1971). Ottawa.
 KINDLER, BEVERLY L., Norton County (1951). Norton.
 KOACHEL, NANCY A., Morton County (1971). Elkhart.
 KROM, BARBARA C., McPherson County (1969). McPherson.
 LARSON, PAULA J., Hamilton County (1972). Syracuse.
 LEACH, GLINDA B., Shawnee County (1967). Topeka.
 LEACH, LUCILLE H., Osborne County (1967). Osborne.
 MCFALL, MARGENE H., Barber County (1969). Medicine Lodge.
 MAHONEY, LORITA M., Rooks County (1969). Stockton.
 MANVILLE, ARLETA, Jefferson County (1970). Oskaloosa.
 MATSON, JANEL M., Ellsworth County (1971). Ellsworth.
 MEIER, VIVIAN L., Lincoln County (1964). Lincoln.
 MERRIMAN, SCHARON S., Lane County (1971). Dighton.
 MITCHELL, MARY Z., Russell County (1971). Russell.
 MOLZ, DIXIE I., Stafford County (1953). St. John.
 MUCKLOW, BONNIE M., Kearny County (1971). Lakin.
 MUDGE, PATRICIA A., Trego County (1971). Wakeeney.
 MUNTZ, PAMELA L., Edwards County (1971). Edwards.
 NEUSCHWANDER, OCIE A., Greeley County (1957). Tribune.
 OLSON, CAROLYN D., Marion County (1970). Marion.
 OLSON, SALLY J., Chase County (1966). Cottonwood Falls.
 PALMER, RACHEL F., Sedgwick County (1941). Wichita.
 PARK, JOYCE E., Stanton County (1971). Johnson.
 PARTCH, SUE L., Saline County (1967). Salina.
 PATTERSON, ARDIS F., Franklin County (1971). Ottawa.
 PEARSON, GLENDA N., Washington County (1965). Washington.
 PRICE, MARJORIE E., Coffey County (1957). Burlington.
 REDIKER, JANET B., Morris County (1966). Council Grove.
 ROBBINS, EMILY R., Leavenworth County (1964). Leavenworth.
 ROBERTS, GAYLE L., Pratt County (1971). Pratt.
 ROBINSON, ELSIE C., Decatur County (1969). Oberlin.
 RUNFT, DONNA M., Elk County (1971). Howard.
 SCHROEDER, DOROTHEA A., Wyandotte County (1942). Kansas City.
 SCOTT, CATHERINE E., Phillips County (1969). Hill City.
 SHOWERS, JANE A., Wallace County (1969). Sharon Springs.
 SMITH, BEVERLY B., Saline County (1961). Salina.
 STEWART, MARGARET S., Gove County (1963). Gove.
 SWART, SHIRLEY A., Hodgeman County (1971). Jetmore.
 SWISHER, MARY T., Rush County (1971). LaCrosse.
 THODEN, NADA F., Miami County (1965). Paola.
 THOMPSON, LOUISE P., Kiowa County (1969). Greensburg.
 THORSELL, CATHERINE, Clark County (1968). Ashland.
 THURSTON, RITA M., Gray County (1971). Cimarron.
 TOOT, JANICE, Haskell County (1966). Sublette.
 TRUAX, RUBY C., Sedgwick County (1959). Wichita.
 VICE, FAYE E., Labette County (1946). Altamont.

WARRINGTON, E. EVON, Cherokee County (1971). Columbus.
 WEAVER, MAE E., Barton County (1952). Great Bend.
 WEIR, RUTH W., Douglas County (1969). Lawrence.
 WESSEL, STELLA P., Atchison County (1964). Effingham.
 WHITE, REBA B., Sheridan County (1967). Hoxie.
 WILKEY, MARGARET M., Ottawa County (1968). Minneapolis.
 WOLFE, FRANCES M., Wyandotte County (1971). Kansas City.
 WUTKE, BETTY D., Bourbon County (1968). Fort Scott.
 YOUNG, CAROL H., Sumner County (1966). Wellington.
 YOUNKER, DIANNE M., Cheyenne County (1972). St. Francis.

COUNTY EXTENSION 4-H AGENTS

ANDEREGG, MARVIN K., Labette County (1968). Altamont.
 BILES, JIMMY L., Cherokee County (1966). Columbus.
 BRINK, DENNIS R., Crawford County (1971). Girard.
 CHARVAT, LEO D., Rice County (1971). Lyons.
 CLAWSON, ELDON L., Shawnee County (1965). Topeka.
 DAVIS, ROBERT J., Reno County (1967). Hutchinson.
 DROGE, DENNIS L., Riley County (1971). Manhattan.
 ELLIOTT, KAREN B., Sedgwick County (1971). Wichita.
 FAULDS, JAMES R., Finney County (1971). Garden City.
 FULTZ, WILLIAM E., Sedgwick County (1962). Wichita.
 GEORGE, HERSCHEL C., Marion County (1970). Marion.
 GILBERT, ROBERT W., Marshall County (1970). Marysville.
 GOFF, HOWARD R., Lyon County (1971). Emporia.
 HENSLEY, DALE, Montgomery County (1957). Independence.
 HUNDLEY, JR., WILLIAM C., Butler County (1965). El Dorado.
 KRAINBILL, MILTON J., Sumner County (1972). Wellington.
 KUECK, DON L., Kingman County (1968). Kingman.

