

# Kansas State University Bulletin



1973-74 General Catalog Issue

\$1.50



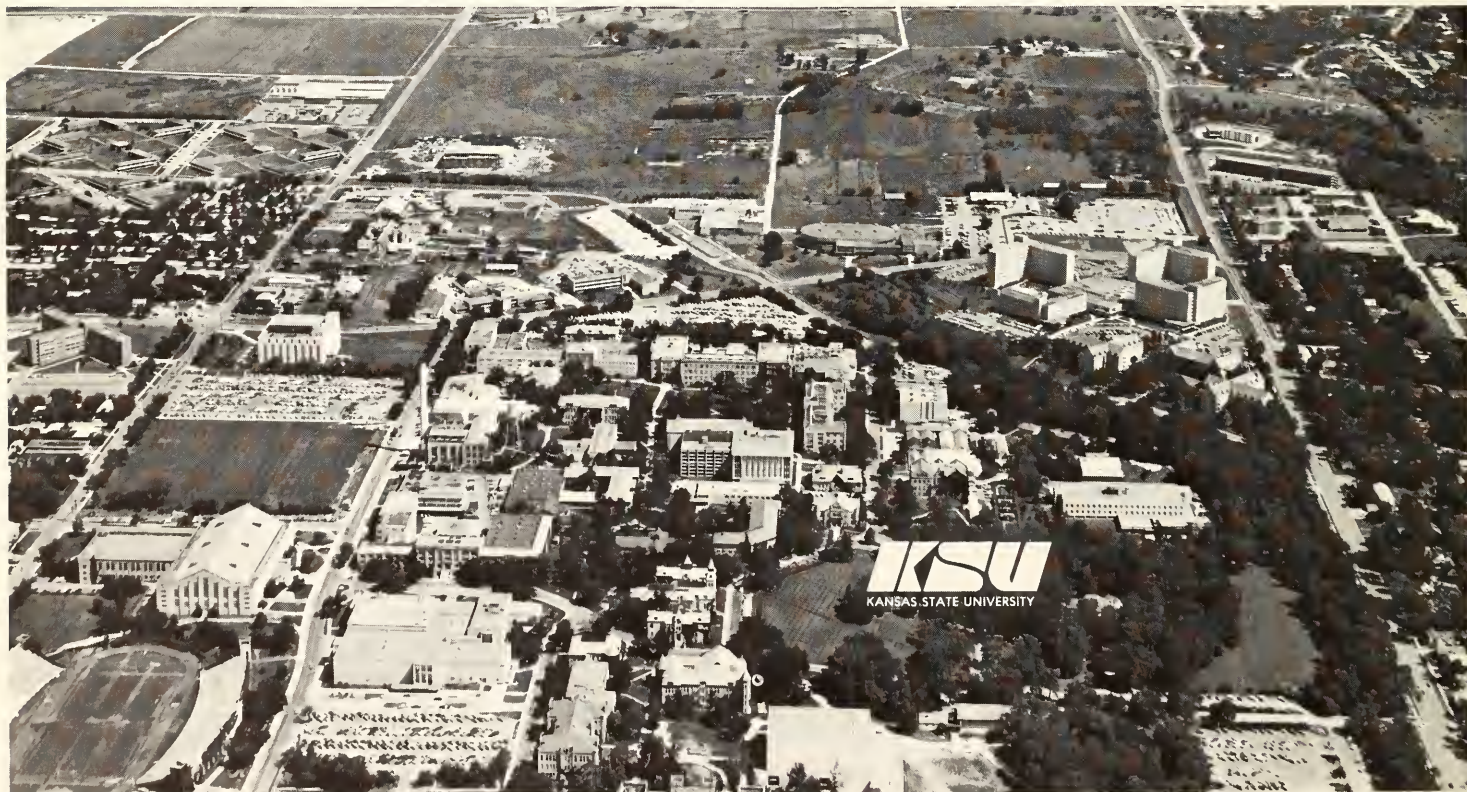


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SPECIAL COLLECTIONS

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# Administration

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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

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June 1973

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The Kansas State University Bulletin is published quarterly by Kansas State University of Agriculture and Applied Science, Anderson Hall, Manhattan, Kansas 66506. Second-class postage paid at Manhattan, Kansas 66506.



# Calendar 1973-74

## FALL SEMESTER 1973

### August 23-25, Thursday-Saturday

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

### August 27, Monday

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

### August 31, Friday

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

### September 3, Monday

Labor Day. No classes.

### September 7, Friday

Last day to enroll without dean's permission.

### September 14, Friday

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



### October 5, Friday

Last day to withdraw and receive a partial refund.

### October 8, 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 12, Friday

Mid-semester grade reports due in Admissions and Records.

### October 16, 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 22, Monday

Veterans Day, no classes.

### October 26, Friday

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

### October 31, Wednesday

Dissertation approval forms due in graduate dean's office.

### November 8, Thursday

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

### November 14, Wednesday

Final date of masters' oral examinations.

### November 19, Monday

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

### November 20, Tuesday

10 p.m. Thanksgiving student recess begins.  
Thanksgiving Day is November 22.

### November 26, Monday

Classes resume.

### November 28, Wednesday

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

### November 30, Friday

Last day course may be dropped before end of semester.

### December 17-21, Monday-Friday

Semester examinations for all students.

### December 24, Monday Noon

Deadline for grades to Admissions and Records.



**SPRING SEMESTER 1974****January 14-15, Monday-Tuesday**

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

**January 16, Wednesday**

Classes begin. Late fee \$2.50 for enrollment.

**January 18, Friday**

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

**January 25, Friday**

Last day to enroll without dean's permission.

**February 5, Tuesday**

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

**February 22, Friday**

Last day for students to withdraw and receive a partial fee refund.

**March 1, Friday**

Mid-semester grade reports due in Admissions and Records.

**March 5, Tuesday**

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

**March 11-16, Monday-Saturday**

Spring break.

**March 20, Wednesday**

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 22, Friday**

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

**April 3, Wednesday**

Dissertation approval forms due in graduate dean's office.

**April 10, Wednesday**

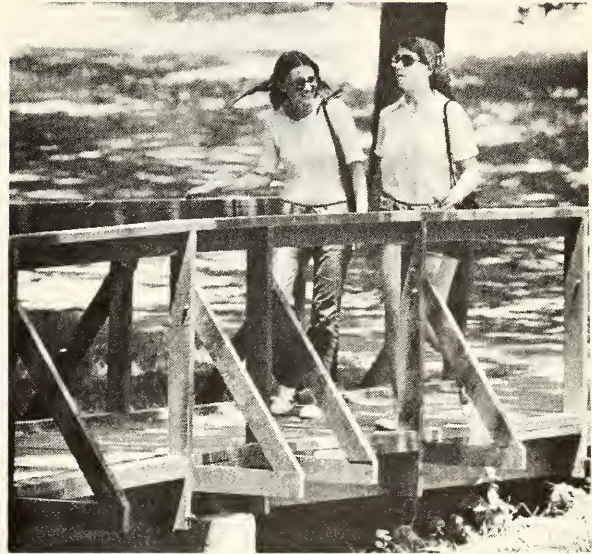
Masters' approval forms due in graduate office.

**April 12, Friday**

Final date of doctors' oral examinations.

**April 15, Monday**

Holiday. No classes. Easter is April 14.

**April 16, Tuesday**

Classes resume.

**April 17, Wednesday**

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

**April 19, Friday**

Final date of masters' oral examinations.

**April 25, Thursday**

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

**April 26, Friday**

Last day course may be dropped before end of semester.

**May 13-17, Monday-Friday**

Semester examinations for all students.

**May 17, Friday**

Commencement.

**May 20, Monday Noon**

Deadline for grades to Admissions and Records.

**SUMMER TERM 1974****June 10-August 2**

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





# General Information

## 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 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, personal, and social life.

To that end the University program is designed:

- I. To provide full and efficient counseling and guidance to the student while at 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 respon-

sibilities 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 aesthetic 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.

### 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 Saturdays.

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 graduate 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 curriculums as listed below. The capital letters correspond to the section on undergraduate degrees. See pages 11-13.

(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. 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 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 must 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

Students who take the College Level Examination Program subject matter tests should have the results sent to the Office of Admissions and Records for departmental review and credit recommendation.

Any student who is enrolled at KSU is eligible to gain undergraduate credit by examination. Credit may be granted for any course with the consent of the head of the department offering credit for that subject.

Credit by examination may receive letter grades of A, B, C, or D, or a notation "credit" as determined by the department. The credit will be treated as resident credit and such graded work will receive grade points to be computed in the student's GPA. Non-graded credit by examination shall be treated as graded hours in implementing credit/non-credit policy.

Departments generating their own tests, materials, and scoring for credit by examination may charge up to \$15 for supplies used above those required in the normal conduct of the course.

## 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 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 at the K-State Union Bookstore.

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.

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.

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 bachelor's 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 regularly enrolled student must have the permission of his dean to take correspondence or extension courses while enrolled and these are 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 I (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 \$3 per credit hour for residents, \$9 per credit hour for non-residents.

## REPORT OF GRADES

As shown on the academic calendar, mid-semester 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 I 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 grade books in the proper departments when semester grade cards have been made out. The head of the department keeps all grade books on permanent file.

## 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.

Undergraduate students (excluding students in the College of Veterinary Medicine) are placed on probation if they have 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 of their status by their academic deans from information supplied by the Director of Records. The scholastic record of each undergraduate is 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 he 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 wishes to enroll.

A student who earns a "C" (2.0) or better average on 12 or more credits during the semester he is dismissed can 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.

Bachelor's 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
KSU Symphony Orchestra .....	1	4
Bands (Marching, Symphonic, Pep, etc.) .....	1	4
University Chorus .....	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
Vocal Ensembles .....	1	4
Debate .....	2	4
Oratorical Contest .....	2	4
<b>Kansas State Collegian</b> journalism .....	1	4
<b>Ag Student News</b> journalism .....	1	4
<b>K-State Engineer</b> journalism .....	1	4
<b>Royal Purple</b> 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 toward a degree are numbered 000-099; lower division undergraduate designed as freshman-sophomore courses, 100-299; upper division undergraduate designed as junior-senior courses, 300-499; upper division undergraduate primarily for juniors and seniors, but also eligible for graduate credit, 500-699; graduate and upper division, primarily for graduate level, 700-799; graduate level for primarily Masters' courses and professional courses beyond undergraduate level, 800-899; graduate level primarily for Doctoral courses, 900-999.

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 fall semester; II, spring 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 who offers 15 acceptable units of high school work, is classified as a freshman. A student is advanced to a higher classification when he has successfully completed sufficient credit hours to meet the requirements as listed below:

Sophomore	Junior	Senior	Fifth-year student
25	56	88	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 one-sixth of the semester hours applied toward a degree can be taken on a non-graded basis. 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 31.
  - Agricultural Journalism major, page 35.
  - Agricultural Mechanization major, page 35.
  - Agronomy major, page 36.
  - Animal Science and Industry major, page 38.
  - Dairy Production major, page 42.
  - Entomology major, page 45.
  - Horticulture major, page 53.
  - Natural Resources Management major, page 57.
  - Plant Pathology major, page 58.
  - Poultry Science major, page 42.
  - Pre-Veterinary Medicine major, page 31.
- (E) Agricultural Education (Teachers), BS in Agriculture, page 34.
- (E) Bakery Science and Management, BS in Bakery Science and Management, page 49.
  - Administration option.
  - Chemistry option.
  - Operations option.
- (E) Feed Science and Management, BS in Feed Science and Management, page 50.
  - Administration option.
  - Chemistry option.
  - Operations option.
- (E) Horticultural Therapy, BS in Agriculture, page 54.
- (E) Milling Science and Management, BS in Milling Science and Management, page 50.
  - Administration option.
  - Chemistry option.
  - Operations option.

### COLLEGE OF ARCHITECTURE AND DESIGN

- (F) Architecture (five years), Bachelor of Architecture, page 66.
- (F) Architectural Structures option (five years), Bachelor of Architecture, page 66.
- (F) Bachelor of Interior Architecture, page 66.
- (F) Landscape Architecture (five years), Bachelor of Landscape Architecture, page 66.
- (F) Building Construction, BS in Building Construction, page 67.

**COLLEGE OF ARTS AND SCIENCES****Bachelor of Arts, page 76.**

AB

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

**Bachelor of Science, page 76.**

BS

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

**Pre-Professional, page 78.**

AB

- (D) Physical Therapy
- (E) Pre-Dentistry
- (B) Pre-Law
- (E) Pre-Medicine
- (E) Social Work
- (A) Speech Pathology

BS

- (E) Medical Technology
- (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
- (E) Social Work
- (A) Speech Pathology

(A) Bachelor of Fine Arts, page 77.

(A) Bachelor of Music, page 77.

(A) Bachelor of Science in Music Education, page 77.

**COLLEGE OF BUSINESS ADMINISTRATION**

- (E) Business Administration, BS in Business Administration, page 160.

**COLLEGE OF EDUCATION**

- (A) Elementary Education, BS in Elementary Education, page 168.
- (A) Secondary Education, BS, page 169.

**COLLEGE OF ENGINEERING**

- (F) Agricultural Engineering, BS in Agricultural Engineering, page 189.
- (F) Chemical Engineering, BS in Chemical Engineering, page 189.
- (F) Civil Engineering, BS in Civil Engineering, page 190.
- (F) Electrical Engineering, BS in Electrical Engineering, page 190.
- (F) Industrial Engineering, BS in Industrial Engineering, page 191.
- (F) Mechanical Engineering, BS in Mechanical Engineering, page 192.
- (F) Nuclear Engineering, BS in Nuclear Engineering, page 192.
- Dual degree programs in Engineering, page 194.

**COLLEGE OF HOME ECONOMICS**

- (C) Home Economics with options, BS in Home Economics, page 220.
- Home Economics Education-Vocational Teaching, page 225.
- Extension, page 223.
- Radio and Television, page 226.
- Clothing Retailing, page 221.
- Textile Research, page 221.
- Fashion Design, page 221.
- Interior Design, page 222.
- Community Services, page 222.
- Early Childhood Education, page 222.
- Consumer Interest, page 223.



**COLLEGE OF HOME ECONOMICS [CONT.]**

Housing and Equipment, page 223.

Foods and Nutrition in Business, page 224.

Foods and Nutrition Science, page 224.

Dietetics and Institutional Management,  
page 224.

(C) Home Economics and Journalism, BS in Home  
Economics and Journalism, page 226.

(C) Home Economics with Liberal Arts, BS in Home  
Economics, page 226.

(C) Restaurant Management, BS in Restaurant Man-  
agement, page 227.

**COLLEGE OF VETERINARY MEDICINE**

Veterinary Medicine, Doctor of Veterinary Medicine,  
page 240.

(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 22.

**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.** This fee is used for numerous  
student functions which include a broad range of  
student interests and 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's academic 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.

**For seven or more semester credit hours.**

	<b>Resident Fees</b>	<b>Non- resident Fees</b>
Incidental Fee:		
All except Veterinary		
Medicine Students .....	\$205.00	\$600.00
Veterinary Medicine students .....	255.00	675.00
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 .....	\$263.00	\$658.00
Totals—Veterinary		
Medicine students .....	\$313.00	\$733.00

**For six or less semester credit hours.**

	<b>Resident Fees</b>	<b>Non- resident Fees</b>
Incidental Fee:		
All except Veterinary Medicine		
students ..... per credit hour	\$14.00	\$40.00
Veterinary Medicine		
students ..... per credit hour	17.00	45.00
Student Health .....	25.00*	25.00*
Student Union Annex I .....	1.50	1.50
Student Union Annex II .....	6.50	6.50
Stadium Bonds .....	.50	.50
Student Activities (including Union operations) ..... total fee	4.50**	4.50**

**For employees enrolled in Graduate School.**

Incidental Fee .....	per credit hour	\$14.00
Special 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
Student Union Annex II .....	total fee	6.50
Stadium Bonds .....	total fee	.50
Student Activities (including Union operations) .....	total fee	4.50**

\*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.

## 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 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
<b>Per semester credit hour:</b>		
Incidental Fee .....	\$14.00	\$40.00
Special Fees .....	5.00*	5.00*

## 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—Sept., Oct. & Nov.

For spring semesters—Jan., Feb. & Mar.

For summer sessions—June or the preceding Jan., Feb. & Mar.

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

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

**5. Dependents.** Dependents (as defined for federal income tax purposes) of staff members, federal employees and military personnel described above.

**6. Employees.** Same as staff members defined above, plus federal employees defined above and ROTC staff members of Kansas State University. Dependents are not entitled to the fees for employees.

## OTHER 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 the availability of staff, facilities and the following refund policy).

	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.

\*Assessed only on the first six credit hours for each summer session, but not applicable to students enrolled in formally organized classes actually conducted at off-campus locations.



**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.

**Transcript Fee.** A fee of \$1 is charged for each transcript of academic record requested by a student after six transcripts have been furnished at no charge.

**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 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 approximate the following:

Enrollment fees for a Kansas resident .....	\$263*
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) .....	\$1,025
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## Services & 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 S360/50 computer, peripheral equipment and supporting services are intended for the research and instructional computer needs of the faculty, staff, and students.

The IBM S360/50 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 equipment. Attached to the machine are



\*Non-resident fees are \$658 per semester and Veterinary Medicine students pay an additional \$50 to \$75.

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 Remote Computing Laboratory, where the data preparation equipment and terminals are housed, is located on the ground floor of Engineering Shops. The professional staff provides assistance in use of the hardware and software. A library of manuals and programs is available at several convenient locations.

Programming languages in current use include FORTRAN, COBOL, WATBOL, APL, PL/I, RPG, WATFIV, PLC, LISP, and Assembler. Also available is a program to produce computer output in Braille. 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, Room 11, Cardwell Hall.

### **DATA PROCESSING CENTER**

Melvin T. Kepple, Director

This Center has the responsibility to provide computing services to the administrative community at Kansas State University. These services consist of systems, programming, operational and keypunch functions performed by the employees of the Center. The Center operates on a closed-shop basis and all work is done by employees of the Data Processing Center. Some of the computerized processing services performed indirectly for the student community are student registration, personnel changes, payrolls, student health billings, and student union concessions.

The computer in operation in the Data Processing Center is an IBM S360/30 with 64K bytes of main core. Supporting equipment to this machine includes tape and disk drives, card reader, card punch, line printer, and card processing gear. In current use is the COBOL programming language.

### **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. 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 atomic and solid state physics. 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, Room 4, 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. It is the first university press in the U.S. 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 presidents 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**—student newspaper.

**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

G. Jay Rausch, 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 640,000 cataloged volumes. Growth is at 30 to 40,000 volumes a 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 receives a current list of 13,000 journals.

Farrell Library now provides over 200,000 square feet of space. Seating is available for 3,000 students and there is sufficient shelf space for over a 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 and the phono record collection, 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.

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 Statewide Continuing Education Network, some K-State summer courses are offered at more than 20 Kansas locations. The network allows individuals to enroll in courses offered by the six state colleges and universities as well as KSU.

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 skills; his emotional balance; his social relationships; his moral and religious values; his physical health; and his aesthetic appreciations.

Student needs for adequate medical care, housing, food, financial assistance, employment, counseling, recreation, and spiritual inspiration, have been anticipated in this program.

The Vice President for Student Affairs is responsible for maintaining a close relationship with the 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 Presidents for Academic and Student Affairs have a special assistant, an Associate Dean for Minority Affairs, who is responsible for counseling and all special 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 serve as liaison to all elements of the University community.

Units within the Center are organized to identify and meet the needs of K-State students. Responsibilities include maintaining 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, a women's resource center, 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.

**New Student Programs.** The new student orientation program assists approximately 3,000 entering students during summer pre-enrollment. The summer program usually is the students' initial encounter with the University and, in addition to providing needed information, often results in the beginning of meaningful friendships. A concurrent program assists parents of new students to become acquainted with the University, its programs and facilities, University staff, and student leaders.

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 personal development and for learning more about the University.

Religious life at the University finds expression in many church-sponsored student organizations in more than 30 church congregations in Manhattan. Student Services staff assist in coordinating campus religious activities. On campus there are two memorial chapels—Danforth and All Faith—which are available for student religious services and private meditation.

**Higher Education Briefs** is a periodical published to assist in keeping abreast of new developments in higher education. Highlighted are recent developments in each of the colleges of the University, news of happenings on other campuses, and current programs and research in the Center for Student Development.





**Minority and Cultural Program.** This is three dimensional in scope, with its primary thrust geared to the educational supportive needs of racial minority students. The program's three components are: (1) Educational Opportunities Unit, (2) Special Services for Minority Students on Campus, and (3) Cultural Enrichment Programs.

The Educational Opportunities Unit assists minority and low-income students in setting and attaining realistic educational goals, provides them with information about post-secondary educational opportunities at Kansas State University, and assists them in securing the necessary resources to meet their financial needs.

The Special Services' primary mission is to provide services for minority students which will enhance their chances of academic success. Included are counseling (personal, vocational, and financial), academic advising, tutoring, and referral services.

The Cultural Enrichment Program component is an integral part of minority life on campus. It is designed to provide additional minority student visibility in leadership roles on campus and, at the same time, enlighten the University community of minority groups' contributions to American life.

The minority organizations such as the Black Student Union (BSU) and MECHA (a Chicano organization) are a tremendous asset both to minority students and the University and play a viable role in facilitating cultural enrichment activities.

**Counseling Service.** A staff of counselors is available to help students. Perhaps it is in searching for answers about majors, careers, values, interests, goals or who you are. Or, it may be in developing more effective skills, attitudes and habits in areas such as studying, social-personal life, leadership or decision making.

Some students prefer to see counselors individually. Many also find help in one of the variety of small groups, such as study skills, learning skills laboratory, life planning workshops, interpersonal communications or for couples in handling conflicts.

Counselors also are available to consult with individuals (students, staff and faculty) and groups about a wide variety of concerns, including program planning and development, leadership skills, group goals and processes and interpersonal communication. Should groups want to develop their own programs, staff members can help in the development of the program and in training the leaders.

At most hours during the day, a counselor is available to see immediately anyone coming to the Counseling Service. High school seniors may use the service before entering college by writing for an appointment. The Counseling Service is located in 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 Advisor 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.

**Program Development and Research.** The Program Development and Research staff is available to assist in the planning, implementation, and evaluation of programs sponsored by students, staff, or faculty, relating to student development. Leadership and human relations training experiences are, upon request, developed to meet the needs of particular groups, such as residence hall members and staffs, crisis center volunteers, Union committees, or "Grèek" officers. Professional staff and members of the University Learning Network (ULN) provide information on effective ways to make inputs into the decision-making systems of the University, city and county government, the state legislature and the U.S. Congress. Research is published on student development and related programs.

## AIDS, AWARDS AND VETERANS SERVICES

Gerald R. Bergen, Director

**Loan Programs.** Many Kansas State University students are assisted with student loans through the National Direct Student Loan, the Alumni Association Loan, and various loan units of the Endowment Association. Many other student loans are provided through the Federally Insured 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 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 Halls 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 services 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	\$118	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 a month 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.

Single graduate students 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 \$560 a 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 \$560 a 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.** Clovia 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 Clovia 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 Clovia 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

Walter D. Smith, 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. All students are invited to apply for membership on these committees.

## RECREATIONAL SERVICES

Raydon H. Robel, Acting Director

Record student interest and participation make the intramural and recreation programs a vital part of the university. The program is in its 53rd year. K-State ranks in the top 20 universities in the country in terms of outdoor facilities and is striving to increase them.

An outstanding new aquatics building opened its doors this year. It features a 40 by 60 foot diving pool, a six-lane water instruction pool, and a regulation eight-lane 25-yard pool.

In addition to organized intramural programs for men and women, the department sponsors as much free play and recreational use of its facilities for the students, faculty, staff, and their families as is possible. Facilities include the aquatics center, Ahearn Gymnasium and Fieldhouse, 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.

While competition is keen in intramurals, you don't have to be a skilled player to compete and enjoy the sports. The physical activity and social contacts are more important than winning or losing; sportsmanship and fair play are stressed. There are opportunities to be employed on the student payroll as a referee, game official, lifeguard or a gymnasium supervisor.

Intramural competition is available in the following activities:

**Men:** Flag football, swimming, golf, cross country, horseshoes—singles and doubles, volleyball, bowling, wrestling, badminton, basketball, table tennis, softball handball—singles and doubles, tennis—singles and doubles, free throw tourney, track, racketball, rifle match, canoeing, and tug-o-war.

**Women:** table tennis—singles and doubles, golf, kickball, swimming, bowling, volleyball, badminton—singles and doubles, basketball, softball, tennis—singles and doubles, track, canoeing, racketball—singles and doubles, cross country, rifle match, and tug-o-war.

**Co-Rec:** Golf, canoeing, badminton, volleyball, bowling, rifle match, table tennis, and tug-o-war.

A recent innovation is the Century Club which encourages K-Staters to run, cycle, or swim a total of 100 miles or its equivalent in one semester.

Students also can participate in the following intercollegiate sports sponsored by the department: MEN — soccer, judo, crew, and sports parachuting; WOMEN — basketball, gymnastics, field hockey, volleyball, softball, tennis, sports parachuting, and track. Club sports include sailing, fencing and scuba diving.

Additional information may be obtained by writing Department of Intramurals & Recreation, Room 12, Ahearn Gymnasium, Kansas State University, 66506.

### 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)  
Judo Club  
K-State Players (Drama)  
KSU Travel Association  
Korean Student Association  
Latin American Association  
Off-Campus Women  
Pakistan Association  
People to People  
Persian Association  
Pakistan Association  
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**

Band  
   Marching  
   Basketball Pep  
   Concert  
   Symphonic  
 Concert Choir  
 Collegiate Chorale  
 Ensembles  
   Brass, Percussion  
   String, Woodwind  
 Jazz Workshop Ensemble  
 K-State Singers  
 Madrigal Ensemble  
 Symphony Orchestra  
 University Chorus  
 Varsity Men's Glee Club  
 Women's Glee Club

### **Home Economics Interest Groups**

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

### **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

### **Professional**

Alpha Chi Sigma (Chemical Engineering, Biochemistry)  
 Alpha Kappa Psi (Business Administration)  
 Alpha Tau Alpha (Agricultural Education)  
 American Chemical Society  
 American Choral Directors Association  
 American Guild of Organists  
 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  
 American Veterinary Medical Association  
 Associated General Contractors of America  
 Bakery Management Club  
 Gamma Theta Upsilon (Geography)  
 Institute of Electrical and Electronics Engineers  
 Kappa Alpha Mu (Photojournalism)  
 Kappa Kappa Psi (Band)  
 Mu Phi Epsilon (Women's Music)  
 Music Educators National Conference (MENC)  
 National Association of Jazz Educators  
 Phi Chi Theta  
 Phi Delta Kappa (Men's Education)  
 Phi Epsilon Delta (Women's Physical Education)  
 Phi Epsilon Kappa (Men's Physical Education)  
 Phi Mu Alpha Sinfonia (Men's Music)  
 Sigma Delta Chi (Journalism)  
 Society of American Military Engineers  
 Steel Ring (Engineering and Architecture)  
 Tau Beta Sigma (Women's Band Service)  
 Wildlife Society  
 Women in Communications, Inc

### **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

### **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 a program of agricultural education in Nigeria is a part of agriculture. Under the vice president for agriculture are

four administrators: the dean of the College of Agriculture, the director of the Kansas Agricultural Experiment Station, the director of the Cooperative Extension Service and the director of International Agriculture Programs.

## THE COLLEGE OF

# Agriculture

Carroll V. Hess, Dean  
Frank R. Carpenter, Assistant Dean  
David J. Mugler, Assistant Dean

### OBJECTIVES

The College of Agriculture offers 20 academic programs. Some have four options: production, science, communications and business-industry. Other curricula, namely those in Grain Science & Industry, Natural Resource Management, and Food 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 95 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). Livestock of many breeds, plus various soil types, field crops, fruits, vegetables and ornamentals are used in teaching and research.

## AGRICULTURE HONORS PROGRAM

In Agriculture the honors program encourages students to recognize and respond to the challenges of

scholarly inquiry into aspects of professional and scientific agriculture as well as to investigate some of the related social, political, economic and international issues. Students with high academic records are invited into the honors program.

At the freshman and sophomore levels, honors students are afforded opportunities to participate in special seminars by scientists in the College of Agriculture and in other Colleges on campus, and by guest scientists. Students attend various departmental lectures and later meet and discuss them.

Juniors and seniors are encouraged to do research problems. They also meet in groups for special seminars and colloquia.

The flexibility of most curricula in Agriculture provides the honors student and his adviser with the opportunity to design an academic program that permits both depth and breadth beyond normal requirements.

## STUDENT SELECTION OF A MAJOR

A student usually selects a curriculum or major at the time he enters the College. He is provided an academic adviser in his 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 student 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. 31
2. Agricultural Education (teaching); B.S., M.S., p. 34
3. Agricultural Journalism; B.S., p. 35
4. Agricultural Mechanization; B.S., p. 35
5. Agronomy (Crops and Soils); B.S., M.S., Ph.D., p. 36
6. Animal Breeding; Ph.D., p. 252
7. Animal Nutrition; Ph.D., p. 253
8. Animal Science & Industry; B.S., M.S., p. 38
9. Bakery Science & Mgmt.; B.S., p. 49
10. Crop Protection; B.S., p. 41
11. Dairy Production; B.S., M.S., p. 42



12. Entomology; M.S., Ph.D., p. 45
13. Feed Science & Mgmt; B.S., p. 50
14. Food Science; M.S., Ph.D., p. 253
15. Food Science & Industry; B.S., p. 47
16. Genetics; M.S., Ph.D., p. 254
17. Grain Science; M.S., Ph.D., p. 49
18. Horticulture; B.S., M.S., Ph.D., p. 53
19. Horticultural Therapy; B.S., p. 54

20. Milling Science & Mgmt.; B.S., p. 50
21. Natural Resource Management; B.S., p. 57
22. Plant Pathology; M.S., Ph.D., p. 58
23. Poultry Science; B.S., M.S., p. 42
24. Pre-Forestry (2 years); p. 55
25. Pre-Veterinary Medicine (2 years); p. 31
26. Retail Floriculture (2 years); p. 55

### OPTIONS AND COURSES REQUIRED

Courses	Science	Business and Industries	Production	Communications
<b>Agriculture:</b>				(See courses below plus Communications Option copy on following page.)
Soils Plant Sci. Prin. An. Sci. Prin. Ag. Econ. Engg. in Ag. Econ. Entom. Econ. Entom. or Livestock Entomol. Plant Path. Natural Resources and Man Intro. Food Sci. & Tech.	Five of the courses listed.	Prin. Ag. Econ., a second Ag. Econ. course, and 12 credits in other courses listed.	Four of the courses listed.	Four of the courses listed.
<b>Biological Science:</b>				
Gen. Botany <sup>1</sup> Organismic Biology Genetics Microbiol. Envir. Biol.	Gen. Botany plus two other courses listed.	Gen. Bot. plus one other course listed.	Gen. Bot. plus one other course listed.	Principles of Biology or Gen. Bot. and one other course listed.
<b>Mathematics, Statistics, and Computer Science:</b>				
Plane Trig. Calc. I Biometrics <sup>2</sup> Fund. Comp. Prog. Comp & Da. Pro.	Plane Trig. plus two other courses listed.	Two of courses listed.	One of courses listed.	One course in statistics or computer science
<b>Physical Science:</b>				
Desc. Physics Physics I Physics II Geology I  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 of courses listed.	Two of courses listed, including one Org. Chem. course or the course Intro. to Org. & Biochem.	One physical science listed.
<b>Business Administration and Agricultural Economics:</b>				
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 500 or higher course number	Fund. of Accounting or Mgmt. Concepts.	Fund. of Accounting and Mgmt. Concepts plus 3 courses listed.	Fund. of Accounting & Mgmt. Concepts	Fund. of Accounting & Mgmt. Concepts

1. Principles of Biology may substitute for Gen. Bot.  
2. Stat. Meth. I may substitute.

## SCIENCE OPTION

(Preparation for Research & Graduate Study)

Nearly 20 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, physics, chemistry, statistics, computer science, economics, and in communications.

## BUSINESS AND INDUSTRIES OPTION

Nearly one-half of recent graduates of the College of Agriculture are now employed in off farm agribusiness, such 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

Nearly 20 per cent of recent graduates return to the farm or ranch. Those who plan to do so 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.

## COMMUNICATIONS OPTION

This option provides the student with some professional skill in journalism and mass communications. These courses are organized to give the student an introduction to news writing and editing. The three areas of specialization allow the student to select more advanced communications courses according to his interests and needs. Such additional skills and abilities will make the student more effective in active citizenship roles and more proficient in his profession.

### Communications Courses (15 credit hours required)

Reporting I (3) or Ag. Journalism (3) and Editing I (3) Plus nine additional credit hours from the following listings which suggest areas of specialization students may choose to pursue.

#### Advertising and Sales Communications

Principles of Advertising .....	3
Advertising Salesmanship .....	2
Advertising Copy Layout .....	3
Administrative Communications .....	3
Sales Communications .....	3
Design I .....	2
Commercial Art Techniques .....	2

#### Organizational Communications

Oral Communications II .....	2
Persuasion .....	3
Group Discussion Methods .....	3
Discussion and Conference Leadership .....	3
English Composition III .....	3
Introduction to Instructional Media .....	1
Audio-Visual Instruction .....	2-3

#### Mass Communications

Reporting II .....	3
Editing II .....	3
Magazine Article Writing .....	3
Magazine Production .....	3
Public Relations .....	3

Public Information Methods .....	2
Photojournalism I .....	3
Ag. Student Magazine .....	1-2
Radio & TV News .....	3
Introduction to TV .....	2
Instructional TV .....	3
TV Production .....	3
Radio & TV Writing .....	3

## 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)  
281 606 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)  
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. 162) 5 1/2 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. 160) 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 160) 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

About 40 per cent of new students entering the College of Agriculture are transfer students from a junior college or denominational college.

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. A number of junior colleges in Kansas offer introductory agriculture courses approved for transfer toward a B.S. degree in Agriculture.

Course	Semester Hours
English I & II .....	6
Speech .....	2
Other communications such as Journalism or a second speech course .....	3 <sup>1</sup>
College Algebra .....	3
Trigonometry .....	3 <sup>2</sup>
Calculus .....	5 <sup>3</sup>
Chemistry (Inorganic) .....	8 <sup>4</sup>
Organic Chemistry .....	3 <sup>5</sup>
Economics I .....	3
General Physics .....	5 <sup>6</sup>
Humanities and Social Sciences .....	12
Biological Science .....	10 <sup>7</sup>
	63

## Professional B.S. and Two-Year 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.
5. Agronomy (Crops and Soils); B.S., M.S., Ph.D.
6. Animal Science & Industry; B.S., M.S.
7. Bakery Science & Management; B.S.
8. Crop Protection; B.S.
9. Dairy Production; B.S., M.S.
10. Feed Science & Management; B.S.

11. Food Science & Industry; B.S.
12. Horticulture; B.S., M.S., Ph.D.
13. Horticultural Therapy; B.S.
14. Milling Science & Management; B.S.
15. Natural Resource Management; B.S.
16. Poultry Science; B.S., M.S.

## PRE-VETERINARY MEDICINE PROGRAM<sup>1, 2</sup>

<b>Freshman</b>	
Ag Orientation .....	1
Chemistry I .....	5
English Composition I .....	3
Principles of Animal Science .....	3
Animal Science and Industry .....	1
Dairy Science .....	1
Concepts in Physical Education .....	0
	14
<b>Sophomore</b>	
Prin. of Biology .....	4
Chemistry II .....	3
Plane Trigonometry .....	3
Humanities or Social Science Elec. ....	3
English Composition II .....	3
Poultry Science .....	1
Lifetime Sports .....	0
	17
<b>Physics I</b>	
Physics I .....	4
General Organic Chemistry .....	5
Humanities or Social Science Elec. ....	6
Oral Communications I .....	2
	17
<b>Physics II</b>	
Physics II .....	4
Genetics .....	3
Humanities or Social Science Elec. ....	3
Chemical Analysis .....	4
General Elective .....	2
	16

## 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,\* Manuel,\* McCoy,\* Orazem,\* Phillips,\* Pine,\* Schruben,\* Scoville,\* Sjo,\* Sorenson,\* and Whitehair,\*  
 Associate Professors Buller,\* Erickson,\* Knight,\* Koudele,\* Langemeier,\* Norman,\* Schlender, Thomas and Walker;  
 Assistant Professors Baker, Biere,\* Fenwick, Figurski, Flinchbaugh, Frederick, McReynolds, Overley, Pretzer, Riley, Treat, Vacin; 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 administration and management in

1. For Bakery Science and Management, Feed Science and Management, or Milling Science and Management, replace with a semester of inorganic chemistry or organic chemistry, or engineering graphics.

2. Required only in Professional Programs number 4, 7, 8, 10, 11, 14 and 15.

3. Required only in chemistry and operations options of 7, 10 and 14.

4. Eight hours required in all except that only five hours are required in 1, 2, 3, 4, 6, 8, 9, 12, 13, and 16.

5. Not required in 1, 3, 4, 12, 13, 16 and option "B" of 15.

6. Required only in 4, 7, 8, 10, 11 and 15.

7. Required in all except that only five hours can be used in 1, 7, 13, 14, and 15. None required in 4.

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.

agriculture. The curriculum in agricultural economics provides an opportunity to explore these areas in depth. Nearly one-half the requirements are electives. This provides flexibility for the student and his adviser to develop a program of study meeting the interest, 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.