LANHAM, K. EUGENE, Wyandotte County (1971). Kansas City.
 MCGINNESS, KENNETH E., Johnson County (1954). Olathe.
 MERHOFF, BILLY R., Douglas County (1968). Lawrence.
 PRESTON, LINDA R., Saline County (1970). Salina.
 RADKE, JOHN E., Finney County (1971). Garden City.
 RECTOR, RALPH B., Leavenworth County (1949). Leavenworth.
 RIAT, LARRY D., Dickinson County (1961). Abilene.
 ROBBINS, BENNY S., Harvey County (1969). Newton.
 ROBERTS, GARY L., Ellis County (1970). Hays.
 SMITH, DAVID R., Franklin County (1970). Ottawa.
 STUDER, RAYMOND L., McPherson County (1966). McPherson.
 VAN SKIKE, WILLIAM V., Barton County (1950). Great Bend.
 WEAVER, ELDON R., Cowley County (1968). Winfield.

COUNTY EXTENSION HORTICULTURAL AGENTS

KIBBY, JIMMY R., Wyandotte County (1966). Kansas City.
 MORRIS, MAX B., Shawnee County (1965). Topeka.
 STOUSE, LAWRENCE D., Johnson County (1966). Olathe.
 THOLE, H. THOMAS, Barton County (1966). Great Bend.
 WARMINSKI, NORMAN V., Sedgwick County (1969). Wichita.

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BAILEY, SHIRLEY J., Wyandotte County (1971). Kansas City.
 GEIGER, GAYLE J., Leavenworth County (1971). Leavenworth.
 HOSKINS, JEANNE A., Barton County (1971). Great Bend.
 KRUMSICK, MARY E., Shawnee County (1955). Topeka.
 STEFFENS, PATRICIA E., Crawford County (1971). Girard.

ENROLLMENT SUMMARY — FALL SEMESTER 1971

Out-of-State

Alabama	10
Alaska	4
Arizona	11
Arkansas	19
California	78
Colorado	42
Connecticut	37
Delaware	6
District of Columbia	0
Florida	33
Georgia	7
Hawaii	8
Idaho	7
Illinois	151
Indiana	29
Iowa	49
Kentucky	7
Louisiana	23
Maine	6
Maryland	34
Massachusetts	26
Michigan	22
Minnesota	31
Mississippi	12
Missouri	322
Montana	3
Nebraska	147
Nevada	3
New Hampshire	3
New Jersey	103
New Mexico	21
New York	184
North Carolina	12
North Dakota	15
Ohio	42
Oklahoma	48
Oregon	4
Pennsylvania	57
Rhode Island	8
South Carolina	3
South Dakota	21
Tennessee	19
Texas	53
Utah	5
Vermont	1
Virginia	26
Washington	8
West Virginia	3
Wisconsin	44
Wyoming	4
TOTAL	1811

Kansas (By County)

Allen	38
Anderson	50
Atchison	97
Barber	52
Barton	220
Bourbon	28
Brown	82
Butler	111
Chase	31
Chautauqua	36
Cherokee	24
Cheyenne	53
Clark	14
Clay	205
Cloud	126
Coffey	28
Comanche	14
Cowley	122
Crawford	44
Decatur	52
Dickinson	227
Doniphan	39
Douglas	101
Edwards	41
Elk	19
Ellis	63
Ellsworth	51
Finney	98
Ford	127
Franklin	83
Geary	282
Gove	31
Graham	22
Grant	27
Gray	30
Greeley	18
Greenwood	39
Hamilton	26
Harper	39
Harvey	120
Haskell	16
Hodgeman	19
Jackson	88
Jefferson	62
Jewell	61
Johnson	1417
Kearney	16
Kingman	52
Kiowa	20
Lafayette	62
Lane	26
Leavenworth	203
Lincoln	60

Linn	29
Logan	28
Lyon	74
McPherson	179
Marion	95
Marshall	165
Meade	24
Miami	78
Mitchell	103
Montgomery	107
Morris	92
Morton	19
Nemaha	138
Neosho	37
Ness	30
Norton	70
Osage	85
Osborne	85
Ottawa	60
Pawnee	89
Phillips	60
Pottawatomie	220
Pratt	56
Rawlins	34
Reno	284
Republic	103
Rice	86
Riley	1920
Rooks	43
Rush	29
Russell	85
Saline	416
Scott	51
Sedgwick	719
Seward	48
Shawnee	564
Sheridan	33
Sherman	45
Smith	73
Stafford	46
Stanton	19
Stevens	28
Sumner	108
Thomas	60
Trego	41
Wabaunsee	85
Wallace	17
Washington	114
Wichita	34
Wilson	44
Woodson	13
Wyandotte	441

TOTAL 12,518

International

Argentina	2
Australia	1
Bolivia	1
Brazil	3
Canada	3
Canal Zone	1
China	119
Colombia	13
Denmark	1
Egypt (U.A.R.)	10
England	2
Ethiopia	3
Germany	16
Ghana	3
Greece	2
Holland	3
Hong Kong	8
India	109
Indonesia	3
Iran	30
Iraq	5
Ireland	1
Israel	1
Japan	4
Jordan	2
Kenya	2
Korea	11
Lebanon	1
Libya	3
Malaysia	1
Mexico	2
New Zealand	1
Nigeria	12
Norway	1
Okinawa	2
Pakistan	12
Peru	1
Philippines	7
Puerto Rico	8
Saudi Arabia	3
Sikkim	1
Thailand	18
Trinidad	2
Turkey	3
Uganda	1
Venezuela	9
Vietnam	11
Virgin Islands	1
Yugoslavia	1
TOTAL	460



DEGREES CONFERRED IN 1971

	Men	Women	Total		Men	Women	Total		Men	Women	Total
College of Agriculture	264	10	274	Graduate School				Master of Science (Cont.)			
Agriculture	242	9	251	Master of Architecture	8	1	9	Horticulture	1	2	3
Bakery Sci. & Management	7		7	Master of Arts				Industrial Engineering	19		19
Biochemistry		1	1	Art	2	2	4	Institutional Management		6	6
Feed Sci. & Management	11		11	Economics	3	1	4	Mathematics	1	3	4
Milling Sci. & Management	4		4	English	3	5	8	Mechanical Engineering	5		5
College of Architecture	95		95	Geography	1	1	2	Microbiology	2	1	3
Architecture	69		69	History	6		6	Music	4	3	7
Architectural Engineering	2		2	Modern Languages	5	3	8	Nuclear Engineering	6		6
Building Construction	10		10	Music	1	1	2	Pathology	5		5
Bachelor of Landscape Architecture	14		14	Philosophy	1		1	Philosophy	1		1
College of Arts & Sciences	522	249	771	Political Science	4	3	7	Physical Education	19	5	24
Bachelor of Arts	71	86	157	Sociology	2	2	4	Physics	8		8
Bachelor of Science	405	133	538	Speech	4	13	17	Plant Pathology	3	1	4
Bachelor of Music	1	1	2	Master of Regional & Community Planning	8		8	Poultry Science	2		2
Physical Education	43	19	62	Master of Science				Psychology	9	3	12
Music Education	2	10	12	Accounting	2	2	4	Statistics	4		4
College of Business Administration	199	22	221	Agricultural Economics	10		10	Surgery & Medicine	2		2
College of Education	36	237	273	Agricultural Education	12		12	Technical Journalism	11	4	15
Bachelor of Science	32	66	98	Agricultural Engineering	6		6	Doctor of Philosophy			
Elementary Education	4	171	175	Agricultural Mechanization	1		1	Agricultural Economics	2		2
College of Engineering	150		150	Agronomy	12		12	Agronomy	7		7
Agricultural Engineering	7		7	Animal Science	11		11	Animal Science	2		2
Chemical Engineering	9		9	Applied Mechanics	5		5	Animal Breeding	5		5
Civil Engineering	26		26	Biochemistry	5	3	8	Animal Nutrition	2		2
Electrical Engineering	43		43	Biology	9	1	10	Applied Mechanics	2		2
Industrial Engineering	11		11	Business Administration	5	1	6	Biochemistry	4	2	6
Mechanical Engineering	41		41	Chemical Engineering	7	1	8	Biology	4	2	6
Nuclear Engineering	13		13	Chemistry	6	1	7	Chemical Engineering	3		3
College of Home Economics	2	269	271	Civil Engineering	15		15	Chemistry	10		10
Home Economics	2	263	265	Clothing & Textiles	1	17	18	Economics (Arts & Sciences)	7		7
Home Economics & Journalism		6	6	Computer Science	5	1	6	Economics (Agriculture)	1	1	2
College of Veterinary Medicine	73	5	78	Dairy Manufacturing	3		3	Education	3		3
				Dairy Production	3		3	Electrical Engineering	2		2
				Education (Elementary)	3	12	15	English	1		1
				Education (Elementary Administration)		1	1	Entomology	4		4
				Education (Guidance)	13	4	17	Family & Child Development	5		5
				Education (Secondary)	23	25	48	Food Science	7		7
				Education (Secondary Administration)	6		6	Foods & Nutrition		5	5
				Electrical Engineering	8		8	Genetics	2		2
				Entomology	5		5	Grain Science	4		4
				Extension Education	1	2	3	History	3		3
				Family & Child Development	3	13	16	Horticulture	7		7
				Family Economics		4	4	Industrial Engineering	2		2
				Food Science	3	2	5	Mathematics	3	2	5
				Foods & Nutrition	2	12	14	Mechanical Engineering	2		2
				General Home Economics		12	12	Microbiology	5		5
				Genetics	2		2	Nuclear Engineering	1		1
				Geology	2		2	Parasitology	1		1
				Grain Science	8		8	Pathology	2	1	3
				Home Economics Education		5	5	Physics	7		7
								Physiology	1		1
								Plant Pathology	4		4
								Psychology	5	1	6
								Statistics	2	1	3
								GRAND TOTAL	1810	986	2796

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