**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 per cent of agricultural economics graduates will find employment in agribusiness such as banking, management, sales, finance, credit and insurance. About 20 per cent 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 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 at the top of the next column:

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
	Concepts in Phys. Ed.	0
	Lifetime Sports	0
	Humanities <sup>1</sup>	6
269 110	Principles of Political Science	3
277 211	Introduction to Sociology	3
215 198	Principles of Biology	4
	Agriculture <sup>2</sup>	12

### Department Requirements

<b>Major Courses</b>		
010 100	Principles of Agricultural Economics <sup>3</sup>	3
010 500	Production Economics	3
010 505	Agricultural Market Structures	3
	Major Electives <sup>1</sup>	15

<b>Supporting Courses</b>		
	A statistics course <sup>1</sup>	3
	Two communications courses <sup>1</sup>	6
273 110	General Psychology	3
305 260	Fundamentals of Accounting	4
	Fundamentals of Computer Programming	3
	Supporting electives <sup>1</sup>	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.** The department administers and advises students enrolled in the Resource Administration option of the Natural Resource Management Curriculum. See page 57.

### Graduate Study

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

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, 015 205 Soils, 035 105 Introductory Food Science & Technology, 005 500 Genetics.

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



**010 101. Economics of Population, Food and Environment.**

(3) II. 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) I. 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.

**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. 1110.

**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, II. 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 AND GRADUATE CREDIT IN MINOR FIELD**

**010 500. Production Economics.** (3) I, II. 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 firm. 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.

**010 505. Agricultural Market Structures.** (3) I, 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. 500.

**010 510. 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.

**010 511. 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.

**010 512. 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.

**010 513. 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.

**010 514. 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.

**010 515. 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.

**010 516. Agricultural Law and Economics.** (3) I, II. 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, intergenerational 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.

**010 517. 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. 260 and Junior standing.

**010 518. Economic Principles of Agricultural Business Firms.** (3) I, 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. 260.

**010 520. 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.

**010 521. 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.

**010 522. 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.

**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.

**010 625. 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.

**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.

**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.

#### UNDERGRADUATE AND GRADUATE CREDIT

**010 705. Price Analysis.** (3) II. The analysis of selected agricultural prices; application of regression analysis to price analysis and special econometric considerations. Two hours recitation and two hours laboratory a week. Pr.: Ag. Econ. 500 and 519.

**010 710. 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. 518 or consent of instructor.

**010 712. 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. 500 and Stat. 700 or consent of instructor.

**010 750. 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.

**010 823. 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. 500 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.

**010 831. 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. 505 and B.A. 260 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. 510 or consent of instructor.

**010 898. Agricultural Economics Master's Report.** Credit arranged. I, II, S. Master's Report.

**010 899. Agricultural Economics Master's Research.** Credit arranged. I, II, S. Research for master's thesis.

**010 901. Seminar in Economic Research.** (3) I. 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.

**010 922. 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.

**010 930. 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.

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

**010 999. Agricultural Economics Ph.D. Research.** Credit arranged. I, II, S. Research for Ph.D. thesis.

#### 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.
Gen. Agr.	035 101	Ag Orientation .....	1
English	229 100	English Composition I .....	3
Mathematics	245 100	College Algebra .....	3
Biology	215 198	Principles of Biology .....	4
		Elective Ag. Science .....	4
Physical Education	261 011	Concepts In Phys. Ed. ....	0
			15
Spring Semester			
English	229 120	English Composition II .....	3
Psychology	273 110	General Psychology .....	3
Chemistry	221 110	General Chemistry .....	5
Horticulture	040 200	Plant Science .....	4
Physical Education	261 011	Lifetime Sports .....	0
			15



## SOPHOMORE

<b>Fall Semester</b>			
Biology	215 201	Organismic Biology	4
Ag. Engg.	506 151	Ag. Mechanics Practices	2
Education	405 215	Educational Psychology I	3
Economics	225 110	Economics I	3
Speech	281 105	Oral Communications I	2
		General Elective	1
			15

<b>Spring Semester</b>			
Biochemistry	020 120	Intro. Bio. & Org. Chem.	5
Agronomy	015 270	Soils	4
		Elective Agricultural Science	3
Ag. Engg.	506 351	Farm Power	3
		General Elective	1
			16

## JUNIOR

<b>Fall Semester</b>			
Ag. Ec.	010 201	Prin. of Ag. Econ.	3
Education	405 315	Educational Psychology II	3
		Literature or Language	3
		Elective Agricultural Science	3
		Elective Social Science	3
			15

<b>Spring Semester</b>			
Education	410 620	Prin. & Phil. of Voc. Ed.	3
Journalism	289 350	Agricultural Journalism	3
		Elective Agricultural Science	3
		Ag. Engg. Elective	3
		Literature or Language	3
			15

## SENIOR

<b>Fall Semester</b>			
Education	410 621	Prog. Plan. in Voc. Ed.	3
Education	410 500	Methods of Teaching Ag.	2
Education	410 586	Tchg. Partic. Sec. Sch.	8
Ag. Engg.	506 559	Ag. Mechanic Methods	3
Ag. Engg.	506 553	Ag. Machinery Operation	3
			19

<b>Spring Semester</b>			
		Ag. Engg. Elective	2
		General Elective	3
		Elective Social Science	3
		Elective Ag. 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
Concepts in Phys. Ed.	0
Lifetime Sports	0
Humanities and / or Social Sci. (see pg. 30)	12
Communications (see pg. 30)	2 or 3

Other general requirements are based on the production option on page 29. A faculty adviser assists students in the selection of non-major and elective courses.

Agricultural Journalism	3
Reporting II	3
Editing	3
Photojournalism 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.

Agricultural Mechanization is administered through the Department of Agricultural Engineering. See page 189 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.

### 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

(Continued next column)

Concepts in P.E. ....	0
Life Time Sports ....	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 not 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 29.

## 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, 552, 651, 652, 653.	

Total credits of 24 hours required in Agricultural Engineering series 506 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	

	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
Concepts in Phys. Ed. ....	0
Life Time Sports .....	0
Humanities and/or Social Sciences pg. 30) .....	12
Communications (see pg. 30) .....	2 or 3

There are four options available in agronomy: production, science, business and industry and communications. 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 58; or the crop protection curriculum, see page 41. 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 or 015 220 Crop Science and 015 205 Soils. Other courses taken in agronomy depend upon student interest and the option selected. Minimum requirements for the various options are given on page 29.

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

## Graduate Study

Graduate studies 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.

A prerequisite 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

**015 150. Plants and Soils for Crop Production.** (3) I, II. Resources and techniques used to produce crops; soil properties and plant processes basic to understanding cropping practices and systems. For freshmen and sophomores who want an introductory field crop production course. Three hours recitation per week.

**015 190. Environmental Impact of Food Production.** (2) I, S. Current concepts of food production and human population. Production practices and their influence on environmental quality. Current use of fertilizers and pesticides and alternatives to their use. Waste disposal, sedimentation, conservation, water quality and land resources related to food production. Two recitations per week. Designed primarily for non-agricultural students.

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

## AGRONOMY

(Crops, Soils, Range Management)

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,\* Sorenson,\* Withee,\* and Woodruff; Associate Professors Atkinson, Barnett,\* Edelblute, Harper, Hyde,\* Liang,\* Lyles, Murphy,\* Nilson, Overley, Paulsen,\* Peterson, Powers,\* Russ,\* Sloan, Skidmore,\* Teare,\* Vanderlip,\* Wassom,\* and Whitney,\* Assistant Professors Burchett, Dicken, Ehler, Humburg, Kanemasu,\* Lundquist, Moore, Nickell,\* Owensby,\* Raney, Swallow, Thien, and Walter; Instructors Bonne, 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:



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

**015 205. 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.

**015 210. Forage Crops for Livestock.** (3) I. Production and use of forage crops. Forage programs for livestock production including pasture, hay and silage. Two hours rec. and two hours lab. a week.

**015 220. Crop Science.** (4) I, II. Principles underlying practices used in the culture of crops. Application of principles to production management. Plant morphology, crop protection, seed technology. A basic course for majors in Agronomy and other undergraduates interested in crop production. Three hours recitation and two hours laboratory a week.

**015 260. Range Management.** (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.

**015 340. Market Grading of Cereals.** (2) I. Market grades of cereals and factors that influence them. Six hours lab. a week.

**015 365. Soil-Plant Relationships.** (3) I. Study of the relationship of chemical and physical properties of soils to plant nutrition; forms of essential elements in soils and their role in plant nutrition; fertilizer materials and application. Three hours rec. a week. Pr.: Agron. 205 and 200 or 220.

**015 415. 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.

**015 499. Internship in Pest Management.** (1-2) S. Offered in cooperation with Horticulture and Forestry. See 040 499.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**015 505. Soil as a Natural Resource.** (3) II. Factors influencing soil development and distribution. Methods of mapping and classifying soils for agriculture and other uses by society; field trips. Two hours rec. and three hours lab. a week. Pr.: Geol. 100 and Agron. 205 or consent of instructor.

**015 510. 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 040 510.)

**015 525. Crop and Soil Management.** (3) II. Production management of crops and soils in semi-arid, sub-humid and humid areas. Selection of cropping systems and appropriate practices to achieve maximum production and conservation of soil resources. Three hours rec. a week. Pr.: Agron. 200 or 220 and Agron. 205.

**015 591. 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 265 591.

#### 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.

**015 605. Soil Fertility.** Advanced study of the relationships of soil chemistry to plant nutrition; interactions of nutrients and roles of nutrients in plant nutrition; soil reactions of fertilizer materials; diagnosis of soil fertility problems and formulation of recommendations. Three hours recitation a week. Pr.: Agronomy 200, or 220, 205, and 365 or consent of instructor.

**015 610. 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 or 220 and 205 or consent of instructor.

**015 615. Soil Problems.** Credit arranged. I, II, S. Studies may be chosen in the fields of: Chemistry, Physics, Conservation, Fertility, Development and Classification.

**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 or 220 and Chem. 190 or equiv.

**015 625. 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 or 220 and 205.

**015 635. Properties of Pesticides.** (2) I. A discussion of the nature, mode of action, and fate of agricultural pesticides used on crops. Two hours rec. a week. Pr.: Biochem 120 or equivalent.

**015 641. Identification of Range and Pasture Plants.** (2) II. Offered 1973-74 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.

**015 645. Physical Environment of Crops and Soils.** (3) I. The properties of crops and soils as affected by their physical environment, including water content, temperature, soil structure and aeration. Two hours rec. and three hours lab. a week. Pr.: Agron. 205.

**015 655. Integrated Pest Management.** (3) II. Offered in cooperation with Entomology. See 030 655.

**015 665. Chemical Fertilizers.** (3) II. A study of the processes involved in the formulation of chemical fertilizers, the physical and chemical properties of various fertilizer materials and the technology of fertilizer use. Three hours rec. a week plus a field trip to inspect fertilizer manufacturing facilities Pr.: Agron. 200 or 220, 205, and 365 or consent of the instructor.

**015 670. Range Management Problems.** Credit arranged. I, II, S.

**015 680. Range Management II.** (3) II. Offered 1973-74 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. 260, Biol. 530.

**015 705. 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. 205, Geol. 100.

**015 710. 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. 500 or equivalent (Joint listing with the Dept. of Horticulture and Forestry. See 040 710.)

**015 715. Agricultural Climatology.** (3) I. Offered 1974-75 and alt. years. A study of the soil-plant-atmosphere continuum with a laboratory in instrumentation. Two hours rec. and three hours of lab. a week. Pr.: Agron. 591 or 610 or consent of instructor.

**015 725. Soil and Plant Analysis Applications.** (3) I. Offered 1973-74 and alt. years. Theories and procedures for the chemical analysis of soils and plant materials. Applications of analysis in soil fertility evaluations and in research work are discussed. One hour rec. and six hours lab. a week. Pr.: Agron. 205, Chem. 271.

**015 760. 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. 260, Biol. 530. Suitable field experience may be substituted for these prerequisites with consent of instructor.

**015 770. 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. 500.

**015 780. 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.

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

**015 870. Agronomic Plant Breeding.** (3) II. Offered in 1973-74 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 or 220 and 710.

**015 898. Master's Report.** (2) I, II, S. Preparation of a written report either of research or of problem work on a topic in the major field.

**015 899. Master's Research.** Credit arranged. I, II, S. Research on a problem which may extend throughout the year and furnish data for a master's thesis.

**015 905. Soil Physical Chemistry.** (3) I. Offered 1974-75 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. 645, 705 and Chem. 585.

**015 910. 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 040 910.)

**015 915. Soil Physics.** (3) I. Offered 1973-74 and alt. years. An advanced study of prominent theories concerning the physical behavior of soils. Three hours rec. a week. Pr.: Agron. 645, Math. 222, Phys. 211.

**015 925. Soil Genesis.** (2) II. Offered 1974-75 and alt. years. Theories of soil formation processes. Two hours rec. a week. Pr.: Agron. 505.

**015 930. 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 040 930.)

**015 940. Advanced Forage Crops.** (3) I. Offered 1973-74 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. 210.

**015 950. Advanced Crop Ecology.** (3) I. Offered 1974-75 and alt. years. Principles of growth and development of crops in relation to the environment. Three hours rec. a week. Pr.: Agron. 610, or equiv., and Biol. 600.

**015 999. Ph.D. Research.** Credit arranged. I, II, S. Research on a problem which may extend throughout the year and furnish data for a doctoral dissertation.

## ANIMAL SCIENCE AND INDUSTRY

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

Don L. Good,\* Head of Department

Professors Koch,\* Kropf,\* Moyer, Richardson,\* E. Smith,\* and Wheat,\* Associate Professors Allen,\* Brent,\* Francis, Harbers,\* Hines,\* Kiracofe,\* McKee,\* Riley,\* 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 experimental projects with meat animals. All animals maintained by the department are used for class work.

The department offers the Animal Science & Industry major with options in Production, Business & Industries, Science & Communications, p. 29. In addition the department helps administer and advise students enrolled in the new curriculum in Food Science & Industry, see p. 47.

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
Concepts in Physical Education .....	0
Life Time Sports .....	0
Humanities and / or Social Sciences (see pg. 30) .....	12
Communications (see pg. 30) .....	2 or 3

Other general requirements depend upon the option selected (see page 29). 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
Fundamentals of Nutrition .....	3
Principles of Feeding .....	3
Livestock & Meat Evaluation .....	3
Elements of Meat Processing .....	3
Animal Breeding .....	3

(Continued next column)



## 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**

**005 102. Principles of Animal Science.** (3) I, II, S. 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 Principles of Animal Science and Animal Agriculture and Man toward a B.S. degree in Agriculture.

**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. 2 hrs. lab. per week. A companion course to A.S.I. 101 and 102 and Dy. and Pl. Sc. 102.

**005 104. Animal Agriculture and Man.** (2) I, II. An introduction into the scope and importance of animal agriculture to man's existence. Concepts of inheritance, reproduction, nutrition, marketing procedures, management and product utilization will be discussed. Two hours lecture a week. For non-animal science, non-dairy science and non-pet majors. No prerequisites. Offered on a CR-NCR or graded basis.

**005 200. Fundamentals of Nutrition.** (3) I, II, S. Elementary principles of comparative nutrition of farm animals. Three hours rec. a week. Pr.: Chem. 110 or 210. Taught in cooperation with the Department of Dairy and Poultry Science.

**005 250. Elements of Meats.** (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.: AS&I 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. 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 lab. demonstrations per week.

**005 300. Principles of Livestock Feeding.** (3) II. Practical application of nutritional principles to the feeding of livestock; feedstuff evaluation; nutritive requirements; basic ration formulation and evaluation. Not open to A.S.&I. majors. Student cannot apply credit for both A.S.&I. 300 and 320 toward a B.S. degree. Pr.: Chem. 110 or equivalent.

**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.

**005 315. Livestock and Meat Evaluation.** (3) I, II. Evaluation of slaughter livestock and their carcasses as related to economic merit. Evaluation of breeding livestock based on visual appraisal, performance and progeny test records. Modern techniques of livestock and carcass evaluation including ultrasonic sound, K-40 counter and tenderometer devices will be demonstrated. One hr. lec. and 2 hrs. lab per week. Pr.: A.S.&I. 102 and 103 or consent of instructor.

**005 320. Principles of Feeding.** (3) I, II. Application of basic nutrition principles to the feeding of beef cattle, sheep and swine; feedstuff evaluation; nutrient requirements; ration formulation and practical feeding problems. Two hours rec. and 2 hours lab a week. Pr.: Fundamentals of Nutrition or equivalent.

**005 340. Animal Science and Industry Practicums.** (2) II. Practical manual phases of livestock management are practiced by students. Four hrs. lab. per week. Pr.: A.S. & I. 102, and 103.

**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. rec. and lab 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) 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. 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. 385 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.

**005 450. Principles of Livestock Selection.** (2) II. Origin, development, characteristics, and adaptation of different breeds of livestock, with special emphasis on the selection of breeding animals. Four hours lab a week. Pr.: A.S.I. 102; 103 and 315.

**005 470. 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. 450.

**UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD**

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

**005 510. Animal Breeding.** (3) II. Present status of livestock improvement; function of purebred livestock; breeding systems and practices; application of genetics to problems in animal breeding. Pr.: A.S.I. 500.

**005 512. 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 at-

tachment, 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.

**005 515. 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. 300 or 320; senior standing or consent of instructor.

**005 520. 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. 200 or consent of instructor.

**005 525. 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. 300 or 320; senior standing or consent of instructor.

**005 535. 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. 300 or 320; senior standing or consent of instructor.

**005 555. 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. (Offered in the Dairy and Poultry Department.)

**005 580. 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. 320.

#### UNDERGRADUATE AND GRADUATE CREDIT

**005 601. 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 are specific areas covered during the semester. Open only to students in the curriculum of Veterinary Medicine. Pr.: Chem. 350; Physiol. 735 or consent of instructor.

**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. 515.

**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. 535.

**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. 515 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. Senior standing or consent of instructor.

**005 700. Animal Nutrition.** (3) I. Intended for graduate-level course in animal nutrition. An in-depth study of digestion, absorption, and metabolism in both monogastric and ruminant species. Three hours recitation per week. Pr.: Biochemistry 521 or equivalent.

**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. 102, 320, 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. 525.

**005 720. 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. Pr.: A.S.I. 250 or equivalent and consent of instructor.

**005 730. 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. 500 or equivalent.

**005 735. Environmental Physiology of Farm Animals.** (3) II. A detailed study of the effects of the environment on animal physiology and performance efficiency. Three hours lecture per week with frequent laboratory demonstrations. Pr.: Physiol. 530 or consent of instructor.

**005 740. 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. 500 and three hours in statistics.

**005 745. Population Genetics Laboratory.** (1) II. Compilation and analyzing of genetic data. Three hours lab. a week. Pr.: A.S.I. 740 or conc. assignment.

**005 760. Animal Science and Industry Problems.** Credit arranged. I, II, S. Pr.: A.S.I. 320 and other courses; consult instructor. Work offered in: Animal Breeding, Animal Nutrition, Beef Cattle Production, Horse Production, Livestock Evaluation, Meats, Sheep Production, Swine Production.

**005 770. Institutional Meats.** (2) II. Particular attention to grades, brands, wholesale cuts, institutional cuts, fabricated meats, serving portions, shrinkage, variety meats; emphasis given to costs and prices as related to menus; field trip required. One hour rec. and three hours lab. a week. Pr.: A.S.I. 280 or consent of instructor, senior or graduate standing.

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

**005 818. Meat Processing and Preparation.** (1) S, and on sufficient demand. Inspection, grading, processing, and preparation in relation to chemical and physical characteristics, cost, safety, quality and palatability of red meat. Pr.: 640 303 or equivalent and concurrent enrollment in 640 818.

#### GRADUATE CREDIT

**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.



**005 850. Analytical Techniques in Animal Science and Industry.** (3) I, II. Principles of analytical procedures used in research in Animal Science and Industries. Oen 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.

**005 898. Master's Report.** (2) II. Pr.: Consult major professor.

**005 899. Research in Animal Science and Industry** (M.S. degree). Credit arranged. I, II, S. Pr.: Consult instructor.

**005 900. Topics in Ruminant Nutrition.** (2) II. Advanced consideration of theoretical and applied ruminant nutrition—classical and current development of feeding standards; energy and nutrient metabolism. Emphasis on discussion of advanced topics of current interest in ruminant nutrition. Pr.: A.S.I. 700 or equivalent and Dairy and Poultr. 820.

**005 901. Topics in Monogastric Nutrition.** (2) I. Lectures and assigned readings concerned with determination of nutrient requirements; nutrient utilization and metabolism; nutrient interrelationships; feeding frequency; feed processing; appetite factors; methods of determining design and techniques useful in monogastric nutrition research. Pr.: A.S.I. 700 or equivalent and Biochem. 521.

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

**005 930. Advanced Meat Science.** (3) I. (Offered in Fall of odd numbered years) 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. Three hours rec. a week. Pr.: A.S.I. 776 or equivalent and Biochem. or consent of instructor.

**005 999. Research in Animal Science and Industry.** (Ph.D. degree). Credit arranged. I, II, S. Pr.: Consult instructor.

## CROP PROTECTION

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

Crop Protection deals with the proper use of various types of control of crop pests (insects, plant diseases, weeds and nematodes), and is often termed "pest-management" or "integrated control." The goal is to minimize cost, produce nutritious food and good fiber while avoiding adverse effects on man, wildlife and the environment. Those who are trained in Crop Protection monitor the environment and supervise environmental monitors, become agricultural extension agents, pest management supervisors, technical sales representatives, research assistants, retail salesmen, regulatory specialists, research specialists and private practitioners.

The Crop Protection Curriculum is administered by a committee of faculty from the Departments of Agronomy, Entomology, Horticulture and Forestry, and Plant Pathology. Persons interested in the curriculum should contact the Dean's Office, College of Agriculture, for additional information and assignment of an adviser. It offers options as discussed below.

The Pest Management Option is designed to prepare a student to 1) recognize and analyze factors that

cause pest problems, 2) prescribe an economical control that does not violate state or federal regulations and that has minimal adverse effects on the environment, 3) advise on control programs, including ecologically sound preventative measures and 4) to use new biological, cultural and chemical controls as they evolve.

The Business and Industries Option permits students to take more business and economics courses and fewer biological science courses while still providing basic core courses in Entomology, Plant Pathology, Weed Science and Nematology. It is for students interested in private business, retail sales and management.

The Entomology and Plant Pathology Science Options are designed for students who wish to specialize and/or do graduate study in the various areas of those sciences. (See page 45 for the Entomology Science Option and Page 58 for the Plant Pathology Science Option.)

Students majoring in Crop Protection are required to complete the following basic courses.

### GENERAL REQUIREMENTS

229 100	English Composition I	3
229 120	English Composition II	3
281 105	Oral Communications	2
035 101	Agricultural Orientation	1
245 100	College Algebra	3
221 210	Chemistry I or 221 110 Gen. Chem.	5
289 250	Agricultural Journalism (recommended communications course)	3
225 110	Economics I	3
261 001	Concepts in Physical Education	0
261 004 to 261 059 (one appropriate course)		0
	Humanities and Social Sciences (See page 30)	9

Other requirements depend upon the option selected.

### PEST MANAGEMENT OPTION

#### Curriculum Requirements

050 210	Intro. to Plant Pest Control	2
030 311	General Entomology	3
030 666	Advanced Applied Entomology I	3
030 677	Advanced Applied Entomology II	3
050 420	Plant Nematology	3
050 500	Plant Pathology	2
050 645	Diseases of Field & Hort. Crops	3
015 620	Weed Science	3
015 635	Properties of Pesticides	2
030 645	Federal and State Regulations	1
050 410 or 030 410	Plant Pest Diagnosis	1
030 655	Integrated Pest Management	3
040 499	Internship in Pest Management	1
040 680	Plant Protection	3

#### Supporting Courses — Agriculture and Biological Sciences

015 200	Plant Science	4
015 205	Soils	4
215 198	Principles of Biology	4
215 201	Organismic Biology	4
215 530	Environmental Biology	3

#### Four or more of the following

005 102	Principles of Animal Science	3
005 500	Genetics	3
015 525	Crop and Soil Management	4
015 260	Range Management	3
015 665	Chemical Fertilizers	3
015 505	Soils as a Natural Resource	3
015 610	Crop Ecology	3
030 695	Insect Taxonomy	3
030 745	Insect Control by Host Plant Resistance	2
040 280	Forest Conservation	3
040 508	Landscape Horticulture	3
040 520	Fruit Production	3
040 560	Vegetable Crop Ecology	3
506 300	Engineering in Agriculture	4

**Supporting Courses — Physical Sciences and Mathematics**

265 113	General Physics I or 265 115 Descriptive Physics	4
221 190 and 221 191	Elementary Organic Chemistry Lecture and Laboratory	5
211 200	Elementary Biochemistry	5
245 150	Plane Trigonometry	3
285 340	Biometrics I	3

**BUSINESS AND INDUSTRIES OPTION****Curriculum Requirements**

Curriculum requirements for the Business and Industries Option are the same as for curriculum requirements under the Pest Management Option.

**Supporting Courses — Biological Sciences**

015 200	Plant Science	4
015 205	Soils	4
215 198	Principles of Biology	4
215 530	Environmental Biology	3

**Two or more of the following**

005 102	Principles of Animal Science	3
015 525	Crop and Soil Management	4
015 505	Soils as a Natural Resource	3
015 260	Range Management	3
015 610	Crop Ecology	3
015 665	Chemical Fertilizers	3
040 280	Forest Conservation	3
040 508	Landscape Horticulture	3
040 520	Fruit Production	3
040 560	Vegetable Crop Ecology	3
506 300	Engineering In Agriculture	4

**Supporting Courses — Physical Sciences and Mathematics**

245 150	Plane Trigonometry	3
285 340	Biometrics I or 010 480 Agricultural Economics Statistics	3
265 113	General Physics I or 265 115 Descriptive Physics	4
211 120	Intro. Organic and Biol. Chemistry	5

**Supporting Courses — Business Administration and Economics**

305 260	Fundamentals of Accounting	4
305 420	Management Concepts	3

**Three or more of the following**

305 270	Managerial Accounting	3
305 202	Small Business Operations	3
305 450	Business Finance	3
305 292	Business Law I	3
305 421	Production Management	3
225 530	Money and Banking	3
225 620	Labor Economics	3
225 631	Principles of Transportation	3
Any 3 credit courses above a 500 number in Agricultural Economics (010)		

**DAIRY AND POULTRY SCIENCE**

C. L. Norton,\* Head of Department

Professors Bartley,\* Claydon,\* Craig,\* Farmer,\* 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 technical training. Courses below provide excellent background for training in the dairy industry.

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

The department offers the Dairy Production major with options in Production, Business & Industries,

Science, & Communications, p. 29. In addition the department helps administer and advises students enrolled in the new curriculum in Food Science & Industry, see p. 47.

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
Concepts in Phys. Ed.	0
Lifetime Sports	0
Humanities and/or Social Sciences (see pg. 30)	12
Communications (see pg. 30)	2 or 3

Other general requirements depend upon the option selected (see page 29.)

**Major courses include:**

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
Farm Animal Reproduction	3
Fundamentals of Milk Processing	3
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
Concepts in Physical Education	0
Lifetime Sports	0
Humanities and/or Social Sciences (see pg. 30)	12
Communications (see pg. 30)	2 or 3

Other general requirements depend upon the option selected (see page 29.)

**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.

This department also participates in the Food Science & Industry curriculum. See 47.



## 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 food science 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.)

**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. Taught in cooperation with the Animal Science and Industry Department.

**026 210. Poultry Judging.** (3) I. Production characteristics and evolution of present breeds and types. Judging the standard breeds and varieties by comparison; judging hens for egg and meat production on the basis of certain physical characteristics. One hour rec. and six hours lab. a week. Pr.: Dy. and Pl. Sc. 102 and 104.

**025 220. Dairy Products Evaluation I.** (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. Relationships of bacteria in milk to public health. Two hours lecture and two 2 hr. labs per week. Pr.: Biochem. 120 or equiv.

**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) Three hours lab. a week. Pr.: Dy. and Pl. Sc. 196.

## UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**025 500. Dairy Seminar.** (1) II. Study of dairy periodicals, bulletins, books, other dairy literature. One hour rec. a week. Pr.: Junior standing in dairy science.

**025 501. 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.

**025 505. Principles of Dairy Foods Processing Laboratory.** (1-3) II. Laboratories are integrated with the lecture offered in Principles of Dairy Foods Processing and with outside reading materials. 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. 501 or concurrent enrollment.

**026 555. 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 and junior standing.

## UNDERGRADUATE AND GRADUATE CREDIT

**025 601. Milk Secretion.** (3) II. Offered in 1974-75 and alternate 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. Two hours lec. and two hours lab. a week. Pr.: Junior standing or consent of instructor.

**025 605. Farm Animal Reproduction.** (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.

**025 621. Dairy Cattle Management.** (3) II. Offered in 1974-75 and alternate years. Dairy farm layout planning and analysis, integration of agronomic, physiologic and economic aspects of dairying, field study trip, farm analysis problem. Three hours rec. a week. Pr.: Dy. and Pl. Sc. 102 and 103 and junior standing.

**026 630. Poultry Problems.** (1-3) 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.

**026 660. 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.** (1-3) I, II, S. Pr.: Junior standing.

**025 675. Dairy Manufacturing Problems.** (1-3) I, II, S. Pr.: Junior standing in dairy manufacturing.

**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.

**026 700. Poultry Products Technology.** (3) II. Offered in 1973-74 and alternate 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, problems, and egg products. Two hours rec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 102, 104; Biochem. 200, 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 evidence 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.: Dy. and Pl. Sci. 350.

**026 712. 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. Two hours rec. and three hours lab. a week. Pr.: Dy. and Pl. Sc. 102 and 104.

**025 715. 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.

**026 720. Avian Metabolism.** (3) I. Offered in 1974-75 and alternate 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.

**025 740. Poultry Management.** (3) II. Offered in 1974-75 and alternate 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.

**026 746. Quantitative Genetics and Poultry Improvement.** (3) II. Offered 1975 and odd years. Major concepts, experimental verification and applications of quantitative genetics to improvement by breeding. Special emphasis on evaluation of genetic grains, genotypic-environmental interactions, selection plateaus, heterosis, selection for combining ability and special techniques in relation to poultry breeding. Discussion, 3 lectures a week. Pr.: One semester each of genetics and statistics.

**026 750. 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.

## GRADUATE CREDIT

**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; 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. 521 or 755, or consent of instructor.

**026 899. Research in Poultry Science.** Credit Arranged. I, II, S. Investigations which may form the basis of a master's thesis. Conferences by appointment. Pr.: Consent of instructor.

**025 899. Research in Dairy Science.** Credit arranged. I, II, S. Special investigation of dairy production or dairy foods processing which may be used as a basis for a master's thesis. Pr.: Consent of instructor.

**025 905. Lipids in Food Systems.** (2) I. Offered in 1974-75 and alternate years. Processing, analysis and physical and chemical characteristics of lipids with emphasis on their behavior and function of lipids with emphasis on their behavior and function in food systems. 1hr. rec. and 3 hr. lab. Pr.: Biochem. 521 and F&N 601 or Dy. and Pl. Sc. 715.

**025 906. Animal Breeding Seminar.** (1) II. Evaluation of animal experimentation as related to reproduction and breeding.

**025 930. 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.

**025 999. Research in Dairy Science.** Credit arranged. I, II, S. Special investigation of dairy production or dairy foods processing which may be used as a basis for a thesis. Pr.: Consent of instructor.

**026 999. Research in Poultry Science.** Credit arranged. I, II, S. Investigations which may form the basis of a doctor's thesis. Conferences by appointment. Pr.: consent of instructor.



## ENTOMOLOGY

B.S. in Agriculture under the Crop Protection Curriculum (see Page 41) which includes the Entomology Science Option.

Herbert Knutson,\* Head of Department

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

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 300 or 311 and at least five additional credits are recommended.

### Undergraduate Study

Students interested in the general field of protecting plants from insects, plant diseases and weeds, should consider the Pest Management or Business and Industries Options of the Crop Protection Curriculum (Page 41).

Students particularly interested in insects as a subject of special study, including insects in relation to plants, man or animals, and students anticipating graduate work, should consider the Entomology Science Option of the Crop Protection Curriculum.

### Entomology Science Option of the Crop Protection Curriculum

Students majoring in this option take, in addition to the general requirements for the curriculum, the following:

Entomology Courses		
030 311	General Entomology .....	3
030 660	External Insect Morphology .....	3
030 695	Insect Taxonomy .....	3
030	Electives in Entomology .....	9
Other Agriculture and Biology Courses		
005 500	Genetics .....	3
215 198	Principles of Biology .....	4
215 201	Organismic Biology .....	4
215 450	Microbiology .....	4
215 530	Environmental Biology .....	3
Physical Sciences and Mathematics		
265 113	General Physics I and .....	4
265 114	General Physics II .....	4
	OR	
265 115	Descriptive Physics .....	4
221 230	Chemistry II and .....	3
221 250	Chemistry II Laboratory .....	2
221 531	Organic Chemistry I and .....	3
221 532	Organic Chemistry Lab. ....	2
	OR	
221 350	General Organic Chem. and .....	3
221 531	General Organic Chem. Lab. ....	2
211 521	General Biochemistry and .....	3
211 522	General Biochemistry Lab. ....	2
	OR	
211 510	General Plant Biochemistry .....	4
	OR	
211 200	Elementary Biochemistry .....	5
245 150	Plane Trigonometry .....	3
245 220	Analytical Geo. and Calc. I .....	4
	OR	
285 200	Fundamentals of Computer Prog. ....	3
285 340	Biometrics I .....	3

## 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 lec. and 3 hours lab. a week.

**030 300. Economic Entomology.** (3) I, II. Classification, life histories, habits, and control of important economic insects. For agriculture majors. Two hours lec. and 2 hours lab. a week.

**030 305. Livestock Entomology** (2) I, II. Biology and behavior of insects and other pests attacking livestock, poultry, pets and wildlife. Current recommendations for control are discussed. For students interested in livestock production, feedlot management, dairy and poultry science, as well as general agriculture. Two hours lecture-demonstration a week.

**030 311. General Entomology.** (3) I, II, S. Basic study of insects and related arthropods, their classification, behavior, and relations to plants and animals, including man. Two hours rec. and 2 hours lab. a week.

**030 325. Insects of Home, Lawn and Garden.** (2) I, II. An introduction to Entomology with special reference to insects and other pests of home, lawn and garden. Various methods of control, including non-chemical methods of keeping pest problems to a minimum. Primarily intended for students other than Agriculture majors. Two hours lecture-demonstration a week.

**030 410. Plant Pest Diagnosis.** (1) I. First offered in 1974. A practical experience in diagnosis of insects and insect damage as occurs in the field, lawn and garden. Four hours combined lec. and lab. a week. Pr.: 015 610, 030 311, 050 500, and 050 420.

**030 499. Internship in Pest Management.** (1-2) S. First offered in 1975. In cooperation with Horticulture and Forestry. (See 040 499).

## UNDERGRADUATE AND GRADUATE CREDIT

**030 635. Properties of Pesticides.** (2) I. First offered 1973. (See 050 635)

**030 645. Federal and State Regulation of Pesticides.** (1) II. First offered in 1974. Laws regulating the use and development of pesticides, quarantines, and other legal aspects as they pertain to crop protection. One hour lec. a week. Pr.: Junior standing or consent of instructor.

**030 655. Integrated Pest Management.** (3) II. First offered in 1975. The systematics of all facets of pest management presented on a crop basis. Cultural, biological, chemical and legal methods of pest management are employed in developing models for integrated controls. Three hours lec. a week. Pr.: Senior in Crop Protection Curriculum or consent of instructor.

**030 660. External Insect Morphology.** (3) I. 1973-74 and alt. years. External form, structure and anatomy; leading theories of form and structure from generalized to specialized conditions. One hour lec. and 6 hours lab. a week. Pr.: Entom. 300 or 311.

**030 666. 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 lec. and 3 hours lab. a week. Pr.: Entom. 300 or 311.

**030 677. 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 lec. and 3 hours lab. a week. Pr.: Entom. 300 or 311, Entom. 666 desirable.

**030 695. Insect Taxonomy.** (3) II. 1973-74 and alt. years. 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. lec. and six hours lab. a week. Pr.: Entom. 300 or 311; Entom. 660 recommended but not required; Insect collection desirable.

**030 705. 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 300, or 311, or consent of instructor. Two hours lec. and 3 hours lab. a week.

**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. 790, 695.

**030 720. Medical Entomology.** (3) I. 1973-74 and alt. years. Insects and other arthropods as parasites and disseminators of disease; life cycles, biology, and control of insect parasites of man and animals. Two hours lec. and 3 hours lab. a week. Pr.: Entom. 300 or 311.

**030 730. Insect Ecology.** (3) I. Offered 1974-75 and alt. years. Influence of biotic, physical and edaphic factors of environments on insects. Two hours lec. and 3 hours lab. a week. Pr.: Entom. 300 or 311, or equiv. in zoology.

**030 740. Entomological Methods.** (1 to 3) Offered on demand. Methods, materials, and techniques used in entomological research. Pr.: Entom. 300 or 311 or equiv. One hour lec. and 6 hours lab. a week.

**030 745. Insect Control by Host Plant Resistance.** (2) I. 1974-75 and alternate years. 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. 300 or 311, and a course in either plant or animal genetics.

**030 750. Entomological and Zoological Literature.** (2) Offered 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. 300 or 311, and beginning biology courses.

**030 757. 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 lec. and 2 hours lab. a week. Pr.: 221 350, General Organic Chemistry, or consent of instructor.

**030 765. Internal Insect Morphology.** (3) II. Offered 1974-75 and alt. years. Internal anatomy of representative insects; plan and structure of internal systems. One hour lec. and 6 hours lab. a week. Pr.: Entom. 660.

**030 775. 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. Two hours lec. and 3 hours lab. a week. Pr.: Entom. 765 or consent of instructor.

**030 790. 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. 300 or 311 and 695 or equiv. in Zool. Entom. 950 may be taken concurrently.

**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 or non-dissertation 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. One credit per 3 hours lab. Pr.: consent of instructor.

**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. 300 or 311 and consent of instructor.

**030 860. Insect Behavior.** (3) Offered on demand. Major behavior patterns of insects and other arthropods. Two hours lec. and 3 hours lab. a week. Pr.: Entom. 730.

**030 898. Report in Entomology (M.S.).** Credit arranged. I, II, S. Work in various fields of entomology. Pr.: consent of instructor.

**030 899. Research in Entomology.** (M.S.). Credit arranged. I, II, S. For students majoring in entomology. Pr.: knowledge in special area and consent of instructor.

**030 920. 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. 775 and a course in biochemistry. Two hours lec. and 6 hours lab. a week.

**030 950. 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, 695; consent of instructor; One credit per 3 hours lab. Entom. 790 should be taken concurrently.

**030 956. Action and Metabolism of Insecticides.** (2) II. Offered 1974-75 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. 757 and a course in biochemistry.

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

## FOOD SCIENCE AND INDUSTRY

B.S. in Food Science and Industry, requires 126 sem. hrs.

This curriculum provides the student an education leading toward a career in the food industry. In addition to the general education provided, the student gains attitudes, knowledge and skills essential for an understanding of the principles of food science. Food scientists deal with the theoretical and practical aspects of the food industry from production of raw material through acceptance of the finished product.

The curriculum, designed to educate individuals in the discipline of food science, balances fundamental principles and application of food theory within a flexible program that permits each student to tailor his or her education to fit personal career goals.

Employment opportunities include production management, product and process research and development, public health and regulatory agency service, teaching, merchandising, advertising, technical service and sales, quality control supervision and positions in international food agencies.

Students will select one of three options which fit with their interests and aptitudes: (a) Processing, (b) Business, or (c) Science. The Processing and Business Options are interdepartmental programs involving the Departments of Animal Science and Industry, Dairy and Poultry Science, Grain Science and Industry, and Horticulture and Forestry. The Science Option is an interdepartmental program involving the Department of Foods and Nutrition in the College of Home Economics and the Departments of Animal Science and Industry, Dairy and Poultry Science, Grain Science and Industry, and Horticulture and Forestry in the College of Agriculture. Students may enroll in either college for the Science option of this curriculum, depending upon their interest. See College of Home Economics, page 227.

Facilities range from those required for fundamental studies to pilot plant production and utilization of dairy, poultry, red meat, horticultural and grain-based foods. Students should contact the Dean of Agriculture or Home Economics for assignment of an adviser.

## Core Curriculum — Processing and Business Options

Freshman (20-22 hrs.)		
229 100	English Composition .....	3
229 120	English Composition II .....	3
281 105	Oral Communication I .....	2
or 106	Oral Communication Ia .....	3
035 101	Ag. Orientation .....	1
245 100	College Algebra .....	3
225 110	Economics I .....	3
221 210*	Chemistry I .....	5
261 001	Concepts In Physical Education .....	0
261	Lifetime Sports .....	0

\*221 110 General Chemistry (5) may be taken by those electing the Business Option plus 9 hours minimum from the Physical Sciences.

Agriculture (12-14 hrs.)		
035 105	Intro. Food Science & Technology .....	3
025 200	Fundamentals of Nutrition .....	3
Plus any 2 of the following:		
015 200	Plant Science .....	4
005 102	Principles of Animal Science .....	3
AND		
005 103	Animal Science & Industry .....	1
OR		
025 103	Dairy Science .....	1
OR		
026 104	Poultry Science .....	1
030 300	Economic Entomology .....	3
045 100	Principles of Milling .....	3
010 100	Principles of Agric. Economics .....	3

Food Science (16-17 hrs.)		
025 350	Dairy Bacteriology .....	4
OR		
215 450	Microbiology .....	4
045 625	Food and Feed Plant Sanitation .....	4
OR		
025 690	Practical Quality Control of Dairy & Foods Products .....	3
010 514	Economics of Food Marketing .....	3
025 311	Introductory Food Chemistry .....	3
005 305 Fundamentals of Food Processing .....		
(Course also numbered 025 305; 040 305; & 045 305).		

Biological Sciences (8 hrs.)		
215 198	Principles of Biology .....	4
Plus one of the following:		
215 201	Organismic Biology .....	4
740 530	Anatomy & Physiology .....	4

Physical Sciences* (12-17 hrs.)		
221 230	Chemistry II .....	3
221 250	Chemistry II Lab. ....	2
(Not required if 221 271 Chemical Analysis is taken)		
211 120	Introductory Organic and Biological Chemistry .....	5
OR		
221	Organic Chemistry .....	3
AND		
211 200	Elementary Biochemistry .....	5
OR		
211 521	General Biochemistry .....	3
211 522	General Biochemistry Lab. ....	2
Note: 211 521 and 211 522 may be substituted for Elementary Biochemistry.		
265 113	General Physics I .....	4
OR		
265 115	Descriptive Physics .....	4

Mathematics (5-7 hrs.)		
Any two courses from the following:		
245 150	Plane Trigonometry .....	3
245 220	Analytic Geo. and Calc. I .....	4
OR		
245 500	Intro. to Anal. Proc. ....	3
284 200	Fundamentals of Computer Prog. ....	3
285 320	Elements of Statistics .....	3
OR		
285 340	Biometrics I .....	3
OR		
285 700	Statistical Methods I .....	3

## Social Sciences/ Humanities (9 hrs.)

**Communications (2-3 hrs.)**  
From College of Agriculture list of suggested Communications courses.

**TOTAL CORE CURRICULUM: 84-97 hours**

### MINIMUM

Core courses	Processing	Business
Options	84	81
Electives	24	27
	18	18
	126	126

\*9 credits minimum for Business Option

## Processing Option

A minimum of 18 hours from the following courses plus 6\* hours in other options.

005 250	Elements of Meat Processing	2
	AND	
005 260	Meat Processing	1
005 720	Meat-Packing Plant Operation	2-6
025 401	Fundamentals of Milk Processing	3
005 776	Meat Technology	3
025 501	Principles of Dairy Foods Processing	3
025 505	Principles of Dairy Foods Proc. Lab.	1-3
026 700	Poultry Products Technology	3
040 692	Harvesting, Handling and Processing of Fruits and Vegetables	3
045 120	Introductory Bakery Technology	2
045 610	Baking Science I	2
045 611	Baking Science I Lab	2
045 615	Baking Science II	2
045 616	Baking Science II Lab	1
045 710	Fund. of Processing Grains for Food	3
215 520	Microbiology of Foods	4
506 655	Dairy Mechanics	3
640 601	Food Science	4
640 612	Principles of Food Product Development	3

## Business Option

A minimum of 18 hours from the following courses which must include 305 260 and 305 270, plus 9 hours from Processing Option.

010 518	Econ. Principles of Business Firms	3
010 520	Grain Marketing	3
010 521	Livestock and Meat Marketing	3
225 120	Economics II	3
305 260	Fundamentals of Accounting	4
305 270	Managerial Accounting	3
305 271	Cost Accounting	3
305 292	Business Law I	3
305 392	Business Law II	3
305 420	Management Concepts	3
305 421	Production Management	3
305 440	Marketing	3
305 450	Business Finance	3
305 520	Personnel Administration	3
305 530	Labor Legislation	3
305 540	Consumer Behavior	3
305 541	Retailing	3
305 542	Sales Management	3

## Science Option — Joint Program of Colleges of Agriculture and Home Economics

### Liberal — General: (23 hrs.)

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

Electives in Social Science or Humanities ..... 9

### Biological Science: (8 hours)

215 198	Principles of Biology	4
215 450	Microbiology	4

Agriculture or Home Economics Core  
(Choose either A or B).

#### A. Agriculture (4-7 hours)

035 101	Ag Orientation	1
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Plus any of the following

015 200	Plant Science	4
005 102	Principles of Animal Science	3
	AND	
005 103	Animal Science & Industry	1
	OR	
025 103	Dairy Science	1
	OR	
026 104	Poultry Science	1
045 100	Principles of Milling	3

#### B. Home Economics (5-6 hours)

### Physical Sciences: (37 hrs.)

221 210	Chemistry I	5
221 230	Chemistry II	3
221 271	Chemistry Analysis	4
221 350	Gen. Org. Chemistry	3
221 351	Gen. Org. Chemistry Lab.	3
211 521	Gen. Biochemistry	3
211 522	Gen. Biochemistry Lab.	2
265 113	Gen. Physics I	4
265 114	Gen. Physics II	4
245 150	Plane Trig.	3
245 220	Anal. Geom. & Cal. I	4

### Professional Courses: (23-24 hrs.)

035 105	Intro. Food Science & Technology	3
640 602	Principles of Nutrition	3
215 520	Microbiology of Foods	4
640 601	Food Science	4
025 311	Introductory Food Chemistry	3
005 305	Fundamentals of Food Processing	3
	(Course also numbered 025 305; 040 305; & 045 305).	
045 625	Food and Feed Plant Sanitation	4
	OR	
025 690	Practical Quality Control of Dairy & Food Products	3

### Professional Elective: Total (14-17 hrs.) including (5-8 hrs.) of the following

005 250	Elements of Meat Processing	2
	AND	
005 260	Meat Processing	1
005 776	Meat Technology	3
005 720	Meat-Packing Plant Operation	2
025 401	Fund. of Milk Proc. & Sant.	3
045 710	Fund. of Processing Grains for Food	3
025 501	Principles of Dairy Foods Processing	3
025 505	Principles of Dairy Foods Processing Lab.	1-3
026 700	Poultry Products Technology	3
040 692	Harvesting, Handling and Processing of Fruits and Vegetables	3
045 120	Intro. Bakery Technology	2
045 610	Baking Science I	2
045 611	Baking Science I Lab.	2

### Plus Minimum 9 hours of the following:

010 514	Economics of Food Marketing	3
025 350	Dairy Bacteriology	4
025 715	Chemistry of Foods	3
045 300	Cereal and Feed Analysis	3
045 630	Cereal Science	3
045 635	Qualities of Feed & Food Ingredients	3
045 700	Adv. Cereal Chem.	3
045 730	Prin. of Food Analysis	3
215 201	Organismic Biol.	4
215 425	Human Physiology	4
285 340	Biometrics I	3
286 200	Fund. of Computer Programming	3
506 655	Dairy Mechanics	3
640 301	Trends in Food Products	3
640 760	Fund. of Food Flavor Analysis	3
640 710	Nutr. Needs Throughout Life Cycle	3
640 790	Food Res. Techniques	3
740 530	Anat. & Physiology	4

### Unrestricted Electives (13-16 hrs.)

#### Summary of Course Areas & Hours

Liberal-General	23
Biological Sci.	8
Agriculture or Home Economics Core	4-7
Physical Sciences	37
Prof. courses	23-24
Prof. electives	14-17
Unrestricted Electives	13-16

126

## GENERAL AGRICULTURE

Carroll V. Hess,\* Dean College of Agriculture  
Frank R. Carpenter,\* Assistant Dean  
David J. Mugler,\* Assistant Dean

## UNDERGRADUATE CREDIT

**035 101. Ag Orientation.** (1) I. Objectives, organization and procedures of the College of Agriculture and the University are studied. Historical developments and projected trends in agriculture and the application of basic sciences to

\*Could include 025 694 Food Plant Management (2)



agriculture are presented. Required of freshmen in Agriculture.

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

**035 298. Honors Colloquium in Agriculture.** (1) I, II. Open to freshmen and sophomores in the Honors Program for the College of Agriculture. Discussions and lectures on topics of interest to agriculture students. Seminar attendance may be included.

**035 398. Honors Colloquium in Agriculture.** (1) I, II. Open to juniors and seniors in the Honors Program for the College of Agriculture. Special seminars and visitations are arranged. Students are encouraged to enroll in research problems in their areas of interest.

**035 410. Agricultural Student Magazine.** (1-2) I, II. Planning, interviewing, preparing stories, headlines, layouts, and editing, for the Kansas State Agriculturist published by students in the College of Agriculture.

## UNDERGRADUATE AND GRADUATE CREDIT

**035 610. Problems in Agricultural Publications.** (1-3) 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 readers understanding and accepting content expressed. Junior standing.

## GRADUATE CREDIT

**035 988. Scientific Writing.** (1) I. Instruction in reporting research results, as in a scientific journal article, thesis or dissertation. Course shows 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 Seib;\* Assistant Professors Balding,\* Bates,\* and Miller;\* Instructors Pedersen and Sanchez.

### Undergraduate Study

The Department of Grain Science and Industry offers three curriculums. One leads to a Bachelor of Science degree in Bakery Science and Management; another to a Bachelor of Science degree in Feed Science and Management; and the third to a Bachelor of Science degree in Milling Science and Management. In each curriculum an option can be selected in Administration, Chemistry or Operations. This department also participates in the Food Science & Industry curriculum, see page 47.

## BAKERY SCIENCE AND MANAGEMENT

B.S. in Bakery Science and Management; requires 126 hours.

### 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 Comp. I	3
Mathematics	245 100	College Algebra	3
Phys. Ed.	261 001	Concepts in P.E.	0

15

<b>Spring Semester</b>			
Chemistry	221 230	Chemistry II	3
Economics	225 110	Economics I	3
English	229 120	English Comp. II	3
Mathematics	245 150	Plant Trig.	3
Phys. Ed.	261	Lifetime Sports	0
Speech	281 105	Oral Communications I	2
Mech. Engg.	560 212	Graphical Comm. I	2
			16

### SOPHOMORE

<b>Fall Semester</b>			
Grain Science	045 120	Introductory Bakery Technology	2
Biology	215 198	Principles of Biology	4
		Option A, B, or C	10
			16
<b>Spring Semester</b>			
Biology	215 450	Microbiology	4
		Social Science, Humanities Elect.	6
		Option A, B, or C	6
			16

### JUNIOR

<b>Fall Semester</b>			
Grain Science	045 635	Baking Science I	2
Grain Science	045 636	Baking Science I Lab.	2
Biology	215 520	Microbiology of Foods	4
		Option A, B, or C	8
			16
<b>Spring Semester</b>			
Grain Science	045 637	Baking Science II	2
Grain Science	045 638	Baking Science II Lab.	1
Grain Science	045 602	Cereal Science	3
		Option A, B, or C	9
			15

### SENIOR

<b>Fall Semester</b>			
		Social Science, Humanities Elect.	3
		Option A, B, or C	13
			16
<b>Spring Semester</b>			
Grain Science	045 634	Bakery Technology	3
Grain Science	045 651	Food and Feed Plant Sanit.	4
		Option A, B, or C	9
			16

### Option A (Administration)

Grain Science	045 300	Cereal and Feed Analysis	3
Biochemistry	211 120	Intro. Org. & Biol. Chem.	5
Chemistry	221 250	Chemistry II Lab.	2
Economics	225 120	Economics II	3
Com. Science	286 200	Fund. Computer Program	3
Physics	265 113	General Physics I	4
Statistics	285 320	Elements of Statistics	3
Mathematics	245 500	Intro. Analytic Processes	3
Bus. Ad.	305 260	Fund. of Accounting	4
Bus. Ad.	305 292	Business Law I	3
Bus. Ad.	305 440	Marketing	3
Bus. Ad.	305 450	Business Finance	3
		Electives	7

And nine (9) hours from the following:

Economics	225 530	Money and Banking	3
Bus. Ad.	305 270	Managerial Accounting	3
Bus. Ad.	305 271	Cost Accounting	3
Bus. Ad.	305 420	Management Concepts	3
Bus. Ad.	305 461	Taxation I	3
Bus. Ad.	305 520	Personnel Administration	3
Bus. Ad.	305 530	Labor Legislation	3
Bus. Ad.	305 540	Consumer Behavior	3
Bus. Ad.	305 542	Sales Management	3
Bus. Ad.	305 551	Investment	3
Industrial Engg.	550 501	Industrial Management	3

### Option B (Chemistry)

Grain Science	045 300	Cereal and Feed Analysis	3
Grain Science	045 625	Flour and Dough Testing	3
Biochemistry	211 521	General Biochemistry	3
Biochemistry	211 522	General Biochemistry Lab.	2
Chemistry	221 271	Chemical Analysis	4
Chemistry	221 531	Organic Chemistry I	3
Chemistry	221 532	Organic Chemistry I Lab.	2
Chemistry	221 550	Organic Chemistry II	3
Chemistry	221 551	Organic Chemistry II Lab.	2
Chemistry	221 500	Desc. Physical Chemistry	3
Mathematics	245 220	Anal. Geom. & Calc. I	4
Mathematics	245 221	Anal. Geom. & Calc. II	4
Physics	265 213	Engg. Physics I	5
Physics	265 214	Engg. Physics II	5
		Electives	9

**Option C (Operations)**

Biochemistry	211 120	Intro. Org. & Biol. Chemistry	5
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	265 213	Engg. Physics I	5
Physics	265 214	Engg. Physics II	5
Applied Mech.	510 350	Statics	3
Applied Mech.	510 306	Strength of Matis.	3
Elect. Engg.	530 519	Elec. Cir. Control	4
Industrial Engg.	550 501	Industrial Management	3
Mechanical Engg.	560 217	Graphical Communications II	3
Mechanical Engg.	560 513	Thermodynamics I	3
		Electives	7

**Option A (Administration)**

Ag. Econ.	010 520	Grain Marketing	3
Grain Science	045 300	Cereal and Feed Analysis	3
Grain Science	045 680	Feed Tech. II	4
Biochemistry	211 120	Intro. Org. & Bio. Chem.	5
Chemistry	221 250	Chemistry II Lab.	2
Economics	225 120	Economics II	3
Mathematics	245 500	Intro. Analytic Processes	3
Physics	265 113	General Physics I	4
Physics	265 114	General Physics II	4
Statistics	285 320	Elements of Statistics	3
Computer Science	286 200	Fundamentals of Computer Programming	3
Bus. Ad.	305 260	Fundamentals of Accounting	4
Bus. Ad.	305 292	Business Law I	3
Bus. Ad.	305 450	Business Finance	3
		Electives	6

**FEED SCIENCE AND MANAGEMENT**

B.S. in Feed Science and Management; requires 126 hours.

**FRESHMAN**

Fall Semester		Course	Sem. Hrs.
Gen. Agr.	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
Phys. Ed.	261 001	Concepts in P.E.	0
			15

Spring Semester				
Chemistry	221	230	Chemistry II .....	3
English	229	120	English Comp. II .....	3
Mathematics	245	150	Plane Trig. ....	3
Phys. Ed.	261		Lifetime Sports .....	0
Speech	281	105	Oral Comm. I .....	2
Mech. Engg.	560	212	Graphical Comm. I .....	2
			Option A, B, or C .....	3
				16

**SOPHOMORE**

Fall Semester			
Grain Science	045 110	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
			Social Science, Humanities	
			Elective .....	6
			Option A, B, or C .....	3
				16

**JUNIOR**

Fall Semester			
Grain Science	045 510	Feed Technology I .....	4
		Social Science, Humanities	
		Elective .....	3
		Option A, B, or C .....	9
			<hr/>
			16

Spring Semester			
Grain Science	045 661	Qualities of Feed and Food Ingreds. ....	3
		Option A, B, or C .....	12
			15

**SENIOR**

<b>Fall Semester</b>			Option A, B, or C .....	16
				16
<b>Spring Semester</b>				
<b>Grain Science</b>	<b>045 651</b>	<b>Food and Feed Plant Sanit. . .</b>	<b>4</b>	<b>12</b>
		<b>Option A, B, or C .....</b>	<b>12</b>	<b>16</b>

And nine (9) hours from the following:

Bus. Ad.	305 270	Managerial Accounting	3
Bus. Ad.	305 271	Cost Accounting	3
Bus. Ad.	305 420	Management Concepts	3
Bus. Ad.	305 461	Taxation I	3
Bus. Ad.	305 520	Personnel Administration	3
Bus. Ad.	305 530	Labor Legislation	3
Bus. Ad.	305 540	Consumer Behavior	3
Bus. Ad.	305 542	Sales Management	3
Bus. Ad.	305 551	Investment	3
Industrial Engg.	550 501	Industrial Management	3
Economics	225 530	Money and Banking	3

**Option B (Chemistry)**

Grain Science	045 300	Cereal and Feed Analysis	3
Biochemistry	211 521	General Biochemistry	3
Biochemistry	211 522	General Biochemistry Lab.	2
Chemistry	221 271	Chemical Analysis	4
Chemistry	221 500	Desc. Phys. Chem.	3
Chemistry	221 531	Organic Chemistry I	3
Chemistry	221 532	Organic Chemistry I Lab.	2
Chemistry	221 550	Organic Chemistry II	3
Chemistry	221 551	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	265 213	Engg. Physics I	5
Physics	265 214	Engg. Physics II	5
Statistics	285 700	Statistical Methods I	3
		Electives	12

**Option C (Operations)**

Grain Science	045 640	Advanced Flow Sheets	2
Grain Science	045 680	Feed Technology II	4
Grain Science	045 685	Ad. Flour & Feed Technology	3
Grain Science	045 655	Flour & Feed Mill Const.	3
Biochemistry	211 120	Intro. Org. & Biol. Chemistry	5
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	Ser. & Diff. Equa.	4
Physics	265 213	Engg. Physics I	5
Physics	265 214	Engg. Physics II	5
Applied Mech.	510 306	Strength of Matis.	3
Applied Mech.	510 350	Statics	3
Elect. Engg.	530 519	Elec. Cir. Control	4
		Electives	10

**MILLING SCIENCE AND MANAGEMENT**

B.S. in Milling Science and Management; requires 126 hours.

**FRESHMAN**

Fall Semester		Course	Sem. Hrs.
General Ag.	035 101	Ag Orientation .....	3
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
Phys. Ed.	261 001	Concepts in P.E. ....	0
			15

Spring Semester				
Chemistry	221	230	Chemistry II	3
English	229	120	English Comp. II	3
Mathematics	245	150	Plane Trig.	3
Phys. Ed.	261		Lifetime Sports	0
Speech	281	105	Oral Comm. I	2
Mech. Engg.	560	212	Graphical Comm. I	2
			Option A, B, or C	3



**SOPHOMORE**

<b>Fall Semester</b>		
Grain Science	045 110	Flow Sheets ..... 2
Biology	215 198	Principles of Biology ..... 4
Economics	225 110	Economics I ..... 3
		Option A, B, or C ..... 7
		— 16
<b>Spring Semester</b>		
Grain Science	045 500	Milling Tech. I ..... 4
Biology	215 450	Microbiology ..... 4
		Social Science, Hum. Elec. ... 6
		Option A, B, or C ..... 2
		— 16

**JUNIOR**

<b>Fall Semester</b>		
Agronomy	015 340	Market Grading Cereals ..... 2
		Social Science, Humanities
		Electives ..... 3
		Option A, B, or C ..... 11
		— 16
<b>Spring Semester</b>		
Grain Science	045 602	Cereal Science ..... 3
		Option A, B, or C ..... 12
		— 15

**SENIOR**

<b>Fall Semester</b>		
Grain Science	045 635	Baking Science I ..... 2
Grain Science	045 636	Baking Science I Lab ..... 2
		Option A, B, or C ..... 12
		— 16
<b>Spring Semester</b>		
Grain Science	045 651	Food and Feed Plant
		Sanitation ..... 4
		Option A, B, or C ..... 12
		— 16

**Option A (Administration)**

Ag. Economics	010 520	Grain Marketing ..... 3
Grain Science	045 300	Cereal and Feed Analysis ..... 3
Biochemistry	211 120	Intro. Org. & Biol. Chem. ... 5
Chemistry	221 250	Chemistry II Lab. .... 2
Economics	225 120	Economics II ..... 3
Mathematics	245 500	Intro. Anal. Proc. .... 3
Computer Science	286 200	Fund. Computer Program ... 3
Physics	265 113	General Physics I ..... 4
Physics	265 114	General Physics II ..... 4
Statistics	285 320	Elements of Statistics ..... 3
Bus. Ad.	305 260	Fund. of Accounting ..... 4
Bus. Ad.	305 292	Business Law I ..... 3
Bus. Ad.	305 450	Business Finance ..... 3
		Electives ..... 7

And nine (9) hours from the following:

Bus. Ad.	305 270	Managerial Accounting ..... 3
Bus. Ad.	305 271	Cost Accounting ..... 3
Bus. Ad.	305 420	Management Concepts ..... 3
Bus. Ad.	305 461	Taxation I ..... 3
Bus. Ad.	305 530	Labor Legislation ..... 3
Bus. Ad.	305 540	Consumer Behavior ..... 3
Bus. Ad.	305 542	Sales Management ..... 3
Bus. Ad.	305 551	Investment ..... 3
Bus. Ad.	305 520	Personnel Administration ... 3
Industrial Engg.	550 501	Industrial Management ..... 3
Economics	225 530	Money and Banking ..... 3

**Option B (Chemistry)**

Grain Science	045 300	Cereal and Feed Analysis ..... 3
Grain Science	045 625	Flour and Dough Testing ..... 3
Biochemistry	211 521	General Biochemistry ..... 3
Biochemistry	211 522	General Biochem. Lab. .... 2
Chemistry	221 271	Chemical Analysis ..... 4
Chemistry	221 500	Desc. Phys. Chemistry ..... 3
Chemistry	221 531	Organic Chemistry I ..... 3
Chemistry	221 532	Organic Chemistry I Lab. ... 2
Chemistry	221 550	Organic Chemistry II ..... 3
Chemistry	221 551	Organic Chemistry II Lab. ... 2
Mathematics	245 220	Anal. Geom. & Calc. I ..... 4
Mathematics	245 221	Anal. Geom. & Calc. II ..... 4
Physics	265 213	Engg. Physics I ..... 5
Physics	265 214	Engg. Physics II ..... 5
		Electives ..... 13

**Option C (Operations)**

Grain Science	045 640	Advanced Flow Sheets ..... 2
Grain Science	045 670	Milling Technology II ..... 4
Grain Science	045 685	Advanced Flour and Feed
		Technology ..... 3
Grain Science	045 655	Flour & Feed Mill
		Construction ..... 3
Biochemistry	211 120	Intro. Org. & Biol. Chem. .... 5
Chemistry	221 250	Chem. 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	265 213	Engg. Physics I ..... 5
Physics	265 214	Engg. Physics II ..... 5
Applied Mechanics	510 306	Strength of Matls. .... 3
Applied Mechanics	510 350	Statics ..... 3
Elect. Engg.	530 519	Elec. Cir. Control ..... 4
		Electives ..... 8

**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. Requirements for entering graduate study in Grain Science are: 1. Mathematics including college algebra, 2. Analytical chemistry, 3. Organic chemistry, 4. A course in physics, 5. A course in a biological science, 6. A course in graphical communications. When the student's committee believes it necessary the student will be required to take additional undergraduate courses to prepare him more completely for his own program.

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.

**045 110. 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.

**045 120. 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.

**045 300. 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.

**045 305. 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**

**045 500. 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 110 or consent of instructor.

**045 510. 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. 110.

**045 520. 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. 320 or consent of instructor.

**UNDERGRADUATE AND GRADUATE CREDIT**

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

**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. 602 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. Sc. 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. Offered on sufficient demand. Designing flow diagrams for flour mills, corn mills, or feed mills. Six hours lab. a week. Pr.: Gr. Sc. 500 or 510 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.

**045 655. 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. 500 or 510 or consent of instructor.

**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. 500 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. 510, Phys. 114 or 214.

**045 685. Advanced Flour and Feed Technology.** (3) II. Offered on sufficient demand. 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.

**045 700. Advanced Cereal Chemistry.** (3) II. 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. 521 and Gr. Sc. 602 or consent of instructor.

**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. 602 or 661 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. 300, Biochem. 120 or equivalent or consent of instructor.

**045 715. 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.

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

**GRADUATE CREDIT**

**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. 521, 522, or consent of instructor.

**045 899. Research in Grain Science.** Credit arranged. I, II, S. Research may be used as basis for the M.S. thesis. Pr.: Consent of staff.

**045 900. Graduate Seminar in Grain Science.** (1) I, II. Discussion of technical problems in the cereal industry. One hour lec. a week. Attendance required of all graduate students in Grain Science.



**045 999. Research in Grain Science.** Credit arranged. I, II, S. Research may be used as basis for Ph.D. Dissertation. 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, Dallan,\* Deutsch, Gaylor, Geyer,\* Hadle, Mahaffey,\* 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, Filinger and Pickett; Assistant Professor Willis.

### Undergraduate Study

The Department of Horticulture and Forestry offers two, four-year curriculums (Horticulture and Horticultural Therapy), and two, two-year programs (Pre-Forestry and Retail Floriculture). The Department also helps administer and advise students enrolled in three interdepartmental four-year programs. These are the Crop Protection Curriculum, page 41, the Food Science and Industry Curriculum, page 47, and the Parks and Recreation Area Management option of the Curriculum in Natural Resource Management, page 58.

### HORTICULTURE [4-yr. curriculum]

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

Horticulture is a science and an art involving plants grown for intensive food production, aesthetic value, environmental improvement or social-therapeutic effects. Students, in consultation with faculty advisers, may select courses of study in one of three options: Horticultural Science, Horticultural Industries or Urban Horticulture and Forestry.

All students in the curriculum are required to take a core of general courses in addition to the agricultural and horticultural courses. Within each option the student is advised to take specific courses and restricted electives that give emphasis necessary for career goals.

The **Horticultural Science** option trains undergraduates in horticulture for professional positions requiring advanced degrees. Students in this curriculum receive a horticultural background with additional emphasis in physical and biological sciences. Job opportunities exist for teaching or research with colleges or universities, government, industries (Ag chemicals, production, food science, processing, equipment companies, etc.) and international agriculture.

The **Horticultural Industries** option is for students interested in the production of horticultural crops and the related businesses. It includes careers in horticultural enterprises such as retailing horticultural products, food inspection services, wholesale buyers, saleswork and extension activities. It also includes crop production endeavors such as nursery production,

orchard management, vegetable farming or greenhouse production. Students receive a solid background in horticulture with emphasis on crop production and additional business training.

The **Urban Horticulture and Forestry** option is for students concerned about improving the quality of man's environment with plant materials. Students obtain a background in horticulture with additional training in either landscape development, municipal forest management or in public communications. Students will also elect political science and social science courses to better understand community and city government policies. Graduates will provide landscape services for municipal or public grounds and recreational areas; serve as city foresters; provide landscape contracting for residential, public and industrial grounds; provide public service information for radio, TV, magazine, newspapers, advertisers, etc; or conduct public relation work for industries, government, or other organizations.

### General Education Requirements

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
Gen. Botany or Principles of Biology .....	4
Concepts in Physical Education .....	0
Lifetime Sports .....	0
Humanities and / or Social Science electives .....	12
Communications electives .....	2 or 3

### Horticulture and Agriculture Requirements

Horticulture and Forestry Seminar .....	0
Home Horticulture .....	2
Home Horticulture Laboratory .....	1
Landscape Horticulture .....	3
Greenhouse Management .....	3
Fruit Production .....	3
Vegetable Crop Ecology .....	3
Plant Science .....	4
Soils .....	4
Economic Entomology .....	3
Plant Pathology .....	2

### Horticultural Science Option

Animal Sc. & Ind. 005 500	Genetics .....	3
Biology 215	Biology Elective .....	4
Chemistry 221 230	Chemistry II .....	3
Chemistry 221 250	Chemistry II Lab. ....	2
Physics 265 101	Descriptive Physics ..	4
Chemistry 221 190	Elem. Organ. Chem. ....	3
Mathematics 245 150	Trigonometry .....	3
Computer Sc. 266	Computer Sc. Elec. ....	3
Statistics 285	Statistics Elec. ....	3
Horticulture 040	Horticulture Elec. ....	17
	Free Electives .....	14-15

### Horticultural Industries Option

Business Ad. 305 260	Fund. of Accounting .....	4
	Business Electives .....	6
Biology 215	Bio. Sc. Elec. ....	4
	Phys. Sc. Elec. ....	6
	Math, Stat., Computer Science Elec. ....	6
Horticulture 040	Hort. Elec. ....	18
	Free Elec. ....	15-16

**Urban Horticulture and Forestry Option**

		Biol. Sc. Elec. ....	3
		Phys. Sc. Elec. ....	3-5
Bus. Ad.	305 260	Fund. of Accounting ....	4
		Business Elective ....	3
Landscape Arch.	110 200	Landscape Design ....	3
Hort. & For.	040 220	Plant Propagation ....	3
Hort. & For.	040 680	Plant Protection ....	3
Hort. & For.	040 280	Forest Conservation ....	3
		Free Electives ....	17-20
		Professional Electives ....	15
		(to be selected from list below)	

**PROFESSIONAL ELECTIVES**

(Select a minimum of 15 hours within one of the following three professional areas)

**1. Landscape Horticulture**

Hort. & For.	040 261	Herbaceous Plant Matls. ....	3
Hort. & For.	040 271	Woody Plant Matls. ....	3
Landscape Arch.	110 310	Res. Landscape Des. ....	3
Hort. & For.	040 550	Landscape Contracting and Development ....	3
Hort. & For.	040 610	Turf Management ....	2
Hort. & For.	040 611	Turf Management Lab. ....	1
Hort. & For.	040 620	Arboriculture ....	3
Architecture	105 298	Apprec. of Arch. ....	3
Ag. Engin.	506 558	Conservation Surveying and Planning ....	3
		OR	
Civil Engin.	525 212	Elementary Surveying Engineering ....	3
Architecture	104 207	Arch. Graphics I ....	2
		OR	
Mech. Engin.	560 212	Graphical Communications, Analysis & Design I ....	2
			26

**2. Landscape Forestry**

Hort. & For.	040 261	Herbaceous Plant Matls. ....	3
Hort. & For.	040 271	Woody Plant Matls. ....	3
Hort. & For.	040 290	Dendrology ....	4
Hort. & For.	040 430	Forest Practices ....	3
Hort. & For.	040 610	Turf Management ....	2
Hort. & Forestry	040 611	Turf Management Lab. ....	1
Hort. & For.	040 620	Arboriculture ....	3
Hort. & For.	040 695	Municipal Forestry ....	2
Reg. and Comm. Plan.	109 315	Intro. to Planning ....	3
Ag. Engin.	506 558	Conservation Surveying and Planning ....	3
		OR	
Civil Engin.	525 212	Elementary Surveying Engineering ....	3
			27

**3. Communications**

Art	209 100	Design I ....	2
Art	209 205	Commercial Art Tech. ....	2
Psychology	273 510	Psych. of Bus. & Ind. ....	3
Speech	281 726	Persuasion ....	3
Journ.	289 320	Principles of Ad. ....	3
Journ.	289 310	Photo Journalism ....	3
Journ.	289 250	Ag. Journ. ....	3
Journ.	289 630	Public Relations ....	3
Bus. & Acct.	305 340	Sales Communication ....	3
Bus. & Acct.	305 440	Marketing ....	3
			28

**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 trained horticulturists capable of working with people. 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**

<b>Fall Semester</b>			
English	229 100	English Composition I ....	3
Speech	281 105	Oral Communication I ....	2
Mathematics	245 100	College Algebra ....	3
Psychology	273 110	Gen. Psych. ....	3
Gen. Ag.	035 101	Ag Orientation ....	1
Phys. Ed.	261 001	Concepts In P.E. ....	0
		Humanities Elec. ....	3
Hort. & For.	040 099	Horticulture and Forestry Seminar ....	0
			15

**Spring Semester**

English	229 120	English Comp. II ....	3
Economics	225 110	Economics I ....	3
Chemistry	221 210	Chemistry I ....	5
		OR	
Chemistry	221 110	Gen. Chemistry ....	5
Sociology	277 214	Intro. to Sociology ....	3
Hort. & For.	040 150	Home Hort. ....	2
Hort. & For.	040 151	Home Hort. Lab. ....	1
Phys. Ed.	261	Lifetime Sports ....	0
			17

**SOPHOMORE**

<b>Fall Semester</b>			
Biology	215 210	Gen. Botany I ....	4
		OR	
Biology	215 198	Principles of Biology ....	4
Hort. & For.	040 130	Floral Arrangement I ....	3
Hort. & For.	040 261	Herbaceous Plant Materials ....	3
Landscape Arch.	110 200	Landscape Design ....	3
		Electives ....	3
			16

**Spring Semester**

Hort. & For.	040 200	Plant Science ....	4
Psychology	273 505	Abnormal Psych. ....	3
Soc. and Anthro.	277 450	Group Behavior ....	3
		Electives ....	3
	620	Family and Child Development Elective ....	3
			16

**JUNIOR**

<b>Fall Semester</b>			
Hort. & For.	040 520	Fruit Production ....	3
Hort. & For.	040 570	Greenhouse Management ....	3
Agronomy	015 205	Soils ....	4
Education	405 215	Ed. Psych. I ....	3
		Elective ....	3
			16

**Spring Semester**

Hort. & For.	040 560	Vegetable Crop Ecol. ....	3
Art	209 100	Design I ....	2
Hort. & For.	040 220	Plant Propagation ....	3
Plant Path.	050 500	Plant Pathology ....	3
		Humanities Elective ....	3
		Electives ....	2 or 3
			16 or 17

**SENIOR**

<b>Either Semester</b>			
Entomology	030 300	Econ. Entomology ....	3
Hort. & For.	040 508	Landscape Hort. ....	3
		Communications Elec. ....	3
Psychology	273	Psych. Elec. ....	3
		Electives ....	3
			15

**Either Semester**

Hort. & For.	040 640	Hort. Problems ....	6
Hort. & For.	040 661	Greenhouse and Clinical Practices ....	6
Hort. & For.	040 662	Garden and 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	221 210	Chemistry I	5
English	229 100	English Comp. I	3
Speech	281 105	Oral Comm. I	2
Mathematics	245 100	College Algebra	3
Phys. Ed.	261 001	Concepts in Phys. Ed.	0
Hort. & For.	040 280	Forestry Conservation	3
Hort. & For.	040 090	Horticulture and Forestry Seminar	0
			16

Chemistry	221 230	Chemistry II	3
English	229 120	English Comp. II	3
Mathematics	245 150	Plane Trig.	3
Economics	225 110	Economics I	3
Phys. Ed.	261	Lifetime Sports	0
Agronomy	015 205	Soils	4
			16

### SOPHOMORE

Biology	215 210	Gen. Botany	4
Economics	225 120	Economics II	3
Geology	234 100	Phys. Geology	4
Hort. & For.	040 430	Forestry Prac.	3
Statistics	285 320	Elements of Stat.	3
			17

Physics	265 113	Physics I	4
Hort. & For.	040 290	Dendrology	4
		Electives	3
		Soc. Sci. 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. & For.	040 131	Floral Arrangement	3
Landscape Arch.	110 200	Gen. Landscape Des.	3
Biology	215 210	Gen. Botany	4
Bus. Admin.	305 210	Personal Finance	2
Psychology	273 110	Gen. Psych.	3
			15

### Spring Semester

Hort. & For.	040 140	Advanced Floral Arrangement	3
Hort. & For.	040 200	Plant Science	4
Hort. & For.	040 150	Home Horticulture	2
Cl., Text. & I. Des.	611 100	Design for Contemporary Living	3
Speech	281 105	Oral Comm. I	2
Art	209 100	Design I	2
			16

### Summer School

Bus. Ad.	305 260	Fund. of Acct.	4
English	229 100	English Comp. I	3
			7

## Graduate Study

Both the Master of Science and Doctor of Philosophy degrees are offered. Graduate study leading to the degree Master of Science may be pursued in forestry, floriculture, fruit and nut crops, horticultural therapy, ornamental horticulture, parks and recreation area management, turfgrass and vegetable crops.

Major work leading to the degree Doctor of Philosophy is offered in all fields listed above except for forestry and park and recreation area management. Areas of proficiency include plant breeding and genetics, horticulture and forestry 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

**040 099. 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.

**040 100. 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 the basic concepts and practices of horticulture. Emphasis is on the culture, use and relationship of horticulture plants in the garden, yard, and home. Two hours rec. a week. No prerequisites.

**040 151. Home Horticulture Laboratory.** (1) I, II. The applications of horticultural practices with emphasis on the establishment, maintenance, and use of horticulture plants around the home. Three hours lab. per week. Pr.: 040 150 or concurrent enrollment.

**040 170. Natural Resources and Man.** (3) I, S. A survey of the "web of life" concept of man's role in the ecosystem, in relation to the use of renewable and non-renewable natural resources. The impact of society, economics, politics and philosophy will be examined to determine utilization of natural resources. Three hours rec. a week. No prerequisites.

**040 180. Indoor Plants and Flowers** (2) I, II. The selection, culture, and use of plants in homes, schools, offices, and public buildings. Two hours lec. a week. No prerequisites.

**040 190. Gardening for Food.** (2) II. An introductory course on how to plant, culture, harvest and store fruits and vegetables from the home standpoint. Two hours rec. per week. No prerequisites.

**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.

**040 240. Use of Natural Resources for Leisure.** (3) II. A survey of the concepts, history, present status and goals of outdoor recreation for leisure, with particular emphasis on the role of using natural resources for leisure. Three hours rec. a week. No prerequisites.

**040 261. Herbaceous Plant Materials.** (3) I. Annual and perennial flowers, ornamental and turf grasses, and tropical plants for ornamental planting. Pr.: 215 210 or 040 200.

**040 271. Woody Plant Materials.** (3) II. Deciduous and evergreen trees, shrubs and vines for landscape use. Pr.: 215 210 or 040 200.

**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.

**040 299. Flower Judging.** (1) II. Principles of judging cut flowers, flowering potted plants, and foliage plants for flower shows and judging contests. Pr.: consent of instructor.

**040 300. Landscape Development.** (2) I. The location and arrangement of plants and other permanent features of the landscape around homes and other similar areas. Six hrs. lab per week. Pr.: 040 261, 040 271, and 110 300.

**040 430. Forestry Practices.** (3) I. Introduction to the use of instruments and applied measurements used in forestry practices. Two hours recitation and three hours lab. a week.

**040 499. Internship in Pest Management.** (1-2) S. Principles of pest management including quarantines, legislative enforcement, diagnosis, pesticide application, chemical development, and pest-management program formulation and recommendations. A maximum of two credit hours for each four weeks of supervised work study with an approved organization. A maximum of 2 hours may be applied toward a B.S. in Crop Protection. Credit is allowed only for approved work-study programs. Pr.: 015 610, 030 311, 050 420 and 050 500.

## UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**040 500. Park Administration and Management.** (3) I. Analyses of park administration and management and the detailed study of the principles of administrative behavior, using problem solving models and case studies. Three hours rec. a week. Field trips required. Pr.: 040 240.

**040 508. 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.

**040 510. 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 Agron., Sec. 015 510.)

**040 520. Fruit Production.** (3) I. Principles and practices of cultivating fruit and nut crops commercially and in the home grounds. Laboratory offers experiences in pomological practices. Two hours rec. and 3 hours lab. a week. Pr.: 040 200 or equiv.

**040 550. Landscape Contracting and Development.** (3) II. The use, interpretation and development of planting plans (including contracting, construction, and specifications) as applied to landscape Horticulture. Pr.: 110 300 or consent of instructor.

**040 560. Vegetable Crop Ecology.** (3) II. Study of ecological principles involved in the production of vegetable crops, with emphasis on environmental conditions. Two hours lecture and 3 hours lab. or field trips per week.

**040 570. Greenhouse Management.** (3) I. Greenhouse construction, environmental control, crop scheduling and management. Two hours rec. and three hours lab. a week. Pr.: 215 210 or 040 200.

## 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. 205 or consent of instructor.

**040 611. Turfgrass Management Laboratory.** (1) I. Exercises in identification and application of physical and biological principles in the management of swards for use and beauty. Pr.: 040 610 or concurrent enrollment.

**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. 205 or consent of instructor.

**040 625. Floriculture.** (3) II. The principles and commercial practices for producing greenhouse florist crops. The relationship is stressed between a plant's physiological response and its greenhouse environment. Three hours rec. a week. Pr.: 040 570.

**040 635. Methods of Environmental Interpretation.** (3) II. Principles and techniques necessary to communicate values of man's total environment to visitors in recreation and park areas. The syntheses and analyses of information necessary in various types of formal and informal presentations. The philosophy, design and use of interpretive devices to communicate the understanding of man's total environment in recreation and park areas. Two hours rec. and 3 hours lab. per week. Field trips required. Pr.: 040 240. Senior Standing.

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

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



**040 642. Parks and Recreation Problems.** Credit arranged. I, II, S. Special problems and individual research in recreation. Designed for investigations and individual study not included in the student's normal course work. Pr.: Advanced undergraduates and consent of instructor.

**040 655. Integrated Pest Management.** (3) II. Offered in cooperation with Entomology. See 030 655.

**040 655. Greenhouse and 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.

**040 680. Plant Protection.** (3) II. A discussion of the equipment, procedures, and techniques used in controlling pests on crops. Emphasis placed on types, theory, operation, and maintenance of application equipment. Two hours rec. and three hours lab. a week. Pr.: 030 300 or 050 500 or equiv.

**040 692. Handling and Processing Fruits and Vegetables.** (3) I. Fall '73 and alt. years. Field trips required. Principles of harvesting, grading, handling, nutritive value and processing fruits and vegetable crops. Pr.: 215 198 or equiv. and a course in organic chemistry or biochemistry.

**040 695. Municipal Forestry.** (2) I. A study of management problems of publicly owned shade trees. Financing, public relations, personnel, organization, regulations, and planning in the effective department. Field trip required. Pr.: Junior standing.

**040 700. Vegetable Crop Physiology.** (3) I. Fall '74 and alt. years. 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.

**040 710. 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. 500 or equivalent (Joint listing with the Dept. of Agronomy, see 015 710)

**040 730. Fruit Science** (3) II. Spring '75 and alt. years. Detailed discussion of selected and important pomological topics. Laboratory includes exercises on practical and research topics with emphasis on latter. Two hours rec. and three hours lab. a week. Pr.: 040 200 or equiv.

## GRADUATE CREDIT

**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.

**040 898. Masters Report.** Credit arranged. I, II, S. Investigations in pomology, olericulture, floriculture, ornamental horticulture, forestry or parks and recreation area management, for preparation of masters report. Pr.: Consent of instructor.

**040 899. Research — MS.** Credit arranged. I, II, S. Investigations in pomology, olericulture, floriculture, ornamental horticulture, forestry, or parks and recreation area management for preparation of masters thesis. Pr.: Consent of instructor.

**040 900. Horticultural Plant Breeding.** (3) II. Spring '75 and alt. years. Methods, practices, and application of breeding (flowers, fruits, shrubs, trees, turf grasses and vegetables) to

economic use and environmental improvement. Pr.: 015 710 or 040 710.

**040 910. 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 Agronomy. See 015 910.)

**040 920. Advanced Pomology.** (1-3) II. Spring '74 and alt. years. Morphological and physiological changes occurring in fruit plants. Pr.: Consent of instructor.

**040 921. Horticultural Crop Nutrition.** (2) I. Fall '73 and alt. years. Nutritional requirements of horticultural crops and factors affecting these requirements. Review of current literature on hort. crop nutrition. Two hours lecture or reports a week. Pr.: 040 200, 015 205 and 215 600 or equivalent.

**040 930. 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 Agronomy, 015 930)

**040 951. Horticulture and Forestry Graduate Seminar.** (1) I, II. A discussion of investigational works in the various branches of horticulture and forestry.

**040 955. Controlled Plant Environment.** (3) II. Spring '75 and alt. years. Study of the greenhouse and plant growth chamber as tools for plant science research. Three hours rec. per week. Pr.: Consent of instructor.

**040 961. Dormancy and Regeneration.** (2) I. Fall '74 and alt. years. Physiological and anatomical bases for dormancy, rest and regeneration in seeds, buds and stems. Manipulation and use in research. Pr.: 040 220 or consent of instructor.

**040 999. Research in Horticulture, Ph.D.** 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.

## 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 which help him understand and solve environmental problems, and courses in communications which 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 a committee of faculty from the Departments of Agricultural Economics, Agronomy, Agricultural Engineering and Horticulture & Forestry. These committee members serve as advisers to students in the respective options. 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
Concepts in Physical Education .....	0
	15

**Spring Semester**

English Composition II .....	3
Plane Trigonometry .....	3
Oral Communication I .....	2
General Botany or Principles of Biology .....	4
Chemistry II Lecture .....	3
Lifetime Sports .....	0
	15

**SOPHOMORE****Fall Semester**

Economics I .....	3
Geology I .....	3
Plant Science .....	4
General Physics I <sup>1</sup> .....	4
	14

**Spring Semester**

Soils .....	4
Principles of Agricultural Economics .....	3
Option and Electives .....	9 or 10
	16 or 17

**JUNIOR****Fall Semester**

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

**Spring Semester**

Humanities or Social Science <sup>2</sup> .....	3
Environmental Biology .....	4
Economic Entomology .....	3
Option and Electives .....	6
	16

**SENIOR****Fall Semester**

Population and Human Ecology or Community Organization and Leadership .....	3
Option and Electives .....	13
	16

**Spring Semester**

Option and Electives .....	16
	16

Total 126

**Option A: Soil and Water Conservation<sup>3</sup>**

Chemistry II Laboratory .....	2
General Organic Chemistry <sup>4</sup> .....	5
Organismic Biology .....	4
Microbiology .....	4
Methods of Environmental Interpretation .....	3

**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
	36-38

**Option B: Resource Administration<sup>5</sup>**

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
Geography of Extractive Industries .....	3
Electives .....	14-16

39-41

**Option C: Park and Recreational Areas Management<sup>6</sup>**

Natural Resources and Man .....	3
Use of Natural Resources for Leisure .....	3
Methods of Environmental Interpretation .....	3
Park Administration and Management .....	3
Plant Pathology .....	2
Landscape Horticulture or Plant Protection .....	3
Turf Management .....	2
Arboriculture .....	3
Landscape Design .....	3
Community Recreation .....	3
Electives .....	16

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**PLANT PATHOLOGY**

B.S. in Agriculture under the Crop Protection Curriculum which includes a Plant Pathology Science Option (See page 41).

Earl D. Hansing,\* Acting Head of Department

Professors Dickerson,\* Hansing,\* and King; Associate Professors Edmunds,\* Johnson,\* Stuteville,\* and Willis,\* Assistant Professors Browder,\* Eversmeyer, Niblett,\* Sauer,\* and Schwenk;\* Ancillary Associate Professor Kramer;\* 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**

Students interested in the broad aspects of plant disease and insect and weed control should consider the Pest Management or Business and Industries Options of the Crop Protection Curriculum (See page 41.) Students who wish to specialize in the study of plant diseases should consider the Plant Pathology Science Option of the Crop Protection Curriculum, discussed below.

Students majoring in the Plant Pathology Science Option of the Crop Protection Curriculum take, in addition to the general requirements for the curriculum, the following courses. (See page 41).

Major Courses	Semester Hours
215 210 General Botany .....	4
015 200 Plant Science .....	4
050 500 Plant Pathology .....	2
215 640 Introductory Mycology .....	4
050 700 General Plant Pathology .....	3
Electives in the Botanical Sciences .....	9

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 30.

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.



**Supporting Courses**

215 450	Microbiology .....	4
005 500	Genetics .....	3
221 230	Chemistry II .....	3
221 250	Chemistry II Lab. ....	2
221 350	General Organic Chemistry .....	3
221 351	General Organic Chem. Lab. ....	2
015 205	Soils .....	4
245 150	Plane Trigonometry .....	3
285 340	Biometrics I .....	3
265 113	General Physics I .....	4

**One of the following:**

265 193	Descriptive Meteorology .....	3
265 114	General Physics II .....	4

**One of the following:**

211 510	General Plant Biochemistry .....	4
211 521 and 211 522	Gen. Biochem. Lec. and Lab. ....	5
211 755 and 211 756	Biochem. I Lecture and Lab. ....	5

**One of the following:**

030 300	Economic Entomology .....	3
030 311	General Entomology .....	3

**One or more of the following:**

245 225	Analytical Geometry and Calculus I .....	4
OR		
286 200	Fundamentals of Computer Programming .....	3

**One or more of the following:**

005 102	Principles of Animal Sci. ....	3
005 103	Basic Animal Sci. & Ind. ....	2
010 100	Principles of Agri. Econ. ....	3
506 300	Engg. in Agric. ....	4
Plus		
	An Elective in Accounting or Bus. Admin.	

**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 agronomy, biology, botany, 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, scanning 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 CREDIT**

**050 210. Introduction to Plant Pest Control.** (2) I. A survey of losses due to crop pests and how that affects the world food supply, kinds of abiotic and biotic pests, methods and systems for control of pests, pesticide uses, and state and federal regulations governing the use of pesticides. Two hours rec. a week. No prerequisite.

**050 410. Plant Pest Diagnosis.** (1) I. Practical experience in diagnosing plant diseases in fields, lawns, and gardens. Four hours combined rec. and lab. a week. Pr.: Agronomy 610, Entomology 311, Plant Pathology 420 and Plant Pathology 500.

**050 420. Plant Nematology.** (2) II. An introductory course on the plant parasitic nematodes, their biology and the basis for

controls. Three hours combined rec. and lab. a week. Pr.: Biology 198 or equiv.

**050 499. Internship in Pest Management.** (1-2) S. Offered in cooperation with Horticulture and Forestry. See Horticulture 499.

**UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD**

**050 500. Plant Pathology.** (2) I, II. An introductory course on the nature, cause, and control of crop diseases. One hour lecture and two hours lab. a week. Pr.: Biology 198, 210 or equiv.

**UNDERGRADUATE AND GRADUATE CREDIT**

**050 635. Properties of Pesticides.** (2) I. A discussion of the nature, mode of action, and fate of agricultural pesticides used on crops. Two hours rec. a week. Pr.: Biochemistry 120 or equiv. Offered in cooperation with Agronomy.

**050 645. Diseases of Field and Horticultural Crops.** (3) II. Offered in 1973-74 and alt. years. Diseases of cereal, forage, fiber, vegetable, fruit, and ornamental crops, their causes, symptoms, life histories, host-parasite relationships, and control. The course will be taught principally by general disease; however, about 2/3 of the references may be made to field crops and 1/3 to horticultural crops. Two hours rec. and two hours lab. a week. Pr.: Plant Pathology 500 or consent of instructor.

**050 655. Integrated Pest Management.** (3) II. Offered in cooperation with Entomology. See Entomology 655.

**050 700. 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.: Biology 640 or equiv., or consent of instructor.

**050 710. Principles of Plant Disease Control.** (3) II. Offered in 1974-75 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 500 or consent of instructor.

**050 720. General Nematology.** (3) I. Offered in 1973-74 and alt. years. 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 500 or consent of instructor.

**050 730. General Virology.** (3) II. (Same as Biology 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 Biology 450 or equiv. and Biochemistry 521 or equiv. Consent of instructor. (Taught in cooperation with the Division of Biology).

**050 740. Literature of Plant Pathology.** (1) I. Study and analysis of recent important developments in plant pathology. One hour rec. a week. Pr.: Plant Pathology 700 or consent of instructor.

**GRADUATE CREDIT**

**050 820. Methods in Plant Pathology.** (3) I. Offered 1974-75 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 500 or equiv., or consent of instructor.

**050 750. 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.

**050 870. Seminar in Plant Pathology.** (1) I, II. Reports in the field of plant pathology. Pr.: Consent of instructor.

**050 899. Research in Plant Pathology for the M.S. Degree.** 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.

**050 900. Plant Virology.** (3) I. Offered 1974-75 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 700 or 820, Biochemistry 521 or equiv., and consent of instructor.

**050 910. 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.

**050 999. Research in Plant Pathology for the Ph.D. Degree.** 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 Ex-

periment 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 Anthropology 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; community 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, Kansas 66506.



## BRANCH AGRICULTURAL EXPERIMENT STATIONS

### Fort Hays Branch Station

W. W. Duitsman, 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 Herron, Assistant Professors Condray, Davis, DePew, 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.

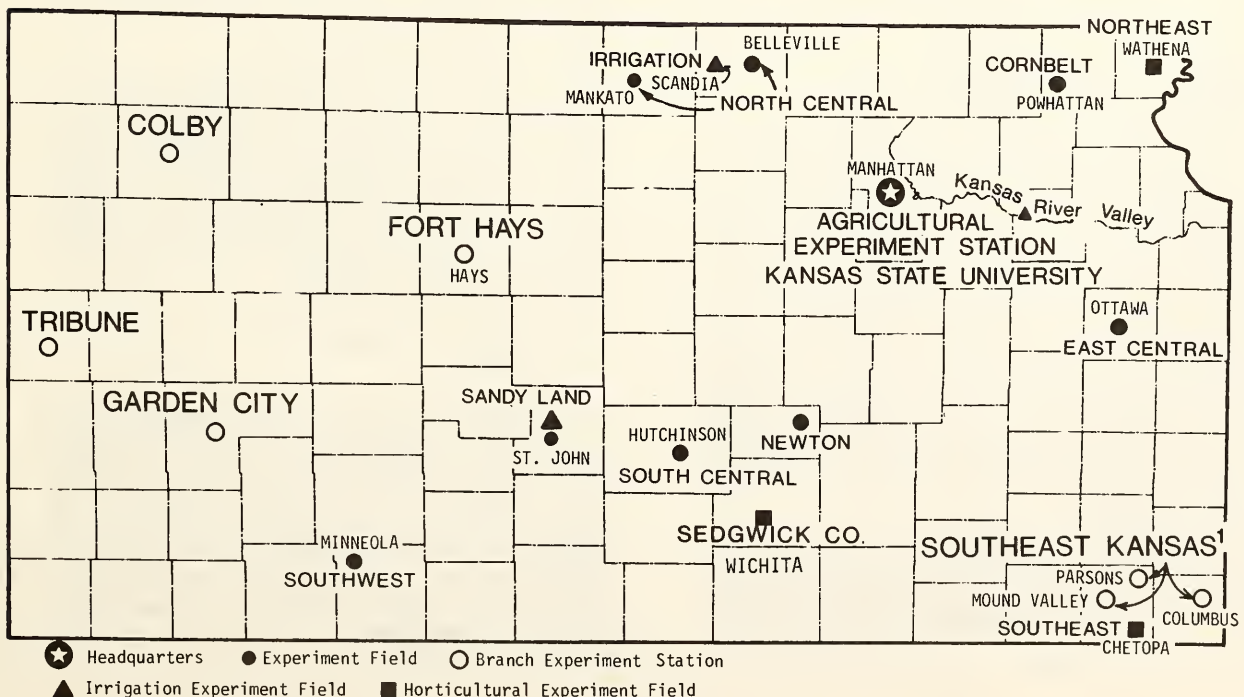
Current investigations involve extensive irrigation research, livestock feeding, dairying, dryland soil management, crop improvement, weed control, horticultural and specialty crops, insect control, and soils and fertilizer relationships. One of the two state soils laboratories is located at the Garden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

### Colby Branch Station

E. E. Banbury, Superintendent

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

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, Instructor Dillon

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 Professor Fuller; Instructors Chyba, Ibbetson and Meyer.

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. Three 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), Kansas River Valley Irrigation (Topeka).

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 with the Water Resources Institute, University of Kansas

The Kansas Water Resources Research Institute was established by the Board of Regents in 1964, at Kansas State University. Both Kansas State University and the University of Kansas participate in the Institute so maximum benefit will accrue to the citizens of Kansas. Consequently, the Institute can support water resources research in any department at either university. The policy committee governing the Institute is composed of representatives from both Kansas State University and the University of Kansas.

The purpose of the Institute is to conduct 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**

Hyde S. Jacobs, Director

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.

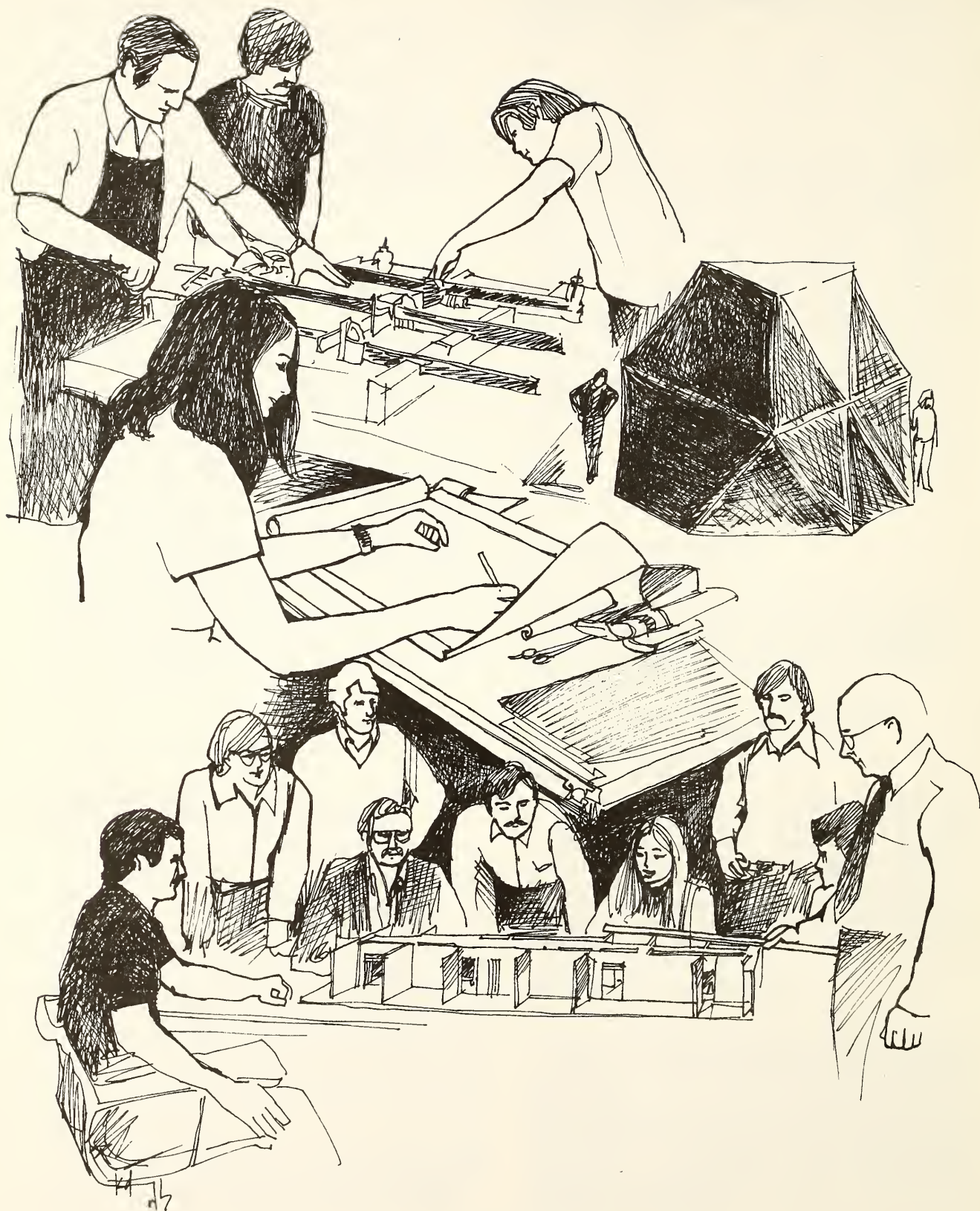
#### **THE STATISTICAL LABORATORY**

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 whose faculty is available by appointment for statistical and computational assistance on a twelve-months basis to assist in the designing of experiments.









## THE COLLEGE OF

# Architecture & 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 66)
- Architectural Structures (curriculum on page 66)
- Interior Architecture (curriculum on page 66)
- Landscape Architecture (curriculum on page 66)
- Building Construction (curriculum on page 67)

### **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 additional 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 247.

### **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 66506.

### **ELECTIVES**

Curricula in the College show two types of electives: those listed merely as free 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 those courses in the indicated field that are open to the student. Only four hours of electives may be taken in Basic Military Science. A list of acceptable electives is available at the dean's office or departmental offices.

### **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. Admission to the Professional Programs is determined every spring by a faculty review committee in each department. Selection criteria include evidence of motivation, aptitude and scholarship.

## 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	261 001	Physical Education . . . . . 0
261 001	Physical Education . . . . . 0		(Life time sport)
	(Concepts)		
	15		15

### SECOND YEAR

First Semester		Second Semester	
104 260	Envir. Des. Studio I . . . . . 4	104 261	Envir. Des. Studio II . . . . . 4
104 270	Intro. Des. Professions . . . . . 2	104 280	Landscape Ecology . . . . . 2
104 290	Basic Const. Tech. I . . . . . 3	104 291	Basic Const. Tech. II . . . . . 3
104 250	Hist. Designed Envir. . . . . 3	104 251	Hist. Designed Envir. . . . . 3
	Science Elective . . . . . 3		Science Elective . . . . . 3
	15		15

## PROFESSIONAL CURRICULUM IN ARCHITECTURE

### Bachelor of Architecture

Fifth Semester		Sixth Semester	
105 401	Arch. Des. Studio I . . . . . 5	105 402	Arch. Des. Studio II . . . . . 5
106 410	Structures I "A" . . . . . 3	106 411	Structures II "A" . . . . . 3
105 433	Arch. Constr. I . . . . . 3	105 434	Arch. Constr. II . . . . . 3
105 413	Envir. Systems	106 520	Env. Technology I . . . . . 3
	in Arch. . . . . 3		Free Elective . . . . . 3
	Free Elective . . . . . 3		
	17		17
Seventh Semester		Eighth Semester	
105 603	Arch. Des. Studio III . . . . . 5		Professional Concentration Studies** . . . . . 15
106 521	Env. Tech. II . . . . . 3	105 604	Arch. Des. IV** . . . . . 5
109 315	Intro. to Planning . . . . . 3		Prof. Conc. Support** . . . . . 10
	Free Elective . . . . . 6	105 504	Arch. Internship . . . . . 15
	17		
Ninth Semester		Tenth Semester	
105 801	Arch. Des. V** . . . . . 5	105 802	Arch. Des. VI** . . . . . 5
	Prof. Conc. Support** . . . . . 4		Prof. Conc. Support** . . . . . 4
105 756	Professional Sem. I . . . . . 2	105 757	Professional Sem. II . . . . . 2
	Free Electives . . . . . 6		Free Electives . . . . . 6
	17		17

## PROFESSIONAL CURRICULUM IN INTERIOR ARCHITECTURE

### Bachelor of Interior Architecture

Fifth Semester		Sixth Semester	
107 401	Int. Arch. Des. Studio I . . . . . 5	107 402	Int. Arch. Des. Studio II . . . . . 5
105 413	Env. Sys. in Arch. . . . . 3	106 520	Env. Technology I . . . . . 3
105 720	Sem. Env. Beh. . . . . 3	107 409	Finishing
	Art Elective . . . . . 2		Electives . . . . . 4
	Humanities Elective . . . . . 4		Art Elective . . . . . 2
	17		17
Seventh Semester		Eighth Semester	
107 603	Int. Arch. Des. Studio III . . . . . 5	107 604	Int. Arch. Des. Studio IV . . . . . 5
107 407	Design Workshop I . . . . . 3	107 408	Design Workshop II . . . . . 3
105 433	Arch. Constr. I . . . . . 3		Electives . . . . . 4
	Electives . . . . . 3	106 521	Env. Tech. II . . . . . 3
550 531	Design Ergonomics I . . . . . 2	550 532	Design Ergonomics II . . . . . 2
	16		17

\*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.

Ninth Semester		Tenth Semester	
107 801	Int. Arch. Des. Studio V . . . . . 5	107 802	Int. Arch. Des. Studio VI . . . . . 5
107 710	Design Workshop III . . . . . 3	107 783	Contemporary Furn. Design . . . . . 4
107 753	Contract Des. Practice . . . . . 2	107 820	Int. Arch. Seminar . . . . . 3
	Business Adm. Elec. . . . . 6		Electives . . . . . 5
	16		17

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

## PROFESSIONAL CURRICULUM IN LANDSCAPE ARCHITECTURE

### Bachelor of Landscape Architecture

Fifth Semester		Sixth Semester	
110 431	L.A. Des. I . . . . . 4	110 432	L.A. Des. II . . . . . 4
110 434	Planting Design I . . . . . 3	110 435	Planting Design II . . . . . 3
110 436	Land. Const. I . . . . . 3	110 433	Hist. & Theory L.D. . . . . 3
525 212	Surveying . . . . . 3	040 410	Land. Hort. . . . . 3
040 271	Woody Pl. Mat. . . . . 3	110 437	Land. Const. II . . . . . 3
	16		16
Seventh Semester		Eighth Semester	
110 641	L.A. Design III . . . . . 4	110 642	L.A. Design IV . . . . . 4
110 643	Planting Des. III . . . . . 3	110 644	Com. Site Planning . . . . . 3
110 647	Land. Const. III . . . . . 3	110 645	Pro. Internship . . . . . 0
110 501	L.A. Seminar . . . . . 1	109 315	Intro. Planning . . . . . 3
	Art Elective . . . . . 5	110 501	L.A. Seminar . . . . . 1
	16		Free Elective . . . . . 4
			Science Elective . . . . . 3
			18

Ninth Semester		Tenth Semester	
110 801	L.A. Design V . . . . . 5	110 802	L.A. Design VI . . . . . 5
110 765	Parks & Rec. . . . . 3	110 753	Pr. Practice . . . . . 2
110 501	L.A. Seminar . . . . . 1	110 501	L.A. Seminar . . . . . 1
	Bus. Adm. Elec. . . . . 3		Bus. Adm. Elec. . . . . 3
	Science Elec. . . . . 3		Free Electives . . . . . 6
	Free Elec. . . . . 2		
	17		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	Arch. Graph. I . . . . . 2	104 208	Arch. Graph. II . . . . . 2
229 100	Engl. Comp. I . . . . . 3	229 120	Engl. Comp. II . . . . . 3
281 105	Oral Comm. I . . . . . 2	106 210	Intro. Const. Prog. . . . . 2
245 220	Anal. Geo. & Calc. I . . . . . 4	245 221	Anal. Geo. & Calc. II . . . . . 4
221 201	Chemistry I . . . . . 5	221 230	Chemistry II . . . . . 3
261 001	Phys. Ed. . . . . 0	261 001	Phys. Ed. . . . . 0
	16		14
Third Semester		Fourth Semester	
104 260	Envir. Des. Stu. I . . . . . 4	104 261	Envir. Des. Stu. II . . . . . 4
104 270	Intro. Des. Pro. . . . . 2	104 280	Landscape Ecology . . . . . 2
104 290	Basic Con. Tech. I . . . . . 3	104 291	Basic Con. Tech. II . . . . . 3
265 310	Engg. Physics I . . . . . 5	265 311	Engg. Physics II . . . . . 5
245 222	Anal. Geo. & Calc. III . . . . . 4		Limited Sci. Elective . . . . . 3
	18		17
Fifth Semester		Sixth Semester	
105 401	Arch. Des. Stu. I . . . . . 5	510 415	Mechanics / Materials . . . . . 3
510 305	Statics . . . . . 3	510 418	Mech / Mats Lab. . . . . 1
105 433	Arch. Constr. I . . . . . 3	105 434	Arch. Constr. II . . . . . 3
525 212	El. Surv. Engg. . . . . 3	510 412	Dynamics . . . . . 3
	Humanities Elective . . . . . 3	105 301	Apprec. of Arch. . . . . 3
	17		Social Sci. Elective . . . . . 3
			16
Seventh Semester		Eighth Semester	
525 531	Stat. Deter. Struc. . . . . 3	106 524	Theory of Str. II . . . . . 4
106 523	Timber Str. . . . . 2	106 534	Thermal Systems . . . . . 3
525 422	Soil Mechanics I . . . . . 3	106 537	Acoustic Systems . . . . . 2
510 471	Fluid Mechanics . . . . . 3	525 532	Stat. Indeter. Struc. . . . . 3
106 536	Sanitation Systems . . . . . 2		Social Sci. Elective . . . . . 3
	Humanities Elective . . . . . 3		
	16		15

Ninth Semester		Tenth Semester	
106 528	Theory of Str. III . . . . . 4	106 780	Theory of Str. IV . . . . . 3
106 535	Lighting Systems . . . . . 3	530 403	Elect. Cir. & Control . . . . . 4
560 413	Thermodynamics I . . . . . 3		FREE ELECTIVES . . . . . 8
525 428	Foundation Engg. . . . . 3		
	FREE ELECTIVE . . . . . 3		
	16		15

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



## CURRICULUM IN BUILDING CONSTRUCTION

Bachelor of Science in Building Construction

### FIRST YEAR

First Semester			Second Semester		
229 100	Engl. Comp. I	3	229 120	Engl. Comp. II	3
245 500	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
261 001	Phys. Ed.	0	261 001	Phys. Ed.	0
	Social Science Elec.	3		Social Science Elec.	3
16			17		

### SECOND YEAR

First Semester			Second Semester		
104 290	Basic Con. Tech. I	3	104 291	Basic Con. Tech. II	3
265 212	Gen. Phys. II	4	510 205	Appl. Mech. A	3
106 250	Site Constr.	3	105 301	Apprec. Arch.	3
234 100	Phys. Geology	3	305 275	Fund. Acctg.	4
106 016	Constr. Seminar	0	106 016	Constr. Seminar	0
	Humanities Elec.	3		Humanities Elec.	3
16			16		

### THIRD YEAR

First Semester			Second Semester		
105 433	Arch. Const. I	3	106 413	Constr. Drawings	3
510 306	Str. Matls. A	3	106 522	Theory Str. I	3
510 307	Str. Matls. A Lab.	1	106 523	Timber Str.	2
106 540	Constr. Prob. I	3	106 537	Acoustic Systems	2
305 325	Business Law I	3	285 320	El. Statistics	3
106 536	Sanitation Systems	3		FREE ELECTIVE	4
106 016	Constr. Seminar	0	106 016	Constr. Seminar	0
16			17		

### FOURTH YEAR

First Semester			Second Semester		
106 524	Theory Str. II	4	106 528	Theory Str. III	4
106 541	Constr. Estim.	3	106 534	Thermal Systems	3
106 542	Constr. Man. I	3	106 543	Constr. Man. II	3
305 630	Industrial Rel.	3	550 401	Industrial Mgmt.	3
106 535	Lighting	3		FREE ELECTIVE	3
106 016	Constr. Seminar	0	106 016	Constr. Seminar	0
16			16		

A minimum total of 130 credit hours is required for graduation.

## DEPARTMENTS AND COURSE OFFERINGS

### PRE-DESIGN PROFESSIONS PROGRAM

W. Michael Martin, Head of Department

Professors Fischer,\* Foerster,\* Krider,\* Associate Professors Bissey,\* Hall,\* Assistant Professors Bartlett, Lippenberger, Martin, Selfridge,\* Instructors Gallis, Goddard, Marshall, Spurgeon, Stahl.

For curriculum see page 66

**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.

**104 260 and 104 261. 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.

**104 260 E.D.S. I.** (4) I. Pr.: 104 208.

**104 261 E.D.S. II.** (4) II, S. Pr.: 104 323.

**104 270. 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.

**104 280. 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.

**104 290 and 104 291. 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.

**104 290 B.C.T. I.** (3) I. Pr.: 104 208.

**104 291 B.C.T. II.** (3) II. Pr.: 104 290.

**104 250 and 104 251. 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.

**104 250 H.D.E. I.** (3) I. Pr.: None

**104 251 H.D.E. II.** (3) II. Pr.: 104 250.

**104 299. Problems In Basic Design.** (Credit Arranged) I, II, S. A study of specified problems in elementary environmental design under the guidance of a member of the staff. Pr.: Approval of Dept. Head.

**104 370. Perspective Methodology for Designers.** (2) Inter-session. Mechanical and freehand perspective drawing methodology as a systematic approach to three-dimensional design. Projects will be directed towards the individual student's area of interest and need. Pr.: 104 208 and two hours drawing credit.

**104 380. Visual Thinking.** (2) Inter-session. An analysis of man's recognition, visualization, and recording of environmental experiences. Experimental exercises in sensory stimulation and response recording. Pr.: Approval of instructor.

**104 510. Man and His Surroundings.** (3) I, II, S. Man as builder-modifier; functional and visual analysis of the designed environment; human response; relation to nature; introduction to design approaches; case studies; strategies for problem solving. 3 hours lecture-discussion per week. Not for students in architecture, interior architecture and landscape architecture.

## ARCHITECTURE

F. Gene Ernst,\* Head of Department

Professors Fischer,\* Heintzelman,\* and Krider,\* Associate Professors Chang,\* Christensen,\* Ernst,\* Hall,\* Sanner,\* Slack and Stotesbury; Assistant Professors Lippenberger, Martin, Reid,\* Selfridge,\* Shepard, Wendt and Windley,\* Instructors Spurgeon, Stahl; Adjunct Professor Shaver; Emeritus Chadwick,\* Weigel.\*

For curriculum see page 66

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 1 1/2-year core studies program.
3. A 1 1/2-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.

**105 413. Environmental Systems in Architecture.** (3) I. Discussion of the influences of environmental technology upon design concepts. 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. Nine hours lab per week. Pr.: 104 291 and 105 433.

**105 433 Arch. Constr. I.** (3) I, II. Pr. 104 291.

**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.

**105 401, 105 402. Architectural Design Studio I, II.** 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.

**105 401. A.D.S. I.** (5) I. Pr.: Admission to the Professional Program and 104 261.

**105 402. A.D.S. II.** (5) II, S. Pr.: 104 401.

**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, 105 603, and approval of the Department Head.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**105 566. 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.

**105 601. 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 and Design for a total of 12 hour-credit. Three rec. per week. Pr.: 104 251 or approval of instructor.

**105 603. Architectural Design III.** (5) I. Problem analysis and program development, generation of alternate solutions, selection and refinement of the building design. Fifteen hours studio per week. Pr.: Arch 502.

**105 604. Architectural Design IV.** (5) I, II. Continuation of Arch. 603. Increased complexity of function and space definition systems. Relating Environmental Technology to total design. Fifteen hours studio per week. Pr.: Arch. 105 603.

**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.

**105 703. 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.

**105 704. 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.

**105 720. Seminar in Environmental Behavior.** (3) I, II. An introductory course investigating the relationship between human behavior and the design of the physical environment, identifying those basic psychological and social concepts which influence and are influenced by the man-built environment. Three hours lecture-seminar per week. Pr.: Senior standing or permission of instructor.

**105 725. Architectural Research Methods.** (3) I, II. An introductory course surveying the basic philosophies and methodologies of science and research as they apply to the field of architecture. Special emphasis will be placed on those methods appropriate for investigating human response to the man-built environment. Three hours lecture-seminar per week. Pr.: Senior standing or permission of instructor.

**105 756 and 105 757. 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.

**105 756 P.S. I.** (2) I, II. Pr.: 4th year standing.

**105 757 P.S. II.** (2) I, II. Pr.: 105 756.

**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.

**105 801. 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 604.

**105 802. 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. 801.

## 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. 802.

## CONSTRUCTION SCIENCE

I. Eugene Thorson, Head of Department

Professor Thorson,\* Associate Professors Jahnke,\* Bissey,\* and Blackman; Assistant Professor Burton; Instructors Simcox, and Goddard.

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 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

**106 016. 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, II. Study of site construction problems and procedures; site survey and investigations, review of site plans, construction layouts, earth-work calculations; computer applications. Pr.: Arch. Pre-Pro 208, Con. Sci. 210, C.E. 212. 4 hours per week.

**106 410 and 106 411. 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.

**106 410. S.I. "A".** (3) I. Pr.: 104 341.

**106 411. S.II. "A".** (3) II, S. Pr.: 106 410.

**106 413. 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, Con. Sci. 250. 9 hours lab per week.

### UNDERGRADUATE CREDIT AND GRADUATE CREDIT IN MINOR FIELD

**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.

**106 522. 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.

**106 523. Timber Structures.** (2) I, II. Analysis and design of timber structures using solid and laminated materials. Two hours rec. per week. Pr.: Ap.M. 220 or 415. Pr. or Conc.: Con. Sci. 522 or C.E. 531.

**106 524. Theory of Structures II.** (4) I, II. Analysis and design of metal structures; emphasis on buildings. Six hours per week. Pr.: Con. Sci. 522 and 523.

**106 528. 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 per week. Pr.: Con. Sci. 522.

**106 530. 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.

**106 534. 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 per week. Pr.: Phys. 211 or 311.

**106 535. 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. 3 hours per week. Pr.: Phys. 212 or 312.

**106 536. 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 per week. Pr.: Gen. Phys. 211, or Engg. Phys. 311.

**106 537. 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.

**106 540. Construction Problems I.** (3) I. Practical problems encountered in the erection of buildings and use of construction equipment. Pr.: Con. Sci. 250 and 413.

**106 541. Construction Estimating.** (3) I, II. Principles, theories and methods of building estimating. Nine hours lab a week. Pr.: Con. Sci. 413 and 540.

**106 542. Construction Management I.** (3) I. General business and management procedures of construction contracting; human relations and communications. Pr. and Conc.: Conc. Sci. 541.

**106 543. Construction Management II.** (3) II. Construction safety; project planning and scheduling techniques. Computer applications. Pr.: Con. Sci. 210, 541, and 542.

**106 544. 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.

#### UNDERGRADUATE AND GRADUATE CREDIT

**106 780. 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. 522, 523, 524, and 528.

#### 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. 780 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 undertake 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

**107 406. 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.

**107 409. Finishing.** (3) II. Methods of finishing various materials in interiors. Six hours lab. a week. Pr.: 104 261.

##### UNDERGRADUATE CREDIT AND GRADUATE CREDIT

**107 401, 402, 603, 604, 801, and 802. 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. **Interior Architectural Design Studios I and II are not for graduate credit.**

**107 401. Interior Architectural Design Studio I.** (5) I, II, S. Pr.: Admission to Professional program and 104 261.

**107 402. Interior Architectural Design Studio II.** (5) II, S. Pr.: 107 401.

**107 603. Interior Architectural Design Studio III.** (5) I, S. Pr.: 107 402.

**107 604. Interior Architectural Design Studio IV.** (5) II, S. Pr.: 107 603.

**107 801. Interior Architectural Design Studio V.** (5) I, S. Pr.: 107 604.

**107 802. Interior Architectural Design Studio VI.** (5) II, S. Pr.: 107 801.

**107 407, 408, and 710. 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.

**107 407. Design Workshop I.** (3) I, S. Pr.: Admission to a professional program and consent of instructor.

**107 408. Design Workshop II.** (3) II, S. Pr.: 107 407.

**107 710. Design Workshop III.** (3) I, S. Pr.: 107 408 or graduate standing.

**107 753. Contract Design Practice.** (2) I. The preparation of specifications, contract documents, purchasing, and professional responsibilities. Pr.: 107 604 or graduate standing.

**107 783. Contemporary Furniture Design.** (4) II, S. Experimentation in the design of spatial component systems, utilizing advanced techniques in construction methods and materials. Pr.: 107 710 or graduate standing.

#### GRADUATE CREDIT

**107 820. 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.: 107 801 or graduate standing.

**107 821. Advanced Interior Architectural Design.** (4) I, II, S. Advanced study of interior space planning and interior component design. Pr.: Professional Design Degree.

**107 830. 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.: Professional Design Degree and approval of instructor.

### LANDSCAPE ARCHITECTURE

Robert P. Ealy, Head of Department

Professor Ealy;\* 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 outdoor space organization, land planning, topographical manipulation, landscape planning and construction, and the role of adapted plant materials in the landscape. The study of man's impact upon the environment, both natural and man made, is of increasing importance.



## Courses in Landscape Architecture

### UNDERGRADUATE CREDIT

**110 200. 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, 260, and 261.

**110 300. Residential Landscape Design** (2) II, S. Basic graphic communication skills, design principles, and design vocabulary for the installation of residential and small landscape development plans. Six hours of studio per week. Pr.: Consent of instructor. A general course for majors other than those in the College of Architecture & Design.

**Landscape Architectural Design Studio I & II.** 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 104 261, 280.

**110 432. L.D.A. II.** (4) II. Twelve hours design studio per week.

**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.: 040 271 concurrent, 104 261.

**110 435. Planting Design II.** (3) II. Cont. of L.A. 434. Eight hours lab. a week. Pr.: 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.: 104 280, 290, 291. 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.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**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.

**Landscape Architectural Design Studio III & IV.** 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.

**104 641. L.A.D. III.** (4) I. Twelve hours design studio per week. Pr.: 110 432 and 110 436.

**110 642. L.A.D. IV.** (4) II. Twelve hours design studio per week. Pr.: 110 641 and 110 437.

**110 643. 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.

**110 644. 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.

**110 645. 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.

**110 647. 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.

### ADVANCED UNDERGRADUATE AND GRADUATE CREDIT

**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.

**110 753. 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.

**110 755. 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.: 104 280, C.E. 212 or consent of instructor.

**110 756. Design of Parks and Recreation Areas.** (3) I. Site planning of national, state, municipal and private parks and specialized recreation areas. Three hours lec. a week. Pr.: L.A. 642 and 647.

**Landscape Architectural Design Studio V & 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.

**110 801. L.A.D. V.** (5) I. Fifteen hours design studio per week. Pr.: 110 642 and 110 647.

**110 802. L.A.D. VI.** (5) II. Fifteen hours design studio per week. Pr.: 110 801 and 110 643.

### GRADUATE CREDIT ONLY

**110 870. Problems in Advanced Landscape Architecture.** (1-3) I, II, S. Special studies and designs in advanced landscape architecture. Pr.: L.A. 802.

**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. 647.

**110 899. 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 Keller, Reid,\* Selfridge\* and Willis; Instructor Keithley; Adjunct Lecturers Lakin, Lister, Madrigal 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 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

**109 315. 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

**109 515. 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

**109 705. Planning Communications.** (3) 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.

**109 710. 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.

**109 715. 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.

**109 720. 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.

**109 725. 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.

**109 735. 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.

**109 745. 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.



**109 750. 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.

**109 755. 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.

#### GRADUATE CREDIT

**109 800. 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.: 615 or equivalent and one course each in graphics, statistics, and computer programming.

**109 810. Practice 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.

**109 820. 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.

**109 825. 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.: 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

Vernon 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 Community 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 and development, the supply of basic information about new techniques and programs in planning and development, and the conduct of research on planning and development 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 and development is accomplished through cooperative action with other state and university extension and continuing education programs. The supply of basic information about new techniques and programs in planning is achieved through a planning and development information service with inquiries handled on an individual basis. The conduct of research on planning and development 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.

#### TRANSFER STUDENTS

A student may complete a portion of the pre-design professions program at another university or junior or community college; however it is advisable that the student transfer to Kansas State University after one year. A student who takes one year at another college can enter the second year of the pre-design professions program, but to be eligible for enrollment in Environmental Design Studio I, the student must have successfully completed the equivalent of Architectural Graphics I and II and six hours of art electives.

More advanced transfer students may also be accepted. But for entrance into the third year of a program in architecture, interior architecture or landscape architecture, the student must have successfully completed all work indicated in the pre-design professions program. Any student desiring advance standing in a professional program must submit a complete transcript of his work for an evaluation of his status. He also may be required to submit a portfolio of his work.





THE COLLEGE OF

# Arts & 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 24 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.<sup>1</sup>**

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  
 Social Work

**B.F.A.**

Art

**B. of Music**

Music

**B.S. in Music Education**

Music

**B.S.<sup>1</sup>**

Anthropology  
 Biochemistry  
 Biology  
 Chemistry  
 Computer Science  
 Economics  
 General (Area Major)  
 Geography  
 Geology  
 Health, Physical Education  
 or Recreation  
 History  
 Journalism and Mass  
 Communications  
 Mathematics  
 Physics  
 Political Science  
 Psychology  
 Sociology  
 Speech  
 Statistics  
 Pre-Professional  
 Physical Therapy  
 Medical Technology  
 Pre-Elementary Education<sup>2</sup>  
 Pre-Secondary Education<sup>2</sup>  
 Pre-Dentistry  
 Pre-Law  
 Pre-Medicine  
 Pre-Nursing<sup>3</sup>  
 Pre-Pharmacy<sup>4</sup>  
 Social Work  
 Pre-Veterinary<sup>5</sup>

**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 (500 level and above)

\*\*F. Social Science (from Departments of Economics, Geography (excluding Geography 220 and 221), 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 220 and 221 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 (Required of Freshmen)

**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 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 220 and 221), History, Modern

\*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.

\*\*\*\* Only courses of two or more credit hours can fulfill General Requirements.

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 167).

2. Requirements for a degree to be completed in the College of Education (See page 167).

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 page 27.



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 (500 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 220 and 221 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

120 hours required for graduation

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, Theory, and Composition. An applied minor also is 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 Psychology.
6. General Education as required to fill.
7. Modern Language, 8 to 20 semester hours.

- II. The remaining hours to be taken in major, additional tool and related courses, and free electives. For major requirements, see catalog statement for Department of Music, page 129.

## BACHELOR OF SCIENCE IN MUSIC EDUCATION DEGREE

128 hours required for graduation

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. The remaining hours to be taken in major, additional tool and related courses and electives:
 

Music 201, 202, 304, 305, 416, 417, 423, 424, 503 (Theory of Music); Music 221, 222, 425, 426 (Music History and Literature); Music 232, 233, 234, 235 (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 427, 428, 429 (Applied Music) and Music 514 (Music Education). Vocal majors are required to have four hours of Applied Keyboard and four hours of Singers Diction as a minor. Instrumental majors complete four additional hours of applied Music, of which two hours of Voice Class are required, as well as a minimum of two hours in Piano Class. Both Vocal and Instrumental majors are required to pass Piano Proficiency before admission to student teaching. Participation in at least one major musical organization in the major applied area is required during each semester until graduation. A maximum of eight semester hours for this participation is

allowed toward degree requirement. Recital attendance is required each semester of the program.

## GENERAL CURRICULUM

(Undeclared Major or Area Major)

- A. Life Sciences
- B. Humanities
- C. Physical Science
- D. Social Science

Fulfill General Requirements for the A.B. or B.S. degree (p. 76) 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:** Fifteen hours in two humanities departments (Art, English, History, Modern Languages, Music, Philosophy, Speech) with at least one 400 level course in each of the two departments; nine hours in the General Requirements in Humanities for the Bachelor of Arts degree must be in a third humanities department. 30 hours. (B.A. degree only)

**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. 27).

## SUGGESTED SCHEDULE OF PRE-VETERINARY MEDICINE REQUIREMENTS

<b>Fall Semester</b>	
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

<b>Spring Semester</b>	
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

<b>Fall Semester</b>	
Chemical Analysis .....	4
Heredity and Evolution .....	2
or Genetics .....	3
General Physics I .....	4
Social Science elective or Principles of Animal Science .....	3
Animal Husbandry .....	1
Dairy or Poultry Science .....	1
	<hr/> 16

<b>Spring Semester</b>	
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. 76) or B.S. degree (p. 76) 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. 76) or the B.S. degree (p. 76) 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 are 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: College Algebra (3 hrs.) or Trigonometry (3 hrs.), General Chemistry (5 hrs.), Intro. to Bio-Organic Chemistry (5 hrs.), Descriptive Physics (4 hrs.) or Physics I (4 hrs.) and Physics II (4 hrs.), Human Anatomy (5 hrs.), Principles of Biology (4 hrs.), Human Physiology (4 hrs.), Kinesiology (3 hrs.) or Physiology of Exercise (4 hrs.), Microbiology (4 hrs.), Intro. to Physical Therapy (1 hr.), General Psychology (3 hrs.) plus two of the following five courses: Abnormal Psychology (3 hrs.), Psychology of Childhood and Adolescence (3 hrs.), Social Psychology (3 hrs.), Psychology of Exceptional Children (3 hrs.), and Personality Development (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 requirements for the B.S. degree (p. 76), 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 College of Education (p. 167). 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. 168).

**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. 168). 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. 168).

**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. Social Work Curriculum:** Kansas State University offers a Social Work Sequence jointly sponsored by the Department of Sociology and Anthropology and by the Department of Family and Child Development of the College of Home Economics. Based on a broad foundation in liberal arts, the program's primary objective is to prepare the student for social work practice positions immediately upon graduation. This is accomplished by an integrated professional program of study and field experience through a generalized model approach, through which the student learns and uses the knowledge, skills, and values of social work applicable in various social work settings. Secondly, the program attempts to develop a wide perspective of human need through an understanding of Social Welfare programs and issues. The program also intends to offer a beginning preparation for graduate education in Social Work. The social work sequence is offered as an option in two departments: The Department of Sociology and Anthropology and the Department of Family and Child Development as a specialized option within the department major (see p. 144 and 230 for a description of the major requirements in each department). Also a complete social work sequence is offered jointly by both departments.

In conjunction with the course material, a field experience curriculum is offered, affording the student the opportunity of placement in a social service agency. The student is expected to spend one day a week in such an agency for two semesters. The objectives of this field experience are as follows: (1) to

gain knowledge on how social agencies function within the community, (2) to gain experience in direct service to clients: individuals, groups, and communities, through which the student will have the opportunity of developing practice skills and techniques of social work, and the opportunity of applying knowledge and theory learned in the classroom, and (3) to encourage self-awareness in the student relative to understanding his own value orientation so he can determine his suitability for a career in social work.

After satisfying the entry criteria, the student following the Social Work Sequence in either Department must satisfy the following requirements:

FCD or SOC			
620 260	277 260	Introduction to Social Work (3)	
	277 510	Social Welfare as a	
		Social Institution (3)	
620 560	277 560	Skills and Techniques in the	
		Practice of Social Work (3)	
620 465	277 465	Field Experience (taken two semesters	
		for a total of 6 credits.)	

## 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 Department 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 Maldivian 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,"** can be taken 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 such as 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.

## 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

Each summer the College of Arts and Sciences offers an opportunity for students to independently read 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 and Course Offerings

### AEROSPACE STUDIES

Joseph P. Hebert, Jr., Head of Department

Professor Hebert; Associate Professor Krieger; Assistant Professors Moore and Sasaki; Instructors Schwab, Dawson, and Wagner.

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. This course examines the development of air power from its beginnings to the present. It traces the development of various concepts of employment of air power and focuses upon factors which have prompted research and technological change. One hour of class plus one hour of leadership training a week.

**205 201. Aerospace Studies 2B.** (1) II. This course examines the variety of events affecting the history of air power; especially stressing those elements that provide significant examples of the impact of air power on strategic thought. One hour of class plus one hour of leadership training a week.

### Professional Officers Courses

#### UNDERGRADUATE CREDIT

**205 300. Aerospace Studies 3A.** (3) I. Focusing on the Armed Forces as an integral element of society, this course provides an examination of the broad range of American civil-military relations and the environmental context in which defense policy is formulated. Communicative skills are stressed. The

role of Contemporary Aerospace Power, and Current and Future employment of Aerospace Forces will also be examined. Three hours of class plus one hour of leadership training a week.

**205 301. Aerospace Studies 3B.** (3) II. This course will examine the role of the professional officer in a democratic society; socialization processes within the Armed Services; the requisites for maintaining adequate national security forces; political, economic, and social constraints upon the national defense structure; and the impact of technological and international developments upon strategic preparedness and the overall defense policy-making process. 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, Munce, O'Shea,\* Rex Replogle,\* Winegardner and Woodward; Instructors J. Abraham, Clore, Davis, McIlvain, Ogg, Renata Replogle, Swiler and Tempero; 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, 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 un-

dergraduate 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 field 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.

**209 220. 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.

**209 225. 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.

**209 245. 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.

**209 299. 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.

**209 405. Problems in Art I.** (1-3) I, II, S. Work offered in drawing, painting, sculpture, printmaking, ceramics, crafts, and commercial art. Pr.: Full sequence of courses related to subject.

**209 420. History of Indian Art.** (3) I, II. History of Indian art from c. 3000 B.C. to the twelfth century B.C.

**209 425. 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.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**209 505. 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.

**209 510. 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.

**209 515. 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.

**209 520. 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.

**209 525. Northern Baroque Art History.** (3) The development of the Baroque in Holland and Flanders. Pr.: Art 195, 196.

**209 540. 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.

**209 545. Twentieth Century Art History I.** (3) I. Origins and development of twentieth century art from 1890 to 1914. Pr.: Art 195, 196.

**209 550. Twentieth Century Art History II.** (3) II. Origins and development of twentieth century art from 1914 to the present. Pr.: Art 195, 196, 545.

**209 560. 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.

**209 570. 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 245.

**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 225.

**209 615. 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 245, 610.

**209 620. 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 220.

**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 block-prints, serigraphy, or lithography. Six hours lab. May be taken for four semesters. Pr.: Art 235.

**209 640. 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.

**209 650. 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 445 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.

**209 670. 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.

**209 675. 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.

**209 680. 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.

**209 685. Problems in Design.** Credit arranged. I, II, S. Advanced work in design-related subjects. Pr.: Full sequence of courses related to problem subject matter.

**209 690. 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.

**209 695. 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.

**209 899. 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, and Nelson; Instructors Morgan, Snow, and Wilson; Coaches Gibson and Hartman; Assistant Coaches Falks, Favrow, Garrett, Gottlieb, Heath, Holbrook, Jackson, McDowell, Madden, Powell, Romaine, Sullivan and Wade; Assistant Athletic Directors Wall and Head; Administrative Assistant Peters.

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.

**BIOCHEMISTRY**

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

Biochemistry bridges the disciplines of biology and chemistry. A sound foundation in both disciplines, as well as appropriate courses in calculus and physics, is required. The aims of biochemistry are to provide an understanding of the structural and functional relationships of chemical constituents of cells and the role that they play in the processes of life.



Biochemistry offers many opportunities in teaching, research, industry, and public service. Biochemistry also serves as a foundation for specialization in areas such as health, agriculture, nutrition, medicine and food science.

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 253). The department also participates in interdepartmental programs in animal nutrition leading to the Doctor of Philosophy degree (see Animal Nutrition, page 253) and in Food Science leading to Master of Science and Doctor of Philosophy degrees (see Food Science, page 253).

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

### Biochemistry Curriculum for the B.S. Degree

120 hours required for graduation

#### 1. Chemistry and Biochemistry: 44 hrs.

Freshman: Biochem. Orient, Chem. I, Chem. II, Chem. Analysis.

Sophomore: Org. Chem. I, Org. Chem. I Lab., Org. Chem. II, Org. Chem. II Lab.

Junior: Phys. Chem. I, Phys. Chem. II Lecture and Lab., Biochem. I Lecture and Lab.

Senior: 3 hours of upper division biochemistry or chemistry.

#### 2. Mathematics: 12 hrs.

Freshman: Anal. Geo. Calc. I and II.

Sophomore: Anal. Geo. Calc. III.

#### 3. Physics: 10 hrs.

Sophomore: Engg. Phys. I and II.

#### 4. Biological Science: (16 hrs.). Princ. Biol., Org. Biol., and additional courses in biological science from offerings within the College of Arts and Sciences or the College of Agriculture.

#### 5. English: (6 hrs.). Eng. Comp. I and II.

#### 6. Speech: 1 course

#### 7. Physical Education: 2 courses

#### 8. Social Sciences and Humanities: 7 courses from the departments of Art, Economics, English, History, Modern Language, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology, Speech, Journalism or Geography (Geo. 150 and 151 only), but must include the following;

- A year of German, French or Russian.
- A course in Philosophy.
- Two advanced level courses.

#### 9. Electives to complete 120 hrs. required for graduation (approximately 9 hrs.).

### Courses in Biochemistry

#### UNDERGRADUATE CREDIT

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

**211 110. 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. (Cr.-NCR only).

**211 120. 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.

**211 200. Elementary Biochemistry.** (5) II. An elementary treatment of the chemistry and metabolism of carbohydrates, lipids, proteins and nucleic acids. Pr.: Chem. 190.

**211 499. Biochemistry Seminar.** (0) I, II. Lectures, discussions, and activities of biochemical interest.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**211 510. 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.

**211 521. 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.

**211 522. 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

**211 655. 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.

**211 656. 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.

**211 665. 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.

**211 666. Biochemistry II Laboratory.** (2) II. A cont. of Biochem. 656. Six hours lab. a week. Pr.: \*Biochem. 656 and 665 or conc. enrollment.

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

**211 670. 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.

**211 799. 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

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

**211 810. Biochemistry of Toxic Materials.** (2) I. Offered 1973-74 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.

**211 815. 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.

**211 820. Vitamins.** (2) II. Offered 1973-74 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.

**211 830. 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.

**211 840. 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.

**211 845. Hormones.** (2) I. Offered 1972-73 and alt. years or on demand. A study of the structure, biosynthesis, biochemical role, metabolism and interrelations of internal secretions. Pr.: Biochem. 665.

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

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

**211 910. Lipids.** (2) II. Offered 1973-74 and alt. years. Chemistry of plant and animal lipids, their occurrence, metabolism and industrial uses. Pr.: \*Biochem. 665.

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

**211 930. Proteins.** (2) I. Offered 1973-74 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.

**211 940. Chemistry of Carbohydrates.** (2) I. Offered 1972-73 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.

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

**211 950. Enzyme Chemistry.** (2) II. Offered 1972-73 and alt. years. Lectures and readings on the chemical nature of enzymes, their reactions and assay. Pr.: \*Biochem. 665.

**221 951. Enzyme Laboratory.** (2) II. Offered 1972-73 and alt. years. A laboratory course to accompany Biochem. 818. Pr.: \*Biochem. 656 and 818 or conc. enrollment.

**211 960. Advanced Animal Nutrition.** (3) I. Offered 1972-73 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.

**211 970. Theoretical Biochemistry.** (2) I. Offered in 1973-74 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.

**211 971. Conformational Analysis of Biopolymers.** (2) II. Offered in 1973-74 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.

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

## DIVISION OF BIOLOGY

L. E. Roth, Director

G. Richard Marzolf, Associate Director

J. S. Weis, Assistant Director

Professors Bode,\* Consigli,\* Fina,\* Gier,\* Hansen,\* Harris,\* Hulbert,\* Pittenger,\* Robel,\* Roth,\* and Tiemeier,\* Associate Professors Anderson,\* Barkley,\* Buck,\* Goss,\* Johnson,\* Kammer,\* Khalil,\* Kramer,\* Lockhart,\* Marzolf,\* Smith,\* Weis,\* Wilson,\* and Zimmerman,\* Assistant Professors Center,\* A. Conrad,\* G. Conrad,\* Doezeema,\* Ferguson,\* Fretwell,\* Iandolo,\* Klaassen,\* Marchin,\* Rodkey,\* Slesinski,\* Spooner,\* Urban,\* and Williams,\* Instructors M. Davis, Hook, Tatschl and R. Weise; Emeritus: Professors Ameel,\* Frazier,\* Goodrich,\* Guhl,\* Pady,\* 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

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



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. Undergraduate advisement and curriculum planning is ultimately the responsibility of the assistant director of the division, and inquiries 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.

### 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.

**215 201. 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 hours 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.

**215 204. Public Health Biology.** (3) I, II, A discussion of diseases and other factors relating to the health of human populations. Directed toward non-biology majors; not open to students in the biological sciences. Three hours lecture per week.

**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.

**215 220. Bacteriology and Man.** (3) II. Two hours lecture and three hours laboratory per week. Fundamental concepts of microbial activities, the techniques for studying them, modes of action, role in natural and man-made ecosystem, with special emphasis on relationships to man. Not for biology or microbiology majors and can not be used as a prerequisite for other Microbiology courses. Pr.: one course in Biology, one course in Chemistry.

**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

**215 505. Comparative Anatomy of Vertebrates.** (4) II. Two hours rec. and six hours lab. per week. Pr.: Bio. 198.

**215 510. 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.

**215 512. 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.** (3) II. A study of development and differentiation in plants and animals. Three hours lec. Pr.: Bio. 535.

**215 516. Developmental Biology Laboratory.** (1) II. One three-hour lab. per week. Basic patterns of development of plants and animals; experimental systems for studying differentiation. Pr.: Concurrent enrollment in Biology 515, status as undergraduate major in the Division of Biology.

**215 518. 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.

**215 520. 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. 550 or equiv.

**215 525. 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.: Bio. 198.

**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.

**215 533. Wildlife Conservation.** (3) II. Methods and techniques in the management and propagation of wildlife. Pr.: Two courses in Bio.

**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.

**215 545. Human Parasitology Recitation.** (3) II. Three hours lec. per week. Pr.: Bio. 198.

**215 546. Human Parasitology Laboratory.** (1) II. Two hours lab. per week. Pr.: To be taken concurrently with Bio. 545.



**215 550. Lower Plants.** (3) II. Morphology, adaptive mechanisms, and evolutionary relationships of the cellular and vascular cryptogams. 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.

**215 555. 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.

#### 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. 510.

**215 605. 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. 555 or equiv.

**215 610. Bacteriology of Human Diseases.** (5) I. Three hours rec. and six hours lab. per week. Pr.: Bio. 555 or equiv.

**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. 555 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 on 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. 555.

**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. 533 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-hours 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.

**215 710. Endocrinology.** (3) I. A survey of the glands of internal secretion in vertebrates with emphasis on mechanisms of control of hormone secretion and mechanisms of hormone action. Pr.: Bio. 198 and a course in organic chemistry or biochemistry.

**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. 555 or equiv. and Biochem. 521 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 522 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. 605 and Biochem. 521.

**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. 710.

**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. 200.

**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 522 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. 521 or equiv.

**215 865. Advanced Plant Ecology.** (4) I 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 522 or equiv.

**215 870. Advanced Systematic Botany.** (4) I 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.

**215 994. 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**

William G. Fateley,\* Head of Department

Professors Fateley,\* Lambert,\* McDonald,\* Meloan,\* Moser,\* Schrenk,\* and Setser,\* Associate Professors Copeland,\* Danen,\* Hammaker,\* Hawley,\* Johnson,\* Lanning,\* Purcell,\* and van Swaay,\* Assistant Professors DesMarteau,\* Kay,\* Hoffman,\* Lenhart, 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 20 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 in the next column; 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 column 2). 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 66506.

### Chemistry Curriculum For The B.S. Degree<sup>1</sup>

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 (531), 3 hr.; Org. I Lab (532), 2 hr.; Org. II (550), 3 hr.; Org. II Lab (551), 2 hr.; Chem. Separations (545), 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 (213), 5 hr.; Engg. Phys. II (214), 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 German for Reading Knowledge I and II.  
 b. Philosophy: one course  
 c. 2 advanced level courses (500 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 Teaching<sup>2</sup>

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 106).
7. **Social Sciences, Humanities, Biological Science and Professional Education:**  
 a. Philosophy: 1 course  
 b. German: German I and II or German for Reading Knowledge I and II  
 c. Biological Science: Prin. of Biol. (198) and Organismic Biol. (201)  
 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 500 level or above  
 e. Education: Ed. Psych. I (215), 3 hr. (should be taken the first semester of the sophomore year); Ed. Psych. II (315), 3 hr.; Instructional Media (316); Professional

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.

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.

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 I.<sup>3</sup>** (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. No open to students who have credit in Chem. 110. Those without high school chemistry should not enroll in this course until the second semester.

221 230. **Chemistry II.** (3) I, II, S. Completion of the 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.

221 299. **Honors Seminar in Chemistry.** (1) I or II.

221 499. **Problems in Undergraduate Chemistry.** Cr. arranged. I, II, S. Problems may include classroom and/or lab. work. Pr.: Consent of instructor.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

221 599. **Undergraduate Research.** (1, 2, 3) I, II, S. Analytical, Inorganic, Organic or Physical Chemistry.

### UNDERGRADUATE AND GRADUATE CREDIT

221 700. **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.

221 799. **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

221 899. **Research in Chemistry.** Credit arranged. I, II, S. Research in analytical chemistry, inorganic chemistry, organic chemistry, and physical chemistry for the M.S. degree.

221 999. **Research in Chemistry.** Credit arranged. I, II, S. Research in analytical chemistry, inorganic chemistry,

organic chemistry, and physical chemistry for the Ph.D. degree.

## 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

221 540. **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.

221 545. **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

221 666. **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.<sup>4</sup>

221 718. **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.<sup>4</sup> or consent of the instructor.

221 725. **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

221 901. **Graduate Seminar in Analytical Chemistry.** (0-1) I, II.

221 942. **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.<sup>4</sup>

221 943. **Advanced Analytical II.** (1-4) II. Theory of solution equilibria and physical and chemical methods of separation. Pr.: Chem.<sup>4</sup>

221 944. **Advanced Analytical Chemistry III.** (3) I in even years. Theory and application of electrochemical methods; chronoamperometry, linear potential sweep chronoamperometry, chronopotentiometry, cyclic chronoamperometry, controlled-potential and constant-current coulometry, electrochemical thin layer techniques, rotating disk, and electrochemical instrumentation. Three lectures a week. Pr.: Chem.<sup>4</sup>

221 945. **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.<sup>4</sup>

221 946. **Principles and Techniques of Analytical Chemistry I.** (1-5) II of odd years. A lecture and laboratory course on

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 I, thus allowing completion of both Chemistry I and Chemistry II during the first semester.

4. All Chemistry courses numbered 600 or above require the following as minimum prerequisites: Organic Chem. II (Chem. 550); Organic Chem. II Lab. (Chem. 551); Physical Chem. II (Chem 595), and Physical Chem. II Lab. (Chem 598).



emission spectroscopy, flame photometry, atomic absorption, and x-ray methods. Pr.: Chem.<sup>4</sup>

**221 947. 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.<sup>4</sup>

### Courses in Inorganic Chemistry

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**221 597. Inorganic Chemistry.** (3) I and alt. S. A survey course in modern inorganic chemistry. Three hours lec. a week. Pr.: Chem. 550, 595.

#### UNDERGRADUATE AND GRADUATE CREDIT

**221 710. Chemical Applications of Group Theory.** (1) I. Applications of group theory to molecular structure, bonding and spectra. One hour lec. a week. Pr.: Chem.<sup>4</sup>

#### GRADUATE CREDIT

**221 855. 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.<sup>4</sup>

**221 876. 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, 710.

**221 902. Graduate Seminar in Inorganic Chemistry.** (0-1) I, II, S.

**221 926. 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.<sup>4</sup>

**221 929. 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, 710.

**221 931. Theoretical Inorganic Chemistry.** (3) II in odd years. Theory of crystal fields and paramagnetic resonance. Three hours lec. a week. Pr.: Chem. 597, 710, 854, 995 or conc. enrollment.

**221 935. 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

**221 531. 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. 532 is recommended.

**221 532. Organic Chemistry I Laboratory.** (2) I. Six hours lab. a week. Pr.: Chem. 531 or conc. enrollment.

**221 550. Organic Chemistry II.** (3) I, II. Cont. of Chem. 531, including additional aromatic chemistry, condensation reactions and introduction to some advanced topics, such as dyes, polymers and heterocyclic chemistry. Conc. enrollment in Chem. 551 is recommended. Three hours lec. a week. Pr.: Chem. 531 and 532.

**221 551. Organic Chemistry II Laboratory.** (2) I, II. Six hours lab. a week. Pr.: Chem. 550 or conc. enrollment.

#### GRADUATE CREDIT

**221 852. Systematic Organic Chemistry.** (3) II. Advanced study of organic compounds and fundamental types of reactions. Three hours lec. a week. Pr.: Chem.<sup>4</sup>

**221 860. Advanced Organic Chemistry.** (3) I. Conditions, scope, and applications of reactions useful in synthetic organic chemistry. Three hours lec. a week. Pr.: Chem.<sup>4</sup>

**221 903. Graduate Seminar in Organic Chemistry.** (0-1) I, II.

**221 905. 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.

**221 965. 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.<sup>4</sup>

**221 967. 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. 965.

**221 970. 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.<sup>4</sup>

4. All chemistry courses numbered 600 or above require the following as minimum prerequisites: Organic Chem. II (Chem. 550), Organic Chem. II Lab. (Chem. 551), Physical Chem. II (Chem. 595), and Physical Chem. II Lab. (Chem. 598).

4. All chemistry courses numbered 600 or above require the following as minimum prerequisites: Organic Chem. II (Chem. 550); Organic Chem. II Lab. (Chem. 551), Physical Chem. II (Chem. 595), and Physical Chem. II Lab. (Chem. 598).

## Courses in Physical Chemistry

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**221 500. 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. 214.

**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

**221 720. Electrochemistry.** (3) II in even years. Fundamentals of electrochemistry and their applications. Two hours rec. and three hours lab. a week. Pr.: Chem.<sup>4</sup>

### GRADUATE CREDIT

**221 801. 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.<sup>4</sup>

**221 802. 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.<sup>4</sup>

**221 854. Molecular Structure.** (3) I. Introduction to quantum mechanics and atomic and molecular spectroscopy. Three hours lec. a week. Pr.: Chem.<sup>4</sup>

**221 904. Graduate Seminar in Physical Chemistry.** (0-1) I, II. Presentation of topics from literature in physical chemistry.

**221 950. Chemical Statistical Thermodynamics.** (3) I. Application of classical and quantum statistical mechanics to chemical phenomena. Three hours lec. a week. Pr.: Chem. 801, 854.

**221 955. 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.<sup>4</sup>

**221 995. Theoretical Chemistry I.** (3) II. Principles of diatomic and polyatomic molecular spectroscopy and chemical bonding. Three hours lec. a week. Pr.: Chem. 854 or consent of instructor.

**221 996. 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. 854 or consent of instructor.

## COMPUTER SCIENCE

Paul S. Fisher, Head of Department

At KSU: Associate Professors Ahmed,\* Conrow,\* Gallagher,\* and Hankley,\* Assistant Professors Brewer,\* Calhoun,\* Fisher,\* Miller, Sincovec,\* Unger, and Wallentine.\*

At KU: Professors Schweppe,\* Sedelow,\* and Sedelow,\* Associate Professors Bavel,\* Bulgren,\* Hetherington,\* and Horowitz,\* Assistant Professors Case,\* Horgan, Lien, Mansfield,\* and Tuggle.\*

### 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 results 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 a Bachelor of Science or Bachelor of Arts degree in Computer Science must fulfill the general requirements of the College of Arts and Sciences; complete Math 220 and 221 and either 224 or 551; complete Electrical Engineering 241; and complete Computer Science 200 and one language laboratory, 300, 305, 405, 420, 480, and 560, plus 15 additional hours chosen from the department's list of technical electives.

### Graduate Study

The Department of Computer Science offers graduate studies leading to Master of Science and Doctor of Philosophy degrees. A minimum of 30 semester hours of graduate course work is required for the Master's Degree, and either a thesis, a written report, or a publishable paper is required for graduation.

The Doctor of Philosophy degree in computer science is offered jointly by the University of Kansas and Kansas State University so that students will benefit from the combined faculties and facilities of the two institutions. The fields of study 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.

<sup>4</sup>. All chemistry courses numbered 600 or above require the following as minimum prerequisites: Organic Chem. II (Chem. 550), Organic Chem. II Lab. (Chem. 551), Physical Chem. II (Chem. 595), and Physical Chem. II Lab. (Chem. 598).



### 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

**286 200. Fundamentals of Computer Programming.** (2) History of computers, description of digital computing systems, strategy of problem solving using digital computers, concepts and properties of algorithms, introduction to procedure-oriented languages, relevance of computers to society. Normally taken concurrently with one or more C.S. Language Labs. Pr.: High School Algebra.

**286 201. FORTRAN Language Laboratory.** (1) Fundamentals of programming in FORTRAN; applications. Three hours lab. a week. Pr. or Conc.: C.S. 200.

**286 202. PL/1 Language Laboratory.** (1) Fundamentals of programming in PL/1; applications. Three hours lab. a week. Pr. or Conc.: C.S. 200.

**286 203. APL Language Laboratory.** (1) Fundamentals of programming in APL; applications. Three hours lab. a week. Pr. or Conc.: C.S. 200.

**286 204. SNOBOL Language Laboratory.** (1) Fundamentals of programming in SNOBOL; applications. Three hours lab. a week. Pr. or Conc.: C.S. 200.

**286 205. COBOL Language Laboratory.** (1) Fundamentals of programming in COBOL; applications. Three hours lab. a week. Pr. or Conc.: C.S. 200.

**286 300. Algorithmic Processes.** (3) Analysis and development of algorithms for solution of computational problems using the language PL/1; applied programming utilizing file handling, debugging aids, and other system features; advanced programming techniques for specialized problems. Pr.: One C.S. Language Lab. or C.S. 790.

**286 305. Computer Organization and Programming.** (4) Assembly languages; logical computer organization; instruction sequencing; addressing systems; subroutine linkages; command languages. Each subject is developed by student computer programs. Pr.: One C.S. Language Lab. or C.S. 790.

**286 397. Seminar in Computer Science.** (1-3).

**286 400. Programming Techniques.** (3) Introduction to psychology of computer programming; program design, style, testing verification, and documentation; programming without "go to's;" debugging and proof techniques. Pr.: C.S. 300 or 790.

**286 405. Introduction to Programming Languages.** (3) Structure of algorithmic, conversational, list processing, and string manipulation languages; concepts and facilities of programming languages. Pr.: C.S. 300 or 790.

**286 410. Discrete Systems Simulation.** (3) Introduction to discrete simulation languages and techniques. Pr.: One C.S. Language Lab. or C.S. 790 and Introductory Probability and Statistics I. (Stat. 510)

**286 420. Introduction to Programming Systems.** (3) Basic systems concepts: assemblers, linking loaders, batch monitors, interrupt systems, input/output systems, and files; procedure implementation; process parallelism and synchronization; memory and name management. Pr.: C.S. 305 or 790.

**286 430. Non-Numeric Programming.** (3) Use of computers in areas not involving numeric calculations; survey of applications into areas such as music, learning theory, games, and discrete pattern recognition; heuristic programs. Pr.: C.S. 300 or 790.

**286 480. Mathematical Machines and Computability.** (3) Introduction to numerical algorithms fundamental to scientific computer work, including elementary discussion of error, roots of equations, interpolation, systems of equations, quadrature, and introduction to methods for solution of ordinary differential equations. Pr.: One C.S. Language Lab. or C.S. 790 and Analytic Geometry and Calculus II (Math 221).

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**286 560. Data Structures.** (3) Study of linear and orthogonal lists, strings, arrays, and graphs; representation of such structures within the computer. Pr.: C.S. 300 or 790 or & Analytic Geometry and Calculus I (Math. 220).

**286 590. Computer Project Management.** (3) Computer selection, programming project management, personnel organization and management, budgeting, physical facility planning, terminal selection, operating system optimization. Students plan, recommend, and defend small data processing systems. Pr.: C.S. 300 or 790.

**286 597. Seminar in Computer Science.** (1-3).

#### GRADUATE AND UNDERGRADUATE CREDIT

**286 650. Design Automation for Digital Systems.** (3) Programming of digital design automation systems for hardware compilers, digital simulators and simulation, documentation and editing, placement and wire-routing algorithms, graphical aids for printed circuit board design and production. Pr.: C.S. 305 or 790 & Introduction to Computer Engineering (E.E. 241).

**286 680. Searching Procedures.** (3) Design and implementation of procedures and algorithms for numerical and semi-numeric searching; mathematical programming; interactive searching with programming projects primarily using the language APL. Pr.: C.S. 480.

**286 690. Introduction to Computational Linguistics.** (3) Problems in text processing and automatic linguistic analysis; construction of dictionaries and concordances; natural language syntactic analyzers. Pr.: C.S. 300 or 790 & Introduction to the Study of Language (Linguistics 280) or Introduction to Linguistics (Linguistics 780).

**286 700. Programming Languages.** (3) Study of formal models of programming languages: relationship between formal languages and automata and of formal languages to actual languages; generation, recognition. Pr.: C.S. 405 or 790.

**286 710. Computer Simulation Experiments.** (3) Digital computer simulations will be programmed and used to predict data and test hypotheses. Pr.: C.S. 410.

**286 720. Applied Programming Systems.** (3) Design of executive systems, scheduler strategies for central processor, system integrity (protection), methods of system development, languages for system implementation. Pr.: C.S. 420 & 560.

**286 730. Artificial Intelligence.** (3) Application of heuristics to problem solving; perceptrons and pattern recognition; learning and self-evolving programs. Pr.: C.S. 430 & 560.

**286 735. Decision Processing.** (3) Pattern recognition by metric and linguistic techniques, feature extraction, clustering techniques. Pr.: One C.S. Language Lab. or 790 & Introduction to Applied Mathematics II (Math 551) & Introductory Probability and Statistics I (Stat. 510).

**286 760. Information Organization and Retrieval.** (3) Models for representing structured information; techniques for organizing and searching files; query analysis; analysis of information by statistical, syntactic, and logical methods; applications to automatic information retrieval systems, question answering systems, and man-machine interaction. Pr.: C.S. 560.

**286 765. Business Data Processing.** (4) Manual, semiautomatic, and automatic data processing systems; accounting concepts, data processing implications; organization of sequential and direct-access files; checking and control techniques. Students will study business applications and recommend data-processing systems. Three hours lecture, two hours lab. a week. Pr.: C.S. 560.

**286 770. Logic and Algorithms.** (3) Propositional calculus, axiomatics; quantification theory; satisfiability and validity, models, first-order theories; foundational considerations. Pr.: C.S. 560.

**286 780. Numerical Solution of Ordinary Differential Equations.** (2) Computer algorithms and techniques for solving ordinary differential equations; programming exercises on the digital computer. Pr.: One C.S. Language Lab. & Numerical Analysis (Math. 555) or C.S. 480 & Series and Differential Equations (Math. 240) plus concurrent enrollment in Math. 780.

**286 785. Numerical Solution of Partial Differential Equations.** (2) Computer algorithms and techniques for solving partial differential equations; programming exercises on the digital computer. Pr.: C.S. 780 & Math. 780 plus concurrent enrollment in Math. 785.

**286 790. Intensive Study of Computer Science.** (3) Intensive course in design of algorithms, computer programming, and advanced computational techniques for students with minimal background in Computer Science. Meets 4 hours each week. Pr.: High School Algebra and Graduate Standing.

**286 798. Topics in Computer Science.** (Credit arranged).

#### GRADUATE CREDIT

**286 800. Translator Design I.** (3) Characterization of interpreters vs. translators; study of interpretive systems such as LISP; features of translators including recognition, parsing, optimization, and code generation; systems. Pr.: C.S. 700.

**286 805. Computational Semantics.** (3) Theoretical prerequisites and computational techniques for mechanical interpretation of language sentences; semantics of formal computer languages; proofs of program validity and implementation equivalences; structural representation of meaning. Pr.: C.S. 800.

**286 830. Image Processing and Recognition.** (3) Two-dimensional digital filtering for enhancement; coding or images; contour processing; analysis of image structure. Pr.: C.S. 735.

**286 870. Theory of Computability.** (3) Finite-state automata, mathematical models, simulation using neural networks, characterization using regular expressions, transition graphs, finite-state recognizers; Turing machine fundamentals. Pr.: C.S. 560 or Consent of Instructor.

**286 875. Automata Theory.** (3) Finite automata, synchronous sequential circuits, Kleenes' theorem, semi-groups, monomorphisms, generator systems, algebraic linguistics, potentially infinite systems, recursive functions. Pr.: C.S. 870 or Consent of Instructor.

**286 890. Special Topics in Computer Science.** (2-4) 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.

**286 897. Seminar in Computer Science.** (1-3).

**286 898. Master's Report in C.S.** (1-2).

**286 899. Research in Computer Science.** (1-6).

**286 900. Translator Design II.** (3) Special topics in translator construction involving incremental, extensible, and conversational compilers, and translator writing systems. Pr.: C.S. 800.

**286 920. Contemporary Concepts in Programming Systems.** (3) Theoretical analysis of deadlock in multiprocess systems, detection, and prevention; theoretical properties of virtual memory, the working set model; theory of resource allocation, scheduling theory. Pr.: C.S. 720 & 805 & Introductory Probability and Statistics I (Stat. 510).

**286 925. Computation Structures.** (3) Theoretical study of hardware/software means for implementing total computer systems; structures arising during execution; computation schemata accommodating parallelism; monosequence and multi-process implementation; process synchronization and determinism. Pr.: C.S. 920 and Design of Digital Systems I (E.E. 641).

**286 999. Research in Computer Science.** (Credit arranged).

#### 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 Delehanty, Greenwood,\* Assistant Professors Akkina, Babcock, Gormely,\* Lyman, Nafziger,\* Olson,\* and Thomas;\* Instructors Bradley and Hazlett; Emeritus: Associate Professor Decou.\*

Economics is concerned with the principles governing the production and distribution of goods and services, the principles guiding the best use of resources — land, labor, 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.

\*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.



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 76) are (1) Econ. 110, 120, 510, 520, (2) five additional courses numbered 500 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, and (4) one of the following: Math. 220 or 500; Bus. Admin. 260; Stat. 351 or 708.

**Secondary Education Certification.** A student majoring in economics may also prepare for teacher certification at the secondary level (see page 169). This program leads to the Bachelor of Science degree (see page 76). 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 169).

**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. 581; B.A. 530, 630, 631.

### 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 fluctuations, 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. Students must demonstrate reasonable proficiency in mathematics and statistics.

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, S. 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.

**225 229. Honors Seminar Economics.** (1) I, II. Readings and discussions. Open to students in the Honors Program not majoring in economics.

**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. 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. P. Sci. 406, Soc. 406, Anthro. 406.)

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**225 510. 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.

**225 520. 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.

**225 530. 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.

**225 531. 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.

**225 532. Fiscal Operation of State and Local Government.** (3) I. Designed for students who plan careers related to state or local government. Selected topics in state and local taxation and expenditure. Pr.: Economics 110 and permission of instructor.

**225 555. 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. P.: 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. 520 or 531 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. Pr.: 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. 530.

**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.** (1-3) II, some S. Analytical and quantitative methods used in economics. Applications to specific problems. Pr.: Math. 220 or 500 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. 520, Math. 221 or 500 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 of slope of the demand schedule for their products by different patterns of expenditure or advertising and selling. Pr.: Econ. 520.

**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. 510 and Econ. 530.

**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 510 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. 520 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.

**225 860. 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.

**225 898. Research in Economics.** MA — Master's Report.

**225 899. Research in Economics.** MA — Research for Master's Thesis.



**225 905. 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.

**225 920. Labor Economics Seminar.** (3) I. A critical analysis of wage theories, collective bargaining and unemployment problems. Pr.: Econ. 620 or consent of instructor.

**225 925. 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.

**225 935. Econometric Methods.** (3) I. Quantitative methods of research used in economics. Pr.: Econ. 730 or consent of instructor.

**225 940. 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.

**225 945. 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.

**225 955. 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. 925 or consent of instructor.

**225 999. Research in Economics.** PhD — Research for PhD Dissertation.

## ENGLISH

Fred H. Higginson,\* Head of Department

Professors Davis,\* Higginson,\* Moses,\* Noonan,\* and Rogerson,\* Associate Professors Adams,\* Ansdell,\* Eitner,\* Johnston,\* Jones,\* McCarthy,\* McGhee,\* Rees,\* and White,\* Assistant Professors Brondell,\* Conrow, Cunningham,\* Donnelly, Evans, Gillespie, Grindell, Houser, Koch,\* Nyberg,\* Psilos, H. Schneider, and M. Schneider,\* Instructors Baker, Cohen, Geissler, and Pelischek; Emeritus: Professors Aberle and Faulkner; Assistant Professors Glenn\* and 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. 500) 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. 260, 265, 280 and 285); one Shakespeare course; Advanced Composition (Engl. 400); Modern English Grammar (Engl. 530); Literature for Adolescents (Engl. 545); and nine hours of electives, six of which must be in courses numbered 600 or above. The English Comprehensive (Engl. 500) 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. 230, 231, 233, and 234; 310; 320; 340; 345; 350; 360; 365; 370; 375; 387 and 388. 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. 310, 320, 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 catalog.

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.

**229 200. English Composition III.** (3) I, II, S. Advanced exposition and argumentation. Pr.: Engl. 120, 125 or 126.

**229 230. Humanities: Classical Cultures.** (3) I, S.

**229 231. Humanities: Medieval and Renaissance.** (3) II, S.

**229 233. Humanities: Baroque and Enlightenment.** (3) I, S.

**229 234. 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.

**229 260. 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.

**229 265. 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.

**229 280. American Survey I.** (3) I, II, S. An introductory review of our literary history from the early accounts of colonization through the American Renaissance. Not designed for the general student. Pr.: Engl. 120, 125, or 126.

**229 285. American Survey II.** (3) I, II, S. An introductory review of our literary history from the Civil War to the present. Not designed for the general student. Pr.: Engl. 120, 125 or 126.

**229 310. 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.

**229 320. Introduction to the Short Story.** (3) I, II, S. American, British and Continental stories are studied. 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. 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.

**229 365. 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.

**229 370. American Literature I.** (3) I, II, S. Major works selected for the general student. Not for English majors. Pr.: Engl. 120, 125 or 126.

**229 375. 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.

**229 387. 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.

**229 388. Books and Men II.** (3) I, II, S. Continues Engl. 387. Not for English majors. Pr.: Engl. 120, 125 or 126.

**229 395. Topics in English.** (0-3) I, II, S. Selected studies in literature and language. Pr.: Consent of instructor.

**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.

**229 400. Advanced Composition.** (3) I, II, S. Expository writing, primarily for candidates for the teaching certificate in Secondary Education. Pr.: Engl. 120, 125 or 126.

**229 405. 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.

**229 410. 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.

**229 490. 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.

**229 499. 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 IN MINOR FIELD

**229 530. 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.

**229 540. 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.

**229 545. 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.

**229 560. 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.

**229 570. 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.

**229 580. The Epic Tradition.** (3) Greek and Roman masterpieces in translation as background for the study of literature. Pr.: Junior standing.

#### UNDERGRADUATE AND GRADUATE CREDIT

**229 610. 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.

**229 625. 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.

**229 640. Elizabethan Non-dramatic Literature.** (3) I in alternate years. An introduction to the literature of the English Renaissance. Pr.: Engl. 120, 125 or 126.

**229 642. Spenser.** (3) II in alternate years. 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.

**229 650. 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.

**229 652. 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.

**229 660. Seventeenth Century Literature.** (3) II, S. A survey of the principal non-dramatic writers, apart from Milton. 1600-1660. Pr.: Junior standing.

**229 670. Milton.** (3) II, S. Pr.: Engl. 120, 125 or 126.

**229 675. Restoration and Eighteenth Century Drama.** (3) I, S. in alt. years. A survey of English dramatic literature from 1600 to 1800. Pr.: Junior standing.

**229 680. 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.

**229 685. Eighteenth Century II.** (3) II, S. The age of Dr. Johnson and the beginnings of Romanticism. Pr.: Engl. 120, 125 or 126.

**229 690. 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.

**229 699. 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.

**229 700. English Novel I.** (3) I, S. A survey of British fiction from Defoe to the Brontës. Pr.: Engl. 120, 125 or 126.

**229 701. 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.

**229 705. 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.: Junior standing, Engl. 280, or consent of instructor.

**229 710. Nineteenth Century American Poetry.** (3) II, S. A survey with special attention to Poe, the "Fireside Poets," Emerson, Whitman, Melville and Dickinson. Pr.: Engl. 280 or consent of instructor.

**229 715. Nineteenth Century American Fiction I.** (3) I, S. Emphasis on Brown, Cooper, Poe, Hawthorne and Melville. Pr.: Engl. 280.

**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.: Junior standing, Engl. 285, or consent of instructor.

**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. 265.

**229 755. Twentieth Century American Poetry.** (3) II, S. Development of American poetry from Robinson and Frost to Eliot and the present. Pr.: Engl. 285.

**229 760. Twentieth Century English Drama.** (3) I, S. British drama from Wilde and Shaw to Pinter and his contemporaries. Pr.: Junior standing.

**229 765. Twentieth Century American Drama.** (3) II, S. American drama from O'Neill and Rice to Leroi Jones and his contemporaries. 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. 405.

**229 790. History of the English Language.** (3) II, S. The development of British English, with digressions. Pr.: Senior standing or consent of instructor.

**229 795. 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.

**299 799. 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.

**229 810. 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.

**229 850. Shakespeare Seminar.** (3) On demand. Pr.: Engl. 650 or 652.

**229 870. Milton Seminar.** (3) On demand. Pr.: Engl. 670 or consent of instructor.

**229 890. Topics in Poetry.** (3) On demand. Intensive study of a poet or group of poets, either British or American. Pr.: Consent of instructor.

**229 892. Topics in Drama.** (3) On demand. Intensive study of a dramatist or group of dramatists, either British or American. Pr.: Consent of instructor.

**229 894. Topics in Fiction.** (3) On demand. Intensive study of a novelist or group of novelists, either British or American. Pr.: Consent of instructor.

**229 898. Master's Report.** (2) I, II, S.

**229 900. Bibliography and Methods of Research.** (3) I, S. An introduction to textual, bibliographic and professional problems, required of Ph.D. candidates.

**229 940. Studies in Sixteenth Century Literature.** (3) On demand. Pr.: Consent of instructor.

**229 950. Studies in Seventeenth Century Literature.** (3) On demand. Pr.: Consent of instructor.

**229 960. Studies in Eighteenth Century Literature: British.** (3) On demand. Pr.: Consent of instructor.

**229 965. Studies in Nineteenth Century Literature: British.** (3) On demand. Pr.: Consent of instructor.

**229 970. Studies in Nineteenth Century Literature: British.** (3) On demand. Pr.: Consent of instructor.

**229 975. Studies in Nineteenth Century Literature: American.** (3) On demand. Pr.: Consent of instructor.

**229 980. Studies in Twentieth Century Literature: British.** (3) On demand. Pr.: Consent of instructor.

**229 985. Studies in Twentieth Century Literature: American.** (3) On demand. 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

##### UNDERGRADUATE AND GRADUATE CREDIT

**Introduction to Linguistics.** (3) I, II, S. Same as Speech and Modern Languages 780.

**Introduction to Historical Linguistics.** (3) Same as Speech and Modern Languages 781.

**Language Typology.** (3) Same as Speech and Modern Languages 782.

**Phonetics and Phonemics of English.** (3) Same as Speech and Modern Languages 783.

**Morphology and Syntax of English.** (3) Same as Speech and Modern Languages 784.

**Transformational Grammar.** (3) Same as Speech and Modern Languages 785.

**Topics in Applied Linguistics.** (3) II. Same as Speech and Modern Languages 787.

**Methods and Techniques of Learning a Second Language.** (3) Same as Speech and Modern Languages 788.

#### GEOGRAPHY

W. R. Siddall,\* Head of Department

Professors Siddall,\* and Stacey,\* Associate Professors Kromm,\* and Stover,\* Assistant Professors Bussing,\* Self,\* and Seyler; Instructor Stallings; 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 theoretical inquiry into the major problems of human society by examining spatial structure and processes. In this more rigorously scientific approach full use is made of various techniques of mathematical and cartographic analysis of spatial phenomena, computer mapping, and remote sensing, with the expectation of acquiring greater insight into many old problems of this spatially-oriented approach.

A typical and traditional problem in geography concerns man's impact on the land; over a century ago the geographer George Perkins Marsh published his now classic *Man and Nature*. Deterioration of environmental quality is best understood by the geographer's characteristically broad approach. Air pollution, contamination of waterways, decaying urban areas, destruction of the landscape, 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 76) consist of a minimum of 28 hours in geography. Included in this total must be Geography 220, 221, 300, 310, 360, and 480, plus a minimum of nine additional hours of geography courses numbered 400 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 76).

In either of these curricula the student may pursue a general program in geography, or he may choose to develop a concentration in either environmental studies or urban studies. Other concentrations also may be developed to reflect the particular interests of a student.

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 700 (except Option B students), 800, 820, and 840.

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 898 which shall consist of the design of a teaching syllabus in some subfield 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. Computer time is available without charge to students for thesis and other research.

## Courses in Geography

### UNDERGRADUATE CREDIT

**235 100. 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.

**235 120. 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.

**235 200. Man, Space and the Environment.** (3) I, II. Spatial aspects of human organization and behavior are examined through selected concepts in modern geography. The course is especially appropriate for students interested in the social and behavioral sciences.

**235 220. 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, a real distribution, and relevance to man. Three hours lec. and two hours lab. a week.

**235 221. 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.

**235 299. Honors Seminar in Geography.** (Var.) Selected topics. Open to non-majors in the Honors Program.

**235 300. 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.

**235 310. Geography of Manufacturing and Commerce.** (3) 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.

**235 360. Cartography.** (3) I. 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.

**235 480. Pro-Seminar in Geography.** (2-3) I. 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 the United States.** (3) I. A regional analysis of the United States with special attention to the historical, political, economic, and social factors which contribute to areal 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) II. 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) I. 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.

**235 670. 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.

**235 680. Seminar in Regional Geography.** (1-3) Pr.: Consent of instructor.

**235 690. Political Geography.** (3) I, II. 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.

**235 700. 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.

**235 710. Geography of World Agriculture.** (3) I. Distribution, variations, and significance of the major types of agriculture. Pr.: Junior standing or consent of instructor.

**235 720. 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.

**235 730. 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.

**235 740. Geography of Transportation.** (3) II. 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. Urban Geography.** (3) I. 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.

**235 760. 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.

**235 770. Social Behavior in Space.** (3) A unifying concept of social geography is the notion of social space. Following

initial conceptual and methodological exploration, students will conduct field inquiry into social dimensions of human spatial experience. Pr.: Junior Standing.

**235 780. Cultural Geography.** (3) I. 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.

**235 790. Seminar in Cultural-Economic Geography.** (1-3) Pr.: Consent of instructor.

**235 799. 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.

**235 820. History and Philosophy of Geography.** (2) I. 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.

**235 840. Seminar in Current Geographical Research.** (0) II. Department-wide seminar required of all graduate students.

**235 860. Topics in Economic Geography.** (1 to 3) Pr.: Consent of instructor.

**235 870. Topics in Cultural Geography.** (1 to 3) Pr.: Consent of instructor.

**235 898. 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.

**235 899. 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,\* Twiss,\* and Walters,\* Associate Professor Chaudhuri,\* Assistant Professors Cullers,\* Riseman,\* West,\* and Whittemore; Instructor Clark.

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?" "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 General Requirements for the B.A. or B.S. degree, the following must be completed: Geol. 100, 130, 200, 520, 560, 561, 570, 580, 581, 630, 703, 707, and 718; Math. 220 and 221; Phys. 211 and 212; Chem. 210, 230, and 250; Biol. 198.

**Geochemistry Option.** In addition to the General Requirements, the following must be completed: Geol. 100, 130, 200, 560, 561, 570, 580, 630, 703, 708, 709, 712, 714, and 718; 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 General Requirements, the following must be completed: Geol. 100, 130, 200, 560, 561, 570, 630, 703, and 718; Math. 220, 221, 222, 240, and 551; Phys. 310, 311, 400; Chem. 210, 230, and 250; Biol. 198.

**Earth Science Options for High School Teachers.** In addition to the General Requirements for the B.A. or B.S. degree, the Teacher Certification requirements and the following must be completed: Geol. 100, 520, 560, and 512; 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 General Requirements for a B.A. or B.S. degree in the College of Arts and Sciences and the following: Geol. 130, 200, 520, 560, 561, 630, 703, and 740.

### Graduate Study

The prerequisite to graduate work for the M.S. degree in Geology 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, instrumentation for chemical analysis of natural waters, complete petrographic, paleobiological, and general geology laboratories. Geophysical facilities include resistivity, 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. Geology I.** (3) I, II, S. The Earth's physical, structural, and dynamic features; the most common minerals and rocks; processes affecting the Earth. Three hours rec. a week.

**234 105. Oceanography.** (3) I, II, S. The oceans: their boundaries, contents and processes. Three hours rec. a week.

**234 110. Geology of Planets.** (3) I. Application of geochemical and geophysical principles to the evolution of planetary structures. Alternative interpretations of current observations of planet features will be discussed. Three hours rec. a week.

**234 120. Environmental Geology.** (2) II. Influence of earth processes on human activity and the geological consequences of man's use of the environment. Two hours rec. a week.

**234 130. Elementary Geology Laboratory.** (1) I, II, S. Field and laboratory investigation of minerals, rocks; use of maps; environmental studies; erosion, transportation, sedimentation. Three hours lab. a week. Pr.: Geol. 100, 105, 110, or 120 or conc. enrollment.

**234 200. Geology II.** (4) I, II, S. Physical and biologic events that have occurred on Planet Earth throughout geologic time. Three hours rec. and three hours lab. a week. Pr.: Geol. 100 or 105.

**234 310. Topics in Geology.** (2) I, II. Seminar discussion of subjects of current interest in geology. Pr.: Geol. 100 or equivalent natural science course.

**234 399. Honors Seminar in Geology.** (1-3) I or II. Selected topics. Open to non-majors in the Honors Program.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**234 506. 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.

**234 512. Earth Science.** (4) I, II, 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.

**234 520. 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.

**234 540. 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. 200.

**234 560. 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.

**234 561. 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. 560.

**234 570. 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. 200.

**234 580. 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. 200 or Biol. 198 or 201 or 205 or consent of instructor.

**234 581. 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. 580.

#### GRADUATE AND UNDERGRADUATE CREDIT

**234 630. 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. 570.

**234 701. 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.

**234 702. 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. 200, 561.

**234 703. 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. 580.

**234 704. Paleocology.** (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. 580 or consent of instructor.

**234 707. Introductory Geochemistry.** (3) I. Chemical principles involved in the understanding of geologic processes. Two hours rec. and three hours lab. a week. Pr.: Geology 561 or consent of instructor for non-majors.

**234 708. 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 561.

**234 709. 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. 708.

**234 710. 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.

**234 712. Sedimentary Geochemistry.** (3) I or II. Application of chemical principles to sedimentary systems; emphasis on

low-temperature aqueous equilibria, oxidation-reduction, crystal chemistry, thermodynamics. Three hours rec. a week. Pr.: Chem. 585 or equiv., Geol. 708 or consent of instructor.

**234 714. High Temperature Geochemistry.** (3) I or II. Thermodynamics of high temperature and pressure phase equilibria applied to igneous and metamorphic rocks. Three hours rec. a week. Pr.: Geol. 709, Chem. 585, or consent of instructor.

**234 716. 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. 520, 630, or 703, or consent of instructor.

**234 718. 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.

**234 720. 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. 703.

**234 740. Regional Geology.** (3) I or II. Structure and stratigraphy of the major tectonic units of North America. Pr.: Geol. 630, 703.

**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. 570.

**234 760. Micropaleontology.** (3) I or II. Preparation, identification, and use of microscopic fossils. One hour rec. and six hours lab. a week. Pr.: Geol. 581 and junior standing.

**234 770. 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. 540, 561 or consent of instructor.

**234 780. Vertebrate Paleontology.** (3) I or II. Evolution, geologic history, and classification of the vertebrate. Pr.: Geol. 200 or 8 hours of biology.

**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. 580, 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. 716 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. 708.

**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. 709.

**234 806. Sedimentary Petrology.** (3) I. Petrography, classification, and origin of mudrocks, sandstones, and conglomerates. Two hours rec. and three hours lab. a week. Pr.: Geol. 708.



**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. 708.

**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. 708 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. 630, 714 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.

**234 880. Clay Mineralogy.** (3) 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.

**234 899. Research in Geology, M.S.** 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.

## HEALTH, PHYSICAL EDUCATION, AND RECREATION

Charles B. Corbin, Head of Department

Professors Corbin,\* Evans,\* and Geyer,\* Associate Professors McKinney,\* and Wauthier,\* Assistant Professors Gench, Merriman,\* Noble,\* Sanner, Snyder,\* and Zuti,\* Instructors Bolan, Laurie, and Poole.

Students enrolling in the Department of Health, Physical Education, and Recreation may earn a degree in Health, Physical Education or Recreation. A major in Health will prepare a student for a career in teaching or in other health occupations. Majors in Physical Education may select specialization areas such as elementary physical education, secondary physical education, athletic coaching or non-teaching. The non-teaching degree is a more general degree which does not prepare the student for teacher certification. The Recreation major is prepared for careers in community and other recreation agencies.

### 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 261 064). After completion of Con-

cepts in Physical Education and one other non-credit class students are encouraged to enroll in one credit hour course (261 101 through 261 164), where an opportunity will be given for gaining knowledge, skill, and appreciation of lifetime recreational activities.

### Undergraduate Majors in Health, Physical Education and Recreation

Barbara Gench, Coordinator

**Health Major.** For a degree in health the student should take the following:

I. General Education Requirements — see Bachelor of Science Degree page 76.

II. Professional Education Requirements

Educational Psychology I and II, 6 hours  
Health Education Professional Semester  
Teaching Participation—8 hours  
Principles of Education (415-450), 3 hours  
Educational Sociology, 3 hours  
Methods (Health) (415-476), 3 hours

III. Health Major Requirements

261 565	Physiology of Exercise .....	4
261 290	Kinesiology .....	3
261 377	First Aid-Instructors .....	3
261 570	Motor Behavior and Skill Learning .....	3
261 230	Social Dimensions of Physical Activity .....	3
261 201	Personal and Community Health .....	3
261 206	Intro. to Phys. Ed. ....	3
261 001(M)	Concepts in Phys. Ed. ....	0
261 065	Motor Skill Evaluation .....	0
261 460	Practice Teaching in Phys. Ed. ....	2
261 583	Current Health Issues .....	3
261 714	Tests and Measurements in Health .....	3
261 780	Seminar in Health Education .....	3
215 303	Ecosystems and Man .....	3
	Elective .....	3

**Physical Education Major.** For a degree in physical education students should take the following:

I. General Education Requirements — see Bachelor of Science Degree page 76.

II. Professional Education Requirements

A. For Those Seeking Teacher Certification

1. Educational Psychology I and II, 6 hours  
2. Physical Education Professional Semester  
Teaching Participation—8 hours  
(must be done in area of specialization)  
Principles of Education (415-450 or 415-300)—3 hours  
Educational Sociology—3 hours  
Methods (415-476 or 415-469)—3 hours

B. For Those Seeking Non-Teaching Degrees

Courses to be selected from no more than two University Academic Departments. A minimum of one course 300 level or above must be taken in each department from which courses are selected. If all courses are taken from one department, at least two courses must be numbered 300 or above—17 hours

III. Professional Physical Education Core

Core Courses (to be taken by all majors):		
261 565	Physiology of Exercise .....	4
261 290	Kinesiology .....	3
261 377	First Aid-Instructors .....	3
261 570	Motor Behavior and Skill Learning .....	3
261 230	Social Dimensions of Physical Activity .....	3
261 201	Personal and Community Health .....	3
261 206	Intro. to Phys. Ed. ....	3
261 001(M)	Concepts in Phys. Ed. ....	0
261 065	Motor Skill Evaluation .....	0
261 460	Practice Teaching in Phys. Ed. ....	2
	or	
261 480	Observation and Participation in Recreation .....	2

IV. Physical Education Specialization Area

To earn a major in physical education a student must complete one of the following in addition to the Professional Physical Education Core.

<b>A. Elementary Physical Education Specialization</b>	
261 280	Phys. Ed. Materials for the Elem. Schools ..... 3
261 252	Rhythms for Elem. Schools ..... 3
261 355	Movement Exploration ..... 3
261 241	Gymnastics and Lead-up Games for Elem. Schools ..... 3
261 712	Test and Measurement for Elem. School Phys. Ed. .... 3
<b>B. Secondary Physical Education Specialization</b>	
261 331	Individual Activities for Sec. Schools ..... 3
261 266	Team Sports for Sec. Schools ..... 3
261 251	Rhythms for Sec. Schools ..... 3
261 242	Gymnastics and Recreational Games for Sec. Schools ..... 3
261 710	Test and Measurement for Sec. School Phys. Ed. .... 3
<b>C. Non-Teaching Physical Education Specialization. Any 15 hours of Phys. Ed. courses numbered 300 or higher.</b>	

**Recreation Major.** For a degree in recreation students should take the following:

- I. General Education Requirements — See Bachelor of Science Degree, p. 76.
- II. Professional Education Requirements —
  - Directed Field Experience
    - A. Seminar, 2 hours
    - B. Internship, 6 hours
  - Recreation Leadership, 3 hours
  - Additional approved tool courses from the following departments: Journalism, Speech, Music, Art, or Horticulture and Forestry, 6 hours

### III. Recreation Major Requirements —

261 565	Physiology of Exercise ..... 4
261 290	Kinesiology ..... 3
261 377	First Aid-Instructors ..... 3
261 570	Motor Behavior and Skill Learning ..... 3
261 230	Social Dimensions of Physical Activity ..... 3
261 201	Personal and Community Health ..... 3
261 206	Intro. to Phys. Ed. .... 3
261 001(M)	Concepts in Phys. Ed. .... 0
261 065	Motor Skill Evaluation ..... 0
261 460	Practice Teaching in Phys. Ed. .... 2
	or
261 480	Observation and Participation in Recreation ..... 2
261 390	Principles and Philosophy of Recreation ..... 3
261 715	Community Recreation ..... 3
261 382	Camp Counseling ..... 3
<b>Electives:</b>	
Approved recreation-related phys. ed. courses including some course work in active games, sports, dance or aquatics. .... 6	

**Coaching Program.** This program is designed to prepare coaches in all areas of varsity athletics, and is open to non-majors as well as students majoring in Health, Physical Education or Recreation. Students completing the following courses will receive an athletic coaching endorsement from the department of Health, Physical Education, and Recreation. Majors taking this program must also complete all requirements for a major in either Health, Physical Education or Recreation. The coaching program is not a substitute for specialization requirements. Non-majors are not required to take any work in the department in addition to the coaching program.

261 359	Org. and Adm. of Athletics ..... 3
261 315	Treatment of Athletic Injuries ..... 3
261 307	Tech. of Training and Conditioning ..... 2
261 202	Exercise Science or Physiology of Exercise ..... 3
261 565	or
261 375	First Aid ..... 2-3
261 377	or
<b>Four hours elected from the following:</b>	
261 302	Tech. of Basketball ..... 2
261 305	Tech. of Football ..... 2
261 301	Tech. of Gymnastics ..... 2
261 298	Tech. of Wrestling ..... 2
261 299	Tech. of Swimming ..... 2
261 309	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) 33 hours including oral and written comprehensive examinations. A minimum of 18 semester hours must be earned in physical education.

## 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).
- 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).
- 261 060. **Ballet.** (0).
- 261 061. **Skiing.** (0).
- 261 062. **Orienteering.** (0).
- 261 063. **Sailing.** (0).
- 261 064. **Self Defense.** (0).
- 261 065. **Motor Skill Evaluation.** (0) Pr.: PE Major.

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. **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).
- 261 160. **Ballet.** (1).
- 261 161. **Skiing.** (1).
- 261 162. **Orienteering.** (1).
- 261 163. **Sailing.** (1).
- 261 164. **Self Defense.** (1).

The following courses may be taken by students majoring in physical education or other students meeting prerequisite requirements.

- 261 202. **Exercise Science.** (3) To teach the basic principles of physiology, psychology, and use of audio-visual analysis in reference to coaching. Pr.: Sophomore standing.
- 261 206. **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.
- 261 210. **Drill Team Fundamentals.** (2) The organization, instruction and routines suitable for junior and senior high school drill teams.
- 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.
- 261 230. **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.

**261 242. 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.

**261 251. 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.

**261 252. 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.

**261 266. 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.

**261 280. 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.

**261 290. 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.

**261 298. Techniques of Wrestling.** (2). Study of rules, theory and practices; methods of coaching. Pr.: Ph. Ed. 230 or 202 or consent of head of department.

**261 299. Techniques of Swimming.** (2). Study of rules, theory and practices; methods of coaching. Pr.: Ph. Ed. 230 or 202 or consent of head of department.

**261 300. Techniques of Volleyball.** (2). Study of rules, theory, and practices; methods of coaching. Pr.: Ph. Ed. 230 or 202, 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 202, 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 202, 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 202, 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 202, 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 202, or consent of head of department.

**261 307. 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.

**261 309. Techniques of Tennis and Golf.** (2). Study of rules, theory, and practices; methods of coaching. Pr.: Ph. Ed. 230 or 202, or consent of head of department.

**261 315. Treatment of Athletic Injuries.** (3). Principles and practices of massage, taping and care of minor athletic injuries. Pr.: Ph. Ed. 230 or 202.

**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. Water Safety Instruction.** (2). Methods of teaching swimming, lifesaving, and water safety. Upon satisfactory completion of this course, a certificate is awarded by the American Red Cross as a water safety instructor. Not open to students in physical education. Pr.: a current senior lifesaving certificate.

**261 345. Water Safety Instruction.** (2). Methods of teaching swimming, lifesaving and water safety. Upon satisfactory completion of this course, a certificate is awarded by the American Red Cross as a water safety instructor. For majors in physical education only. Pr.: A current senior lifesaving certificate.

**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. 280.

**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.

**261 379. Physical Education for the Elementary School Teacher.** (3). Materials, techniques, and programs in physical education activities suitable for the different age periods in the elementary school. Two hours recitation and two hours lab a week. Pr.: Sophomore standing and Education 202 or consent of instructor. Not open to majors in physical education.

**261 399. Honors Seminar in Physical Education.** (1-3). Selected topics in physical education. Open to non-majors in the Honors Program.

**261 460. Practice Teaching in Physical Education.** (2). Supervised students assist in basic physical education classes. Four hours lab. a week. Pr.: Junior standing.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**261 561. 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; Ph. Ed. 290, or consent of instructor.

**261 565. 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.



**261 566. 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.

**261 570. 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.

**261 586. 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.

**261 599. Independent Studies in Physical Education.** (1-3). Selected topics in physical education. Maximum of three hours applicable toward a degree. Pr.: consent of department head.

#### UNDERGRADUATE AND GRADUATE CREDIT

**261 700. 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.

**261 701. 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. 570.

**261 710. 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. 331, 266, 251, 242.

**261 712. 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. 280, 252, 355, and 241.

**261 718. Film Analysis of Sport.** (3). The use and analysis of film, tape and other related aids for coaches. Pr.: Junior standing.

**261 730. Writing Behavioral Objectives for Physical Education.** (3). A study of the major objectives of physical education including techniques for writing specific behavioral objectives. Pr.: 415 476, 415 469 or equivalent.

**261 731. Physical Education Curriculum for the Secondary School.** (3). Organization of material in a progression for a secondary school physical education program. Pr.: 415 476 or equivalent.

**261 732. Physical Education Curriculum for the Elementary School.** (3). Organization of material in a progression for an elementary physical education program. Pr.: 415 469 or equivalent.

**261 745. Sociology of Sport.** (3). A critical analysis of sport and leisure activity in contemporary American society, focusing on such issues as sport participation and social mobility, race and sports, women and sports, and audience involvement (see Sociology 645). Pr.: Sociology 214 or consent of instructor.

**261 750. 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.

**261 775. Seminar in Physical Education.** Credit arranged. Recent trends and problems in physical education. Pr.: Senior standing 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. 565.

**261 805. Motor Development.** (3) I. A study of the motor, physical, and neuromuscular development from prenatal periods to old age. Specific areas of study include the stages of motor development, perceptual motor development, developmental patterns. Pr.: 261 570.

**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. 710, 712, 714.

**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. 290.

**261 896. Topics in Physical Education.** (1-4).

**261 897. Research in Physical Education.** Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken.

**261 898. Master's Report** (1-4).

**261 899. Master's Thesis** (1-6).

#### Courses in Health

#### UNDERGRADUATE CREDIT

**261 201. 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.

**261 373. First Aid (Multimedia).** (1) I, II, S. First aid training for prevention and treatment of injuries in an emergency. Upon satisfactory completion of this course, a certificate is awarded by the American Red Cross. Not open to students in Physical Education.

**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.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**261 581. 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.

**261 583. 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.

#### UNDERGRADUATE AND GRADUATE CREDIT

**261 714. 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.

**261 780. Seminar in Health Education.** Credit arranged. Recent trends and problems in health education. Pr.: Ph. Ed. 486 and consent of instructor.

#### GRADUATE CREDIT

**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. 583.

#### Courses in Recreation

##### UNDERGRADUATE CREDIT

**261 320. Recreational Leadership.** (3). Principles and methods of organizing communities for leisure activities.

**261 382. Camp Counseling.** (3). Basic principles and skills in camping for future counselors. Pr.: Sophomore standing or consent of instructor.

**261 390. Principles and Philosophy of Recreation.** (3). A study of the basic principles of recreation, including a survey of past and current trends in the recreation movement.

**261 480. Observation and Participation in Recreation.** (2). Observation and limited participation with recreational agency. Pr.: Recreation specialization, junior standing.

**261 490. Internship in Recreation.** (6). Supervised experience with recreation services; such as city recreation, government agencies, and other recreation agencies. May be completed in one of the following two ways, as directed by the student's advisor: a) summer employment in an approved agency with concurrent enrollment in the summer school course designation. b) half-time employment during a full semester, or full-time employment during a semester in an approved or supervised recreation job, both with concurrent enrollment in the course designation. Pr.: Senior standing plus completion of core and 9 hours of recreation specialization.

**261 491. Seminar in Recreation Internship.** (2). Designed for recreation specialists. Discussion of current research and innovations. Evaluation of recreational programs. Small group interaction. Taken concurrently with Internship in Recreation. Pr.: Concurrent enrollment in Internship in Recreation.

##### UNDERGRADUATE AND GRADUATE CREDIT

**261 715. 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.

**261 720. Organization and Administration of Intramural Programs.** (3). Policies and procedures in organizing and administering an intramural program.

#### 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).

**263 114. Drill Team.** (1).

#### HISTORY

Joseph M. Hawes,\* Head of Department

Professors Carey,\* Higham,\* Linder,\* Socolofsky,\* and Wilcoxon,\* Associate Professors Crawford,\* Eastwood,\* Hawes,\* Jones,\* Kren,\* Mulhollan,\* Page,\* Assistant Professors Donovan,\* Ferguson,\* Gray,\* Hagan,\* Hamscher, Kipp,\* Mrozek,\* and Ray,\* Emeritus: Professor Parrish,\* Sageser,\* 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, or Hist. 127 and 128), a minimum of 15 hours in courses numbered 500 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 Great Britain),
- III. The Third World (Asia, Africa, Latin America),
- IV. The United States (including the colonial period),
- 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 80. 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 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) 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) 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) 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) 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) 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) 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) 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) From the 17th century to modern times.

**241 127. Far Eastern Civilization I.** (3) The culture, history and traditions of China, Japan, Korea, Taiwan and Indochina.

**241 128. Far Eastern Civilization II.** (3) The history and traditions of China, Japan, Korea, Taiwan and Indochina in the context of contacts and developing involvement with the West.

**241 211. Asian Civilization I.** (3) A survey of Asian Civilization to 1650, emphasizing cultural and political developments.

**241 212. Asian Civilization II.** (3) 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.

**241 251. History of the United States to 1877.** (3) Colonial and Revolutionary America, the federal union, Civil War, and Reconstruction.

**241 252. History of the United States since 1877.** (3) The American nation from Reconstruction to the present.

**241 253. History of the United States to 1877, Honors.** (4) 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) The American nation from Reconstruction to the present. Pr.: Open only to freshmen and sophomores in the Honors Program.

**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.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**241 501. History and Culture of Greece.** (3) 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.

**241 502. History and Culture of Rome.** (3) 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.

**241 503. Civilization of the Middle Ages.** (3) European and Near Eastern Civilizations from the fall of the Roman Empire to the thirteenth century.

**241 505. Introduction to the Civilization of South Asia I.** (3) 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.)

**241 506. 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, language and literature, geography, social and political structure and ideas. (Same as Geog. 406, P.Sci. 406, Soc. 406, Anthro. 406.)

- 241 508. Gandhi: Non-Violent Revolutionary.** (1-3) Introduction to the personality, beliefs and political tactics of Mahatma Gandhi as developed in South Africa and applied in the Indian nationalist struggle against British imperial rule.
- 241 511. History of Christianity.** (3) A history of the Christian religion from the era of Jesus Christ to the present with special emphasis on men and ideas. Not open to freshmen.
- 241 512. Medieval Intellectual History.** (3) The main trends of medieval thought from St. Augustine to William of Ockham in their historical setting. Not open to freshmen.
- 241 521. History of England to 1714.** (3) From Roman Britain to the Hanoverians, with special emphasis on Tudors and Stuarts.
- 241 522. Great Britain since 1714.** (3) Political, constitutional, economic, social and cultural history of the United Kingdom.
- 241 523. The British Empire.** (3) A survey from the trade wars of the seventeenth century to the "Imperial Sunset" of the twentieth.
- 241 530. Europe, 1500-1815.** (3) From the Renaissance to the breakup of the Napoleonic Empire.
- 241 531. Europe, 1815-1914.** (3) From the Congress of Vienna to the First World War.
- 241 532. Europe, 1914-1945.** (3) Emphasis upon the crisis of democracy and the rise of totalitarian movements.
- 241 535. History of the European City.** (3) Development of urban civilization in Europe from the earliest times to the present, with emphasis on selected cities as historical case-studies.
- 241 541. History of Science I.** (3) The growth of scientific knowledge from ancient times to about 1700.
- 241 542. History of Science II.** (3) The development of scientific thought from about 1700 until recent times.
- 241 544. Science and Society from Newton to the Industrial Revolution.** (3) Science and scientific institutions and their relationships to society during the eighteenth and early nineteenth centuries.
- 241 546. History of Biological Thought.** (3) S. Major trends in the development of biological thought. Emphasis on such topics as theories of generation, evolution theory, and genetics. Not open to freshmen.
- 241 553. The United States in World Affairs.** (3) American diplomacy and foreign policy from independence until the modern era.
- 241 554. Colloquium in American History.** (1-3) Intensive analysis of specific periods of United States history.
- 241 556. Civil War and Reconstruction.** (3) Sectional conflict in the United States, 1850-1880.
- 241 557. American Social History.** (3) The evolution and development of American social institutions, including marriage, sexual customs, ethnicity and community problems.
- 241 558. History of Kansas.** (3) Land, people, problems, and cultural development of Kansas.
- 241 559. Black American History I.** (3) From colonial times through the Reconstruction, Slavery, Emancipation, Jim Crowism and the relation of Black Americans to the totality of American culture.
- 241 560. Black American History II.** (3) From the Reconstruction to the present, with emphasis on twentieth century reform movements and growing "black awareness."
- 241 561. War in the Twentieth Century.** (3) World Wars I and II, Korea, Indochina and the "Brush Fire" Wars.
- 241 562. History of American Military Affairs.** (3) The evolution of military institutions, doctrines and policies in peace and war from colonial times to the present.

**241 568. Russian and East European Communism.** (3) From nineteenth century origins through Lenin, the Stalin Era, the development of national communism and the changing nature of Moscow's relations with her neighbors east of the Elbe.

**241 578. History of East Asia.** (3) From the rise of Western power and influence to the present. Emphasis on crises within traditional cultures, the rise of Nationalism, the shape of change since World War II.

**241 585. South Asian Nationalism.** (3) Social, political and religious pressures on the British Indian Empire and the nationalist movements leading to the creation of India, Pakistan, Ceylon, Burma and Bangladesh.

**241 590. Latin American Nations.** (3) Economic, social and political progress of the Latin American nations from independence to the present. Emphasis is placed upon Argentina, Brazil, Chile, and Mexico.

**241 598. Senior Honors Seminar.** (3) Advanced pro-seminar in history. Pr.: Senior standing, recommendation of departmental committee.

#### UNDERGRADUATE AND GRADUATE CREDIT

**241 615. The Renaissance.** (3) The Italian Renaissance as a major phase in the history of Western Civilization and its spread to Northern Europe. Not open to Freshmen.

**241 618. Renaissance Intellectual History.** (3) The history of ideas in Western Europe during the Renaissance, 1300-1600. Not open to Freshmen.

**241 621. The Continental Reformation.** (3) Lutheranism, Calvinism, the wars of religion and their impact on the political, economic, social and intellectual history of the Western World. Not open to Freshmen.

**241 622. The Radical and Catholic Reformations.** (3) A study of the Radical and Catholic Reformations with special attention to their impact on Western political, economic and social thought. Not open to Freshmen.

**241 624. Seventeenth Century Europe.** (3) From the Wars of Religion through the Age of Louis XIV.

**241 625. Eighteenth Century Europe.** (3) From the eclipse of French hegemony in 1714 to the French Revolution.

**241 630. European Thought in the Nineteenth Century.** (3) Intellectual history of nineteenth century Europe and the relationship between ideas and their political, economic and social context.

**241 640. Twentieth Century European Thought.** (3) Main intellectual currents within the context of political and social developments.

**241 642. European and American Political and Social Movement.** (3) Selected revolutionary, reform, or conservative movements since the 1600's. The course transcends geographic and chronological boundaries in search of unifying themes.

**241 643. Topics in European History.** (3) Intensive study of a particular phase of European history. Topics will vary. May be repeated for credit.

**241 649. Medieval and Modern Cultural History of Britain.** (3) Analysis of the institutions and movements which have shaped British life.

**241 650. Eighteenth Century Britain.** (3) From the Hanoverian Succession to the Age of Pitt, Burke and Fox.

**241 651. Nineteenth Century Britain.** (3) Evolution of parliamentary institutions, the social and political implications of England as 'Workshop of the World,' the Victorian recession.

**241 652. Modern Britain.** (3) From the South African War to the welfare state.



**241 654. History of France, 1400-1715.** (3) Reconstitution of society after the Hundred Years War, the Wars of Religion, the Age of Absolutism.

**241 655. History of France since 1715.** (3) The transition from an agrarian to an industrial economy and society; implications for political and cultural change.

**241 659. Germany 1648-1789.** (3) Development of Central Europe from the Peace of Westphalia to the outbreak of the French Revolution.

**241 660. Modern Germany to 1914.** (3) Major developments in Central European history in the nineteenth century.

**241 661. Modern Germany, 1914-1945.** (3) Central European history in the twentieth century; major emphasis on the failure of German democracy and on an analysis of the national socialism.

**241 666. Eastern Europe.** (3) The evolution of East European societies, including the Balkans, from the Congress of Vienna to the present.

**241 667. History of Russia to 1801.** (3) Kievan Russia, the Golden Horde, the Rise of Moscow, Peter the Great and the Imperial Era.

**241 668. Nineteenth Century Russia.** (3) Internal developments and foreign relations from Alexander the Great to the 1905 revolution.

**241 671. The Russian Revolutions and the Soviet System.** (3) The revolutions of 1905 and 1917 and the subsequent development of the Soviet system.

**241 674. Topics in Modern Russian History.** (3) Selected topics in the political, social, or intellectual development of Russia since the Eighteenth century.

**241 680. South Asia I.** (3) 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.

**241 681. South Asia II.** (3) 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.

**241 690. Topics in Non-Western History.** (3) Intensive study of a particular phase of non-Western history. Topics will vary. May be repeated for credit.

**241 719. Science in America.** (3) 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.

**241 733. European Economic History.** (3) Major economic developments, institutions, and ideas since the seventeenth century.

**241 737. American Economic History I.** (3) Development of the American economy from colonial times to the Reconstruction. 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) From the reconstruction 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) Cultural factors based on race and nationality in American history, emphasizing the white minorities.

**241 749. American Urban History.** (3) The history of urbanism in America, its beginnings, its position in American life and its complexity.

**241 752. History of American Diplomacy, 1763-1900.** (3) The evolution of American foreign policy with emphasis on colonial origins and economic factors, prior to 1898.

**241 753. History of American Diplomacy since 1900.** (3) 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.

**241 761. Technology and War to 1900.** (3) 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.** (3) The military role in time of peace, colonial wars, guerrilla activities, civic action.

**241 764. The History of Military Thought.** (3) An examination of the evolution of military thinking from Vauban to Liddell Hart and the atomic age.

**241 771. American Thought to 1860.** (3) American thought from the Puritans through New England domination.

**241 772. American Thought since 1860.** (3) Emphasis upon the impact of industrialism, populism, science, technology, and politics.

**241 775. Colonial America.** (3) Discovery, foundation and development of the North American colonies; the European rivalry for the American empire.

**241 776. The American Revolution.** (3) The foundations of the American republic, 1763-1789.

**241 777. The Early National Period.** (3) Contest between Federalists and Jeffersonian Republicans for national leadership; the War of 1812 and the growth of American nationality.

**241 778. The Age of Jackson.** (3) Growth of democracy. Westward expansion and divisive sectionalism; the flowering of the American mind; the perfectable society.

**241 780. Populism and the Professive Movement.** (3) Growth of the industrial economy, role of the entrepreneur, and the new forces in American life from Civil War to World War I.

**241 781. Frontier America.** (3) Environmental factors, peoples, settlements, and institutions of the frontier.

**241 782. The Great Plains.** (3) The historical development of the region comprising the Great Plains, and its impact on American history.

**241 789. The United States in the Twentieth Century.** (3) Major developments in recent American history.

**241 791. Colonial Hispanic America.** (3) Exploration, settlement, and development of Central and South America and the Caribbean in the colonial period.

**241 794. Modern Mexico.** (3) The last decade of Porfiria Diaz, 1900-1910. The principal developments of the political and social revolution, 1910-1938. Recent changes in Mexico.

**241 797. Topics in the History of the Americas.** (3) 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) Students will read on a central theme, attend weekly discussions, and write a final report.

**241 799. Problems in History.** Credit arranged. 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) 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) Cont. of Hist. 801. Required of all graduate students in history.

**241 808. Quantification in History and Political Science.** (3) 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.**

**241 821. Seminar in Latin American History.** (3).

**241 822. Seminar in American Diplomatic History.** (3).

**241 823. Seminar in the History of the American West.** (3).

**241 824. Seminar in Colonial America.** (3).

**241 825. Seminar in American Intellectual History.** (3).

**241 826. Seminar in American Economic History.** (3).

**241 827. Seminar in American Science and Technology.**

**241 828. Seminar in American History.** (3).

**241 830. Seminar in Modern European History.** (3).

**241 831. Seminar in German History.** (3).

**241 832. Seminar in French History.** (3).

**241 835. Seminar in Modern Russian History.** (3).

**241 836. Seminar in Renaissance and Reformation.** (3).

**241 837. Seminar in British History.** (3).

**241 840. Seminar in Military History.** (3).

**241 850. Seminar in South Asian History.** (3).

**241 879. Seminar in the History of Science.** (3).

**241 880. Topics in European History.** (1-3).

**241 881. Topics in Third World History.** (1-3).

**241 882. Topics in the History of Science.** (1-3).

**241 883. Topics in Military History.** (1-3).

**241 884. Topics in American History.** (1-3).

**241 885. Readings in History.** (1-3).

**241 886. Problems in History.** (1-3).

**241 887. European Intellectual History.** (3) 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.

**241 995. Research in History.** Credit arranged. 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.

## JOURNALISM AND MASS COMMUNICATIONS

Walter Bunge,\* Head of Department

Professors Bunge,\* Howe,\* Associate Professors Bontrager\* and Macy; Assistant Professors Applegate, Brown, Eaton, Jordan, MacFarland, Morris,\* Oukrop,\* and Shaver; Instructor Fidler.

The Department of Journalism and Mass Communications is one of 61 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 communications 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 communications 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, 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 communications 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.

**289 250. Agricultural Journalism.** (3) I, II, S. Survey of agricultural information techniques, with emphasis on principles of news and feature writing.

**289 275. Reporting I.** (3) I, II. Instruction in news gathering and reporting techniques. Pr.: Sophomore standing; ability to type 30 words a minute.

**289 285. Reporting II.** (3) I, II. Three hours rec. and six hours reporting for the *Kansas State Collegian* each week. Pr.: 289 275.

**289 310. Photojournalism I.** (3) I, II. Basic camera and laboratory techniques of news photography. Pr.: 289 275 or 250, or consent of instructor for non-majors.

**289 320. Principles of Advertising.** (3) I, II. An examination of the advertising field and its relationship to marketing and journalism.

**289 330. Editing I.** (3) I, II. 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 289 275.

**289 335. 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.: 289 330 or consent of instructor.

**289 355. Advertising Media.** (3) I, II. The selecting, scheduling, selling and buying of the various advertising media. Pr.: 289 320.

**289 360. 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.

**289 399. Honors Seminar in Mass Communications.** (1-3) Pr.: Honors students only; consent of supervising instructor.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**289 500. Radio and Television News.** (3) II. Processing and broadcasting of radio news. Pr.: 289 275.

**289 510. Yearbook Editing and Management.** (2) I. Planning, editing, layout, writing and financing a publication.

**289 525. The Family Page.** (3) I, II. Study of contemporary trends in community and family life reporting, emphasizing feature writing and creative editing. Pr.: 289 275 or consent of instructor.

**289 535. Photojournalism II.** (3) I, II. Advanced work in taking, processing and editing photographs for newspapers

and magazines, including picture page layout and legal implications. Pr.: 289 310.

**289 555. 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.: 289 320.

### UNDERGRADUATE AND GRADUATE CREDIT

**289 600. Public Affairs Reporting.** (3) II. Investigative reporting of local, state and national affairs. Pr.: 289 285 or consent of instructor.

**289 605. Supervision of School Publications.** (3) II, S. A methods course for those planning to teach secondary or junior college journalism courses and advise high school or junior college publications.

**289 610. 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. Pr.: 289 285 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.: 289 525 or 610 or consent of instructor.

**289 620. Magazine Production.** (3) I. The practical application of theory on the fields of writing, editing, graphic reproduction, layout, and management of magazines. Pr.: 289 330 or consent of instructor.

**289 625. Formation of Public Opinion.** (3) I. Role of interpersonal and mass communications information on public opinion. Practical survey experience. Pr.: Junior standing and consent of instructor.

**289 630. Public Relations.** (3) I. Media, methods, principles, and practices of public relations. Pr.: Junior standing or consent of instructor.

**289 635. Public Information Methods.** (2) I. Advanced media, methods, principles, and practices of public relations. Pr.: 289 630 or consent of instructor.

**289 640. Public Relations and Advertising Campaigns.** (3) The in-depth handling of an organization's public relations and advertising, including analyzing its situation, planning a program and developing the communications to be used. Pr.: 289 320 or consent of instructor.

**289 645. The Black Press in America.** (3) I. Consideration of the growth, development and current status of the black press in the United States.

**289 650. 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.: 289 320.

**289 606. History of Journalism.** (3) II. A review of the growth and development of the press in the United States, with attention to the interrelationships of the press and the social, economic and political forces. Pr.: Junior standing or consent of instructor.

**289 665. Law of Mass Communications.** (3) II. A study of the legal system as it relates to the law of mass communications. Emphasis on defamation, privacy, copyright, obscenity, the courts, and other areas, as related to the mass media. Pr.: Senior standing or consent of instructor.

**289 670. International Communications.** (3) Comparative study of world press systems and the role of communications in national development.

**289 680. Readings in Journalism.** (1-3) I, II, S. Investigation of the literature of journalism.

**289 685. The Journalist in a Free Society.** (3) II. A consideration of influences and controls that define the role of

the journalist in American society. Pr.: Senior standing or consent of instructor.

**289 690. Problems in Journalism and Mass Communications.** (1-4) I, II, S. Pr.: Background of courses needed for problem undertaken.

**289 720. 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.

**289 730. Seminar in the Future of the Media.** (3) II. A study of philosophical and technological advances in mass communications with emphasis on projected patterns of future growth and development. Restricted to seniors and graduate students.

**289 740. Colloquium in Mass Communications.** (1-3) I, II. Discussion of selected topics in mass communications research and practice. Restricted to seniors and graduate students.

**289 750. Mental Health Information Seminar I.** (3) Survey of public attitudes toward mental illness and mass media's role in reporting. Pr.: For Fellows in Mental Health Mass Communications Program or consent of instructor.

**289 755. 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 communications. Pr.: For Fellows in Mental Health Mass Communications Program or consent of instructor.

**289 760. 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.

**289 765. Communication Theory.** (3) An examination of major communication theories as they relate to individual, interpersonal, group and mass communications.

**289 770. 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.

**289 780. Research Methods in Journalism.** (3) I, II, S. Survey of research methods used in the study of the mass media.

## GRADUATE CREDIT

**289 899. 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

**290 250. Radio-Television Speech Procedures.** (3) Basic training in regulations, station operations, and announcing skills. Two hours lecture and two hours laboratory per week. Required of all students with radio-television concentration.

**290 255. KSDB-FM Participation.** (1) Supervised performance in the operation of the University's student FM radio station. Pr.: 290 250.

**290 260. Radio-Television Continuity.** (3) Study of all forms, and the preparation, of non-dramatic scripts for all types of broadcast programs. Required of majors. Pr.: 290 250 for students with radio-television emphasis.

**290 275. Cable Television Participation.** (1) I, II. Supervised participation in program origination for cable television. Pr.: Consent of instructor.

**290 320. Introduction to Television.** (2) Study of the development of TV; its codes and control; its relation to other media; economic and social implications. Required of majors. Pr.: 290 250 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.: 290 250 and 290 260.

**290 350. 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.: 290 250, 260, 320 for students with radio-television concentration; consent of instructor for non-majors.

### UNDERGRADUATE AND GRADUATE CREDIT

**290 510. Radio-Television Writing.** (3) Study of the principles and preparation of dramatized broadcast programs. Pr.: 290 260 or 320.

**290 520. Television Production.** (3) Emphasis placed on basic television production. Pr.: 290 260 and 320 for students with radio-television concentration; consent of instructor for non-majors.

**290 610. History of Broadcasting.** (3) History of the radio-TV industry; its effects on American life; the economic, political and social significance of broadcasting.

**290 615. Radio-Television Series Writing.** (3) Cont. of 290 510. Development of complete scripts for series of documentary and dramatized broadcast programs. Pr.: 290 510 or consent of instructor.

**290 620. Radio-Television Advertising.** (3) Study of the principles and practices in broadcast advertising. Pr.: 289 320 or 290 260.

**290 630. Radio-Television Programming.** (3) Study of the principles and planning and the development of radio and television programs and schedules. Pr.: 290 260 and 320 for students with radio-television concentration.

**290 650. Advanced Television Production.** (3) Study of visual and dramatic principles in television from the viewpoint of directors, producers and performers. Pr.: 290 520 for students with radio-television concentration.

**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.

**290 665. Radio-Television Station Management.** (3) Study of the practices and the problems of broadcast station management. Pr.: Junior standing.

**290 675. 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.

**290 685. Broadcast Regulation and Responsibility.** (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 or consent of instructor.

**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,\* Lee,\* Sloat, Strecker and Yee;\* Assistant Professors Curtis,\* Dressler,\* Hamsher, Herman,\* Huff, Jeffcott,\* A. Miller,\* F. Miller,\* W. Parker,\* Pigno,\* Saeki, W. Spears,\* Summerhill,\* 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 8.

**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, 233, 234, 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. 703	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. 821 and 822 Real and Complex Analysis, I, II or Math. 871, 872 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 and 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. 510 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 708, 709, Set Theory I, II; and Math. 704, 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. 717	The Real Number system	3
Math. 511	Intro. to Algebraic Systems	3
or		
Math. 512	Modern Algebra I	
Math. 572	Modern Geometry	3
Math. 619	Found. of Analysis	3
Math. 791	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. 590	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. 703	Intro. to Linear Algebra
Math. 704	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. 215, 315	Educational Psychology I, II
Educ. 451	Principles of Secondary Education
Educ. 476	Methods of Training in Secondary School
Educ. 586	Teaching Participation in Secondary Schools
Educ. 611	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. 721	Adv. Numerical Analysis I	3
Math. 703		
or		
Math. 713	Linear Algebra or Matrix Theory	3

(b) He is required to select at least 9 hours from

Math. 762	Adv. Numerical Analysis II	3
Math. 550	Complex Variables	3
Math. 622		
or		
Math. 723	Analysis	3
Math. 714	(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. 249. 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 obtained by 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. 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 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 the structures are used to exemplify the linguistic use of mathematics and its impact on society.

**245 149. Functional Trigonometry.** (2) Interim sessions only. A special functional trigonometry course emphasizing trigonometric identities. The course is intended as special preparation for calculus. Pr.: 1 1/2 units of high school algebra.

**245 150. Plane Trigonometry.** (3) I, II, S. Pr.: Plane geometry and 1 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.

**245 233. 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.

**245 234. Algebra and Calculus in Euclidean Spaces II.** (4) II. Continuation of Math. 233. Pr.: Math. 233 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.

**245 399. Seminar in Mathematics.** Credit arranged. On sufficient demand. Primarily for Honors Students. Pr.: Consent of instructor.

**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, Separation, 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.



## UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**245 500. Introduction to Analytic Processes.** (3) II. Some topics in differentiation, integration, linear algebra, matrices and linear programming, with applications. Pr.: Two years high school or college algebra, elements of statistics. Not open to students having credit in Math. 220.

**245 501. Introduction to Mathematics in the Behavioral Sciences.** (3) I, II. Introduction of Matrices, Relations, Sets and Groups with applications to the Behavioral Sciences. Pr.: Student must be a major in Anthropology, Economics, History, Political Science, Psychology, or Sociology; or have the consent of the instructor.

**245 505. Mathematical Foundations for Economics.** (3) II. Geometric and algebraic theory behind the simplex method, the mathematical structure of the theory of networks and flows, and related topics. Pr.: Math. 500 or 501 or its equivalent.

**245 508. Topics in Mathematics for Elementary School Teachers.** (4) I, II, 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.

**245 509. Intuitive Geometry.** (2) S. Measurement, triangles, quadrilaterals, nonmetric geometry, similarity, volumes, elementary coordinate geometry. Pr.: Consent of instructor.

**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  $\mathbb{R}^n$ , Implicit Function Theorem, Vector Fields, Differential Forms, Integration on Manifolds and Stokes' Theorem, Green's Identities. Pr.: Math. 234 and Math. 478 and consent of Department.

**245 531. Introduction to Real Analysis II.** (3) II. Continuation of Math. 530. Pr.: 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 on 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.

**245 555. Numerical Analysis.** (3) I, II. Solution of algebraic and transcendental equations, with emphasis on linear algebraic systems. Introduction to linear programming. Interpolation and curve fitting. Numerical differentiation and integration with an introduction to methods for solving ordinary differential equations. Pr.: Math. 240, 551.

**245 570. History of Mathematics.** (3) II in alt. years. Cannot be used as part of the advanced mathematics needed by mathematics majors. Pr.: Math. 220.

**245 572. 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 Lebesgue and Riemannian geometries. Pr.: Math. 221.

**245 573. Foundations of Geometry.** (3) Euclid's parallel postulate, non-Euclidean geometries, incidence, affine geometries, order congruence, continuity. Pr.: Math. 572.

**245 575. Advanced Analytic Geometry.** (3) On sufficient demand. Properties of conic sections; poles and polars; selected topics in Solid Analytic Geometry. Pr.: Math. 240.

**245 577. Elementary Topology I.** (3) I. Introduction to general topological spaces and invariants under continuous mappings and under homeomorphisms. Pr.: Math. 240 301.

**245 578. Elementary Topology II.** (3) II. Cont. of Math. 577. Pr.: Math. 577.

## GRADUATE AND UNDERGRADUATE CREDIT

**245 612. Finite Applications of Mathematics.** (3) S. Consideration of applications of set theory, matrix algebra, linear programming and graph theory that can be illustrated in the secondary school classroom. Pr.: Membership in Summer Institute.

**245 619. Foundations of Analysis.** (3) A study of sets and sequences, neighborhood, limit point, convergence, and open and closed set in the real line and in the plane, the concept of continuous function. Pr.: Math. 222.

**245 620. Intermediate Analysis.** (3) A brief review of some of the properties of the real number system, limits of functions of a single real variable, theorems on continuity, Rolle's Theorem, mean value theorem with some of its consequences, and theorem on integration. Pr.: Math. 222 and 301.

**245 621 Analysis I.** (3) I, II, S. Metric spaces, limits, continuity, differentiation, mean value theorems, Riemann-Stieltjes integral, series. Pr.: Math. 240, 301 or graduate standing.

**245 622. Analysis II.** (3) I, II. Function spaces, Stone-Weierstrass Theorem, Ascoli Theorem, series, introduction to Lebesgue measure. Pr.: Math. 621.

**245 670. Axiomatic Geometry.** (3) Axiom systems and their use in finite geometries, an axiomatic development of three and four dimensional Euclidean geometries, including the notions of coordinates, order relation, space separation, convexity and measurement.

**245 671. Projective Geometry.** (3) I. Affine spaces, Euclidean spaces, projective spaces, coordinizations, duality principle, geometric lattices, classifications, subgeometries of projective geometry (especially non-Euclidean geometries). Pr.: Math. 513.

**245 701. Set Theory and Logic.** (2-3) Basic set theory, cardinal and ordinal numbers, axiom of choice, transfinite induction, symbolic logic, tautologies, universal and existential quantifiers, propositional and predicate calculus, arguments, deductive systems. Pr.: Math. 301.

**245 703. Introduction to Linear Algebra.** (2-3) I. Finite dimensional vector spaces; linear transformations and their matrix representations; dual spaces, invariant subspaces; Euclidean and unitary spaces; solution spaces for systems of linear equations. Pr.: Math. 512.

**245 704. Introduction to the Theory of Groups.** (3) II. Introduction to abstract group theory; to include permutation groups, homomorphisms, direct products, Abelian groups. Jordan-Hölder and Sylow theorem. Pr.: Math. 513.

**245 706. Theory of Numbers.** (2-3) II in alt. years. Divisibility properties of integers, prime numbers, congruences, multiplicative functions. Pr.: Math. 221.

**245 708. Set Theory I.** (3) I. Set theory; functions, relations and orderings; ordinal and cardinal numbers; transfinite induction; axiom of choice. Pr.: Math. 301 or equivalent.

**245 710. Introduction to Category Theory.** (3) II. Categories, duality, functors, natural transformations, functor categories, comma categories, universal arrows, products, limits, Yoneda's Lemma, Freyd's Adjoint Functor Theorem. Pr.: Consent of instructor.

**245 713. Theory of Matrices I.** (3) The algebra of vectors and matrices, functions of vectors and matrices, similarity and the eigenvalue problem, numerical methods associated with matrices and tensor algebra. Pr.: Math. 511 or 512 or graduate standing.

**245 714. Theory of Matrices II.** (3) II. Cont. of Math. 713. Pr.: Math. 713.

**245 717. The Real Number System.** (3) An extensive development of number systems, with emphasis upon structure. Includes systems of natural numbers, integers, rational numbers and real numbers. Pr.: Math. 221.

**245 723. Analysis III.** (3) II in alternate years. Calculus on normed vector spaces, functions of several real variables, inverse and implicit function theorems, basic existence theorems for differential equations, multiple integrals. Pr.: Math. 621.

**245 724. Analysis IV.** (3) II in alternate years. Calculus on manifolds, differential forms, Stokes' Theorem, vector bundles, Riemannian metrics, differential operators. Pr.: Math. 723.

**245 740. Calculus of Variations.** (3) On sufficient demand. Necessary and sufficient conditions for an extreme value; applications to geometry and mechanics. Pr.: Math. 622.

**245 750. Fourier Series.** (3) On sufficient demand. Trigonometric Fourier Series, general orthogonal expansions, convergence and summability, multiple Fourier series, Fourier integrals and transforms. Pr.: Math. 621, 622.

**245 752. Tensor Analysis.** (3) I every third year. Multilinear algebra, differentiable manifolds, differential forms and tensor fields, exterior differentiation, integration of forms and Stokes' theorem, Frobenius theorem, covariant differentiation, Riemannian connections. Pr.: Math. 513 622.

**245 753. Advanced Calculus for Scientists and Engineers I.** (3) I. Continuous functions, law of mean, functions of several variables, Riemann-Stieltjes integral, infinite series, uniform convergence, Fourier Series and integrals and applications. Pr.: Graduate standing.

**245 754. Advanced Calculus for Scientists and Engineers II.** (3) II. Continuation of Advanced Calculus for Scientists and Engineers I. Pr.: Math. 753.

**245 761. Advanced Numerical Analysis I.** (3) I. Topics covered may include elementary functional analysis relevant to numerical analysis; numerical solution of differential or integral equations; analysis of stability and convergence; numerical linear algebra including large scale systems; approximation theory. Pr.: Advanced Calculus and basic functional analysis.

**245 762. Advanced Numerical Analysis II.** (3) II. Continuation of Math. 761. Pr.: Math. 761.

**245 766. Partial Differential Equations of Mathematical Physics I.** (3) I. Derivation of the three types of linear second order partial differential equations of mathematical physics; the Cauchy-Kovalevsky theorem. The potential equation, the Heat equation, and the wave equation, the hyperbolic equations and the hyperbolic systems, elliptic equations, and the parabolic equations. Pr.: Math 754.

**245 767. Partial Differential Equations of Mathematical Physics II.** (3) II. Continuation of Math. 766. Pr.: Math. 766.

**245 772. Elementary Differential Geometry.** (3) I. Curves and surfaces in Euclidean spaces, differential forms and exterior differentiation, differential invariants and frame fields, uniqueness theorems for curves and surfaces, geodesics, introduction to Riemannian geometry, some global theorems, minimal surfaces. Pr.: Math. 240.

**245 774. Metric Geometry.** (3) II. Topics include characterization of metric betweenness, metric segments and lines, convex extension of a set, geodesic arcs, n-lattice theorem, congruent embedding in Euclidean space, metric characterizations of Euclidean and Hilbert spaces, metric properties of Banach spaces, metric postulates for Banach spaces with unique metric lines. Pr.: Math. 701.

**245 780. Numerical Solution of Ordinary Differential Equations.** (2) I. (Concurrent with Computer Science 631). One-step and multi-step methods for initial value problems. Stability, consistency and convergence of these methods. Stiff equations and boundary value problems. Pr.: Math. 555, Computer Science 315 or Computer Science 315, 505, Math. 240 plus concurrent enrollment in Computer Science 631.

**245 785. Numerical Solution of Partial Differential Equations.** (2) II. (Concurrent with Computer Science 632). Formulation of difference equations and treatment of boundary conditions. Discretization and round-off errors. Stability. Relaxation, alternating direction, and strongly implicit iterative methods. Variational and projection methods. Pr.: Math. 631, Computer Science 631 plus concurrent enrollment in Computer Science 632.

**245 791. Topics in Mathematics for Secondary School Teachers.** (3) Topics of importance in the preparation of secondary school teachers to teach modern mathematics. May be repeated for credit.

## GRADUATE CREDIT

**245 806. Algebraic Theory of Numbers I.** (3) I in alt. years. Algebraic number fields. Dedekind ideal theory, divisors, structure of the multiplicative group, finiteness of the class group, density of ideals in classes. Pr.: Math. 703 and 704.

**245 807. Algebraic Theory of Numbers II.** (3) II in alt. years. Development of the following topics: primes in residue classes, ramifications of Galoisian extensions, Diophantine equations, Gaussian sums and class number formulas, Abelian extensions and class fields. Pr.: Math. 806.

**245 808. Analytic Theory of Numbers I.** (3) I in alt. years. The distribution of primes, geometric number theory, additive theory, additive theory of numbers, Diophantine approximation, arithmetic of quadratic forms. Pr.: Math. 822.

**245 809. Analytic Theory of Numbers II.** (3) II in alt. years. Cont. of Math 808. Pr.: Math. 808.

**245 810. Higher Algebra I.** (3) I. Theory of groups, theory of rings and ideals, polynomial domains, theory of fields and their extensions. Pr.: Math. 513.

**245 811. Higher Algebra II.** (3) II. Cont. of Math. 810. Pr.: Math. 810.

**245 821. Real Analysis I.** (3) I. Measurability, integration theory, regular Borel measures, the Riesz representation theorem, and Lebesgue measure in Euclidean spaces. Pr.: Math. 622.

**245 822. Real Analysis II.** (3) II. The LP-spaces, Banach spaces, and Hilbert spaces, complex measures and the Radon-Nikodym theorem, the Fubini theorem on double integration, and differentiation. Pr.: Math. 821.

**245 825. Complex Analysis I.** (3) I. Holomorphic functions, harmonic functions, the Cauchy integral theorem, normal families and the Riemann mapping theorem, and the Mittag-Leffler theorem. Pr.: Math. 822 or consent of Department.



**245 826. Complex Analysis II.** (3) II. Analytic continuation, the Picard theorem, HP-spaces, elementary theory of Banach algebra, the theory of Fourier transforms, and the Paley-Wiener theorems. Pr.: Math. 825.

**245 852. Functional Analysis I.** (3) I in alt. years. Topics to be selected from linear topological spaces, semi-normed linear spaces, Banach spaces, Banach algebras, harmonic analysis, and others. May be repeated for credit. Pr.: Math. 822.

**245 853. Functional Analysis II.** (3) II in alt. years. Cont. of Functional Analysis I. May be repeated for credit. Pr.: Math. 852.

**245 871. General Topology I.** (3) I. Topological spaces and topological invariants; continuous mappings and their invariants; perfect mappings; topological constructs (product, quotient, direct and inverse limit spaces). Pr.: Math. 578.

**245 872. General Topology II.** (3) II. Compact spaces and compactification, uniform and proximity spaces, metric spaces and metrization, topology of  $E^n$ , function spaces, complete spaces, introduction to homotopy theory. Pr.: Math. 871.

**245 881. Differentiable Manifolds I.** (3) I in alternate years. Differentiable structures, tangent bundles, tensor bundles, vector fields and differential equations, integral manifolds, differential forms, introduction to Lie groups. Pr.: Math. 578, Math. 772, or consent of instructor.

**245 882. Differentiable Manifolds II.** (3) II in alternate years. Fibre bundles, theory of connections, linear and affine connections, Riemann manifolds, submanifolds of Riemann manifolds, complex manifolds. Pr.: Math. 881.

**245 889. Combinatorial Analysis.** (3) II in alt. years. Permutations, combinations, inversion formulae, generating functions, partitions, finite geometries, difference sets, and other topics. Pr.: Consent of instructor.

**245 890. Hilbert Space I.** (3) I in alternate years. Geometry of Hilbert space, bounded and unbounded operators, Riesz representation theorem, spectral theorem. The lattice of closed subspaces of Hilbert Space and generalizations to projection lattices. Pr.: Math. 822 or consent of instructor.

**245 891. Hilbert Space II.** (3) II in alternate years. Continuation of Math. 890. Pr.: Math. 890.

**245 898. Topics in Mathematics.** Credit arranged. I, II, S. Background of courses needed for topic undertaken and consent of instructor.

**245 899. Thesis Topics.** Credit arranged. I, II, S.

**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.

**245 902. Homological Algebra I.** (3) I in alt. years. Categories and functors, Abelian categories, extension and torsion functors, homological dimensions, and spectral sequences and some of their applications. Pr.: Math. 811.

**245 903. Homological Algebra II.** (3) II in alt. years. Cont. of Math. 902. Pr.: Math. 902.

**245 910. Commutative Algebra I.** (3) I in alt. years. Prime ideals and localization, primary decompositions, Noetherian rings and modules, integral dependence, and local rings. Pr.: Math. 811.

**245 911. Commutative Algebra II.** (3) II in alt. years. Valuations and absolute values, valuation rings, places, divisors, Dedekind rings and factorial rings. Pr.: Math. 910.

**245 912. Ring Theory I.** (3) I in alt. years. Structure of rings and algebras including density theorems, chain conditions, reducibility, Kronecker products. Pr.: Math. 811 and one of Math. 713 and 703.

**245 913. Ring Theory II.** (3) II in alt. years. Cont. of Ring Theory I, with emphasis on special rings. Pr.: Math. 912.

**245 914. Lattice Theory I.** (3) I in alt. years. Posets, quantum logics, orthocomplemented, orthomodular, and Boolean lattices; the concepts of atomicity, completeness, reducibility, modularity, M-symmetry, O-symmetry, distributivity, algebraic coordination, and specific realizations. Pr.: Consent of instructor.

**245 915. Lattice Theory II.** (3) II in alt. years. Cont. of Math. 914. Pr.: Math. 914.

**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. 722 and 972.

**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. 811, 872.

**245 954. Topological Groups II.** (3) II in alt. years. Cont. of Topological Groups I. Pr.: Math. 953.

**245 971. Algebraic Topology I.** (3) I. Homotopy groups, covering spaces, fibrations, homology, general cohomology theory and duality, homotopy theory. Pr.: Math. 811 and 872.

**245 972. Algebraic Topology II.** (3) II. Cont. of Algebraic Topology I. Pr.: Math. 971.

**245 991. Topics in Algebra.** (3) On sufficient demand. Selected topics in modern analysis. May be taken more than once for credit. Pr.: Consent of instructor.

**245 992. Topics in Analysis.** (3) On sufficient demand. Selected topics in modern algebra. May be taken more than once for credit. Pr.: Consent of instructor.

**245 993. Topics in Harmonic Analysis.** (3) On sufficient demand. Selected topics in applied mathematics. May be taken more than once for credit. Pr.: Consent of instructor.

**245 994. 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.

**245 995. Topics in Geometry.** (3) On sufficient demand. Selected topics in geometry, such as convex sets of distance geometry. May be taken more than once for credit. Pr.: Consent of instructor.

**245 996. 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

Edwin W. Basham, Head of Department

Assistant Professors Hebrank, Lord, Burns, Underwood; Instructors Reed, Nesler, Pierce.

Students interested in supplementing their degree curriculum with valuable management and leadership training will want to evaluate Army Reserve Officer Training Corps (AROTC) voluntary courses. Although

the program is basically designed to prepare selected cadets for officer roles in the U.S. Army, those students who elect not to compete for commissions should find the acquired management and leadership skills to be equally beneficial in the pursuit of any career.

AROTC courses supplement all degree awarding curriculums offered at KSU and the Department does not specifically recommend any one degree field over another. University credit hours offered through Military Science courses are fully available on a co-educational basis. Interested female students are advised, however, to check with the department for possible restrictions regarding scholarships, commissioning or subsistence payments.

The Military Science curriculum is separated into two elements: (1) a Basic Course, normally completed during freshman and sophomore years, and (2) an Advanced Course oriented toward junior and senior years. Students who satisfy prerequisites and requirements of the Advanced Course receive commissions as Second Lieutenants in the U.S. Army along with their Baccalaureate Degrees. Texts and other materials required in ROTC courses are provided without cost.

Enrollment in the Basic Course permits an objective look at the Army as a possible career or pre-career employment field without assuming any military obligation. Students receive one credit hour for each of four semesters offered. Class participation each week includes one hour of recitation and one hour of leadership laboratory. Department policy allows the student maximum latitude in the selection of personal grooming standards.

Prerequisites for admittance to the Advanced Course may be satisfied in a number of ways such as (1) completion of the Basic Course, (2) Attendance at a Basic Course Summer Camp prior to enrollment as a junior, (3) three or more years of Junior (high school level) ROTC, or (4) prior military service. Juniors accepted into the Advanced Course agree to complete the curriculum and to accept an Army commission concurrently with the university degree. Each Advanced Course cadet receives \$100 per month during the school year in return for this formal agreement. Juniors and seniors attend three hours of recitation and one hour of Leadership Laboratory each week for which they receive three credit hours per semester. A six-week summer camp, with pay, is an integral part of the Advanced Course and is normally completed between the junior and senior years. Selected cadets are offered the option of substituting Army Ranger training for the regular summer camp. Parachute training is available to all Advanced Course cadets on a voluntary basis.

A six-week Basic Course Summer Camp is available as part of the "Two-Year Program." This program is designed to allow ROTC participation by junior college transferees, students who were unable to take the basic course, and graduate degree candidates who require at least two years for post-graduate curriculum completion. Application for admittance to the Two-Year Program should be made to the Military Science Department by sophomores early in the spring

semester. Satisfactory completion of the Basic Course Summer Camp meets all prerequisites for entry into the Advanced Course. The summer camp in itself does not incur any military obligation.

Current Army Regulations provide that the ROTC graduates may discharge their military obligation in one of two ways: (1) two years active duty, or (2) three months active duty with a balance of five years and nine months (six years total) with Army Reserve or National Guard organizations. Preferences indicated by the graduate for a particular form of service are normally respected; however, existing needs of the Army will prevail in event of conflict. Draft deferments are available to all participants in the ROTC program. Cadets who have demonstrated outstanding achievement in academic and military subjects can be commissioned in the Regular Army should they so desire.

The Army provides one-, two-, three- or four-year scholarships to selected high school and college students. These scholarships provide full tuition and fees, up to \$150 a year for books and required supplies, and pays the student a subsistence of \$100 per school month. Four-year scholarships are available to high school seniors who apply during their fall semester. The remaining scholarships are available, on a competitive basis, to all students enrolled in ROTC. These scholarships, applied for during the spring semester, become effective the following fall.

Senior cadets are eligible to participate in the Army ROTC Flight Training Program on a voluntary and selective basis. Successful completion of this training can qualify the cadet for an FAA Private Pilot's Certificate. The program, to include flight instruction, ground school and personal equipment is provided at no cost to the student.

The department sponsors a number of voluntary personal enrichment organizations which engage primarily in professional and/or community service activities. A wide range of functions include such things as competition and trick drill teams, traffic assistance at University sporting events, Varsity and ROTC Rifle Teams, United Fund Campaign support and Bloodmobile support. Students desiring additional information on these organizations are invited to contact the department.

In recognition of leadership's many facets, the department recommends but does not require students enrolled in ROTC to select from a number of University course offerings which complement the leadership program. These include: Computer Science 200; History 461, 462, 761, 762, 763 and 764; Political Science 110; Psychology 435 and 550; Geography 100 and 690; Sociology 440, 450 and 750; and Business Administration 420.

#### **BASIC COURSE UNDERGRADUATE CREDIT**

**249 100. Military Science 1A.** (1) I, II. Introduction to National Defense Establishment, Fundamentals of Leadership and Management, Leadership Lab; One hour recitation and one hour Leadership Lab. each week; no prerequisites.

**249 102. Military Science 1B.** (1) II. Introduction to National Defense Establishment (con't.), Fundamentals of Leadership



and Management (con't.), Leadership Lab.; One hour recitation and one hour Leadership Lab. each week; no prerequisites.

**249 200. Military Science 2A.** (1) I. Applied Leadership and Management, Impact of Military History on the Leader, Leadership Lab.; One hour recitation and one hour Leadership Lab. each week; completion of M.S. I.

**249 202. Military Science 2B.** (1) II. Applied Leadership and Management (con't.), Military Geography; Map Reading and Aerial Photograph Reading, Leadership Lab.; one hour recitation and one hour Leadership Lab. each week; completion of M.S. I.

#### ADVANCED COURSE UNDERGRADUATE CREDIT

**249 300. Military Science 3A.** (3) I. Advanced Leadership and Management, Methods of Instruction; Military Communications, Leadership Lab.; three hours recitation and one hour Leadership Lab. each week; completion of M.S. I and M.S. II or acceptable equivalent.

**249 302. Military Science 3B.** (3) II. Advanced Leadership and Management (con't.), Small Unit Tactics, Branches of the Army, Preparation for Summer Camp, Leadership Lab.; three hours recitation and one hour Leadership Lab. each week; Completion of M.S. I and M.S. II or acceptable equivalent.

**249 400. Military Science 4A.** (3) I. Theory and Dynamics of the Military Team, Leadership Lab.; Three hours recitation and one hour leadership lab. each week; Completion of M.S. III.

**249 402. Military Science 4B.** (3) II. Seminar in Leadership and Management, Leadership Lab.; Three hours recitation and one hour leadership lab. each week, completion of M.S. III.

#### MODERN LANGUAGES

Robert L. Coon, Head of Department

Professor Coon;\* Associate Professors Beeson\* and Coates;\* Assistant Professors Alexander, Bunch, Dehon, Gonzalez-del-Valle, McGraw, C. Miller,\* and Vazquez;\* Acting Assistant Professor Azim; Instructors Bulmahn, Driss, Ossar and Swietlicki, Emeriti: Professors Limper\* and Moore;\* Associate Professors Munro\* and Pettis.\*

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.

All courses in the department are offered to non-majors on a credit or no-credit basis.

Students wishing to acquire retroactive credit for language proficiency gained before coming to KSU should consult with the head of the Department of Modern Languages.

The attention of the student preparing for graduate school or for high school teaching is directed to the corollary courses: 680, 780, and 787. 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 each semester. If there is any doubt as to proper placement, the head of the Department of Modern Languages should be consulted.

#### Graduate Study

The degree Master of Arts in Modern Languages is offered in the fields of 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.

#### Literature in Translation

##### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 501. Classical Literature in Translation.** (3) Selected readings in English from the works of such major classical authors as Homer, Euripides, Vergil, Horace and Terence.

**253 502. French Literature in Translation.** (3) Selected readings in English from the works of such major French authors as Flaubert, Zola, Sartre, Camus and Ionesco. Not accepted for major credit in French.

**253 503. German Literature in Translation.** (3) Selected readings in English from such major German authors as Mann, Brecht, Hesse, Grass and Kafka. Not accepted for major credit in German.

**253 504. Russian Literature in Translation.** (3) A study of 19th-century Russian literature in English translation, from Pushkin to Chekhov.

**253 505. Spanish Literature in Translation.** (3) Selected readings in English from the works of such major Spanish and Latin-American authors as Garcia Lorca, Borges, Neruda and Garcia Marquez. Not accepted for major credit in Spanish.

**253 506. Urdu Literature in Translation.** (3) The main genres and periods of Urdu literature in classical and modern times. Selected readings in English translation.

**253 516. Modern French Culture.** (2) French culture since World War II with special emphasis on social, economic, historical and artistic developments of that period. Taught in English. Not accepted for major credit in French.

**253 567. Two Latin-American Masters of Fiction in Translation.** (2) Two major writers of Latin America as seen in their novels and short stories. Not accepted for major credit in Spanish.

#### French

##### UNDERGRADUATE CREDIT

**253 001. Orientation for Summer School Program in Paris.** (0).

**253 101. 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. 112.

**253 102. French for Reading Knowledge II.** (3) Continued reading of selected French texts. Not considered as prerequisite for Mod. L. 211. Pr.: Mod. L. 101 or equiv.

**253 111. French I.** (4) Introduction to the structure of modern French, emphasizing the spoken language with practice in the language laboratory.

**253 112. 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. 111 or equiv.

**253 211. French III.** (4) Intensive review of the structure of the French language. Reading and discussion of French prose. Pr.: Mod. L. 112 or equiv.

**253 212. Elementary French Conversation IIIA.** (1) Course not open to fluent speakers of French. Normally to be taken concurrently with French III. Pr.: Mod. L. 112 or equiv.

**253 213. French IV.** (3) Reading and discussion of modern French prose and review of the more difficult points of French grammar. Pr.: Mod. L. 211 or equiv.

**253 214. 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. 211 or equiv.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 511. 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. 213 or equiv.

**253 512. Survey of French Literature II.** (3). The reading and discussion of French literature from the early nineteenth century to the present. Pr.: Mod. L. 213 or equiv.

**253 513. French Composition and Conversation.** (3) Review in depth of the structure of the language. Intensive practice in written and conversational French. Pr.: Mod. L. 213 or equiv.

**253 514. French Civilization.** (3) Introduction to French culture with special emphasis on social and historical developments since World War II. Pr.: Mod. L. 213 or equiv.

**253 515. Literary Analysis in French.** (3) Introduction to methods of literary analysis by study in depth of chosen texts as representative of French literature. Pr.: Mod. L. 213 or equiv.

**253 519. Special Studies in French.** Credit arranged. Pr.: Consent of department head and instructor involved.

#### UNDERGRADUATE AND GRADUATE CREDIT

**253 710. 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.

**253 711. Seventeenth-Century French Literature I.** (3) The literature of the Baroque period. Pr.: Twenty-one hours of college French or equiv.

**253 712. Seventeenth-Century French Literature II.** (3) The literature of French Classicism. Pr.: Twenty-one hours of college French or equiv.

**253 713. Eighteenth-Century French Literature.** (3) Critical study of the literature of the Enlightenment. Pr.: Twenty-one hours of college French or equiv.

**253 714. Nineteenth-Century French Literature I.** (3) A study of Pre-romanticism and Romanticism. Pr.: Twenty-one hours of college French or equiv.

**253 715. Nineteenth-Century French Literature II.** (3) A study of Realism, Naturalism and Symbolism. Pr.: Twenty-one hours of college French or equiv.

**253 716. 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.

from the 17th century to the present, seen through selected masterworks. Pr.: Twenty-one hours of college French or equiv.

**253 717. 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.

**253 719. 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.

**253 720. Seminar in French.** (3) A seminar with variable topics. Pr.: Senior standing or consent of the instructor.

#### German

#### UNDERGRADUATE CREDIT

**253 002. Orientation for Summer School Program in Germany.** (0).

**253 103. 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. 122.

**253 104. 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. 103 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.

**253 122. 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. 122 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. 122 or equiv.

**253 223. 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.

**253 224. 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

**253 521. 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. 223 or equiv.

**253 522. 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. 223 or equiv.

**253 523. German Composition.** (3) A study of German syntax and exercises in composition. Pr.: Mod. L. 223 or equiv.

**253 524. 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. 223 or equiv.

**253 529. Special Studies in German.** Credit arranged. Pr.: Consent of department head and instructor involved.

#### UNDERGRADUATE AND GRADUATE CREDIT

**253 721. 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.



**253 722. German Romanticism.** (3) II. 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.

**253 723. Goethe and Faust.** (3) I. The writings of Goethe and his masterpiece Faust. Pr.: Twenty-one hours of college German or equiv.

**253 724. 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.

**253 725. Early 20th Century German Literature.** (3) II. A study of the drama and lyric of Naturalism, Neo-Classicism, Neo-Romanticism, and Expressionism. Pr.: Twenty-one hours of college German or equiv.

**253 726. 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.

**253 727. 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.

**253 728. History of the German Language.** (3) I. 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.

**253 729. 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

**253 143. Greek I.** (4) Introduction to the grammar of classical Greek and reading of elementary prose.

**253 144. Greek II.** (4) Completion of the grammar of classical Greek and continuation of the reading of elementary prose. Pr.: Mod. L. 143 or equiv.

## Honors Program

### UNDERGRADUATE CREDIT

**253 299. Honors Seminar in Modern Languages.** Credit arranged. I, II. Selected topics. Open to non-majors in the Honors Program.

## Italian

### UNDERGRADUATE CREDIT

**253 131. Italian I.** (4) Introduction to the structure of modern Italian.

**253 132. 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. 131 or equiv.

## Latin

### UNDERGRADUATE CREDIT

**253 141. Latin I.** (4) An introductory study of the structure of Latin.

**253 142. Latin II.** (4) Continuation and completion of the study of the structure of Latin. Pr.: Mod. L. 141 or equiv.

**253 241. Latin III.** (4) Review of Latin grammar and reading of an anthology of Roman prose and poetry. Pr.: Mod. L. 142 or equiv.

**253 242. Latin IV.** (3) Continuation of the study of Latin syntax and grammar, based upon the reading of Roman prose and poetry. Pr.: Mod. L. 241 or equiv.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 541. Vergil.** (3) A study of the Latin epic as exemplified by Vergil's Pr.: Mod. L. 542 or equiv.

**253 542. Cicero.** (3) A study of the versatility of Cicero as evidenced in various works. Pr.: Mod. L. 242 or equiv.

**253 543. Horace.** (3) A critical study of the major works of Horace. Pr.: Mod. L. 511 or equiv.

**253 549. Special Studies in Latin.** Credit arranged. Pr.: Consent of the department head and instructor involved.

## Linguistics

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 680. General Phonetics.** (3) Same as Speech 680.

### UNDERGRADUATE AND GRADUATE CREDIT

**253 780. Introduction to Linguistics.** (3) I, II, S. Same as Speech 780.

**253 781. Introduction to Historical Linguistics.** (3) Same as Speech 781.

**253 782. Language Typology.** (3) Same as Speech 782.

**253 783. Phonetics and Phonemics of English.** (3) Same as Speech 783.

**253 784. Morphology and Syntax of English.** (3) Same as Speech 784.

**253 785. Transformational Grammar.** (3) Same as Speech 785.

**253 787. Topics in Applied Linguistics.** (3) II. Same as Speech 787.

**253 788. Methods and Techniques of Learning a Second Language.** (3) Same as Speech 788.

## Russian

### UNDERGRADUATE CREDIT

**253 151. 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.

**253 152. Russian II.** (4) II. Continuation of the study of Russian grammar and oral communication. Pr.: Mod. L. 151 or equiv.

**253 251. Russian III.** (4) I. Completion of the study of Russian grammar. Reading of selected prose on the intermediate level. Pr.: Mod. L. 152 or equiv.

**253 252. Russian IV.** (3) II. Intensive review of Russian grammar. Exercises in reading selected modern Russian texts in the original. Pr.: Mod. L. 251 or equiv.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 551. Russian V.** (3) Reading of Russian short stories of the 19th and 20th centuries, including works by Pushkin, Lermontov, Dostoevsky and Chekhov.

**253 552. 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.

**253 553. Russian Conversation and Composition.** (3) Discussion in Russian. Extensive practice in writing Russian compositions.

**253 559. Special Studies in Russian.** Credit arranged. Pr.: Consent of department head and instructor involved.

## Spanish

### UNDERGRADUATE CREDIT

**253 003. Orientation for Summer School Abroad Program in Mexico City.** (0).

**253 161. 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.

**253 162. 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. 161 or equiv.

**253 261. Spanish III.** (4) An intensive review of syntax and a comprehensive structural review of Spanish, with emphasis on composition and conversation. Pr.: Mod. L. 162 or equiv.

**253 262. 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.

**253 263. Spanish IV.** (3) Reading and discussion of selections from contemporary prose, and review of grammatical structures as needed. Pr.: Mod. L. 261 or equiv.

**253 264. 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

**253 561. 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.

**253 562. Spanish Literature II.** (3) Verse, prose, and drama of Spain from 1700 to the present. Pr.: Eighteen hours of college Spanish or equiv.

**253 563. Spanish Grammar.** (3) A systematic study of the structure of Spanish. Pr.: Mod. L. 263 or equiv.

**253 564. 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. 563 or equiv.

**253 565. 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.

**253 566. Hispanic-American Civilization.** (3) Survey of Spanish-American culture and civilization from 1492 to the present. Pr.: Eighteen hours of college Spanish or equiv.

**253 569. Special Studies in Spanish.** Credit arranged. Pr.: Consent of department head and instructor involved.

### UNDERGRADUATE AND GRADUATE CREDIT

**253 761. 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.

**253 762. Spanish-American Literature II.** (3) Continuation of Spanish-American Literature I. Pr.: Eighteen hours of college Spanish or equiv.

**253 763. Spanish-American Novel I.** (3) The reading and study of selected Spanish-American novels. Pr.: Twenty-one hours of college Spanish or equiv.

**253 764. Spanish-American Novel II.** (3) Continuation of Spanish-American Novel I. Pr.: Twenty-one hours of college Spanish or equiv.

**253 765. 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.

**253 766. Spanish-American Drama.** (3) Study of modern Spanish-American plays. Pr.: Twenty-one hours of college Spanish or equiv.

**253 771. Spanish Novel I.** (3) Reading and analysis of Golden Age novels. Pr.: Twenty-one hours of college Spanish or equiv.

**253 772. Spanish Novel II.** (3) Reading and analysis of several nineteenth century novels. Pr.: Twenty-one hours of college Spanish or equiv.

**253 773. Spanish Drama I.** (3) Reading and analysis of Golden Age Dramas. Pr.: Twenty-one hours of college Spanish or equiv.

**253 774. Spanish Drama II.** (3) Reading and analysis of nineteenth century dramas. Pr.: Twenty-one hours of college Spanish or equiv.

**253 775. 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.

**253 776. The Works of Benito Perez Galdos.** (3) Study of his novels. Pr.: Twenty-one hours of college Spanish or equiv.

**253 777. Contemporary Spanish Literature.** (3) Reading and analysis of twentieth century Spanish literature. Pr.: Twenty-one hours of college Spanish or equiv.

**253 778. The Works of Federico Garcia Lorca.** (3) Study of his drama and poetry. Pr.: Twenty-one hours of college Spanish or equiv.

**253 779. Seminar in Spanish.** (3) A seminar with variable topics. Pr.: Senior standing or consent of the instructor.

## South Asian Languages

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 571. 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.

**253 572. Urdu II.** (5) Continuation of Urdu I. Pr.: 571.

**253 573. Urdu III.** (4) Readings in graded texts, conversation drills and applied grammar. Pr.: 572 or equivalent.

**253 574. Urdu IV.** (4) Continuation of Urdu III. Reading and discussion of contemporary literature and grammatical analysis. Pr.: 573 or equiv.

**253 575. Urdu V.** (4) Individual study in Urdu. Readings, composition and conversational practice relevant to the student's interests and disciplinary needs. Pr.: 574 or equiv. May be repeated for credit.



**253 576. Introduction to Hindi.** (5) Concentration on Devanagari script and Hindi idiom with graded readings and grammatical exercises. Pr.: 572 or equiv.

**253 577. Individual Study in Hindi.** (5) Readings, composition and conversational practice relevant to the students' interests and disciplinary needs. May be repeated for credit.

**253 578. Tamil I.** (5) The elementary study of the principal modern Dravidian tongue. Pr.: Some knowledge of another foreign language desirable.

**253 579. Tamil II.** (5) Continuation of Tamil I. Pr.: 578.

**253 580. Tamil III.** (4) Readings in graded texts, conversational drills, and applied grammar. Pr.: 579 or equiv.

**253 581. Tamil IV.** (4) Reading and discussion of contemporary prose texts, including journalistic essays and historical material, with applied grammatical analyses. Pr.: 580 or equiv.

**253 582. 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.

## GRADUATE CREDIT

**253 799. Problems in Modern Languages.** Credit arranged.

**253 899. Research in Modern Languages.** Credit arranged. Pr.: Thirty hours in one modern language or equiv.

## MUSIC

Robert A. Steinbauer,\* Head of Department

Professors Leavengood,\* Steinbauer,\* Steunenberg\* and Walker;\* Associate Professors Flouer, Langenkamp,\* and Shull;\* Assistant Professors Caine,\* Edwards,\* Hewett, Jackson,\* Polich, P. Roby,\* Sidorfsky,\* Sloop,\* Thomson,\* and R. Walker;\* Instructors Bolan, Gray, L. Roby and M. 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 129 and 77.

**Bachelor of Arts.** A major program of music leading to the degree Bachelor of Arts may be elected in one of these three fields: Music Literature, Music Theory, or Applied Music. The general requirement is the completion of Music courses 201, 202, 304, 305, 423, 424, (Theory of Music); Music 221, 222, 250, 425, 426 (Music History and Music Literature). Recital Attendance is required for eight semesters.

If the field is Music Literature, the program also calls for Music 615, 616 (Theory of Music), and six semester hours selected from Music 709, 761, 763, 764 (Music History and Literature). In addition, eight semester hours in a single applied area are required.

If the field is Music Theory, the program calls for Music 423, 503, 521, 615, 616 (Theory and Composition); two semester hours elected from Music 425, 426 (Music Literature); and eight semester hours of Applied Piano.

If the field is Applied Music, the program calls for Music 423, 521 (Music Theory and Composition). Sixteen hours of an Applied Instrument or Voice are required.

Participation in a Music organization (Instrumental or Choral, depending on the major applied area) is required each semester and the Piano Proficiency requirement must be passed before graduation.

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. However, available time with an instructor and fees for non-majors (page 14) are factors in securing applied lessons. This elective credit cannot be used later toward a music degree unless it meets the requirements of that course as they apply to those majoring in music. No more than two credits a semester will be granted for Applied Music as an elective.

The major in music in the Bachelor of Arts Degree is not intended to prepare students to teach in the public schools in Kansas.

**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, 423, 424, 616, 617 (Theory of Music), 221, 222, 425, 426 (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 77.

In the Vocal Program, 28 semester hours of voice, 4 semester hours of diction, 4 semester hours of piano, piano proficiency, and 4 semester hours of vocal ensemble and/or opera workshop 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 604, 605, 701, 702 (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 Music majors.

### Graduate Study

Graduate work leading to the degree Master of Music 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.

The degree Master of Music may be obtained by pursuing the curriculum of Graduate Studies in Music. Emphasis may be placed on music education, applied music, theory and composition, or music history and music literature. All areas of emphasis are built around a common core of graduate study in Music which includes a Graduate Seminar in Music, a Master's Report (or Graduate Recital), Music History, Literature and Theory.

The separate areas of emphasis are developed through consultation between the candidate and the Director of Graduate Studies in Music.

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. Textures of Music.** (4) I, II, S. An introduction to musical elements and historical practice with emphasis on texture as a uniting force; stylistic procedures as applied to sound parameters by the major composers. Lecture and Lab. meets 6 hours per week. Pr.: Music 100 or tested knowledge of basic Music Theory.

**257 202. Musical Style of the Middle Ages and Renaissance.** (4) I, II, S. An in depth study of the early music; monody, organum and modal counterpoint. Lecture and Lab. meets 6 hours per week. Pr.: Music 201 (Textures of Music), or consent of instructor.

**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.

**257 416. Conducting I.** (2) I, S. Basic meters and the proper manner of executing each; introduction to score reading and transposition. Pr.: Music (Theory) 305.

**257 417. 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) 416.

**257 423. 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.

**257 424. 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) 423 or consent of instructor.

#### UNDERGRADUATE AND GRADUATE CREDIT

**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.

**257 521. Composition I.** (2) I, S. Composition in the small forms for piano, voice and instruments; development of style concept. Pr.: 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.

**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.

**257 615. Counterpoint I.** (2) I, S. Canon and Fugue in the 18th century style.

**257 616. Counterpoint II.** (2) II, S. Contrapuntal devices used by 20th century composers. Serial Techniques.

**257 631. Technology of the Electronic Music Studio.** (2) I, S. Instrumentation and systematic procedures as applied to the construction of electronic music. Principles of voltage controlled systems, synchronous tape machines, and audio mixing. Individual and team projects. Pr.: Music 522 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 631.

**257 701. 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) 423 or consent of instructor.

**257 702. Advanced Analysis II.** (2) and alternate S. Modern chord structures, atonality, polytonality and form used in contemporary compositions. Pr.: Music (Theory) 701.

**257 711. 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.

**257 714. 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.

**257 736. 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, S. 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.

**257 221. 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.

**257 222. History of Music II.** (2) II, S. Continuation of Music 221. Pr.: Music 221 or consent of instructor.

**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.

**257 299. Honors Seminar in Music.** (1) Offered on demand. Not open to music majors. Pr.: Honors students only.

**257 425. 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 222 and Music 305.

**257 426. Survey of Music Literature II.** (2) II, S. Continuation of Music 425. Pr.: Music 425.

### GRADUATE AND UNDERGRADUATE CREDIT

**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.

**257 709. Music of the 20th Century.** (2) Offered on demand. The historical aspect in musical analysis of composition since the romantic period. Pr.: Music 222, Music 423, or consent of instructor.

**257 761. 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 221 or consent.

**257 763. 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 221 or consent.

**257 764. 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 221 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.

**257 897. 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.

**257 898. Master's Report in Music.** Credit arranged. I, II, S. Directed document in interest area chosen by student and Director of Graduate Studies in Music. Pr.: Consent of the Director of Graduate Studies in Music.

## 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) II. 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.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**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) I. Organization, administration, operation of vocal music programs in junior and senior high schools. Emphasis on voice-training, methods, ensemble development, techniques, selection of repertoire.

**257 514. Secondary School Instrumental Music.** (2) I. 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.

**257 706. 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.

**257 707. 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.

**257 712. 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.

**257 719. Workshop in Electronic Music.** (1) S. A practical and non-technical explanation of synthesizers, synchronous tape-recorders, and audio mixing devices. Applications for the class room. Consent of instructor.

**257 720. Workshop in Marching Band.** (1) S. Survey of the methods, materials and the teaching techniques of the Marching Band. Pr.: Music 115 or consent.

**257 721. 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.

**257 722. 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.

**257 723. Workshop in Secondary Vocal Music.** (2) S. Choral techniques and interpretation of Baroque, Classical, Romantic, and Modern styles.

**257 724. Workshop in Instrumental Music.** (1) S. Teaching techniques, methods and materials for woodwind, brass, string, and percussion sections of bands and orchestras.

**257 725. Workshop in Piano Pedagogy.** (1) S. Methods, materials, and teaching techniques for all grade levels.

**257 726. 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.

**257 727. 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.

**257 728. 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 727.

**257 729. 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.

**257 730. 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.

**257 731. 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.

**257 760. 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 Performance

### UNDERGRADUATE CREDIT

**257 050. Recital Attendance.** (0) I, II.

**257 111. Concert Choir.** (1) I, II. Membership by tryout.

**257 115. Marching Band.** (1) I. Marching Band during fall semester: Performs for Athletic and University events. Admission by audition.

**257 116. Concert Band.** (1) II. Open to all interested wind and percussion performers without audition.

**257 117. Symphonic Band.** (1) I, II, S. A select performing organization. Admission by audition only.

**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. Symphony Orchestra.** (1) I, II, S. Membership by audition.

**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.

**257 288. Instrumental Ensemble.** (1) I, II, S. Elective for selected students.

**257 289. Concert Jazz 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.

**257 292. Jazz Instrumental Ensemble.** (1) I, II, S.

**257 293. String Ensemble.** (1) I, II, S.

**257 294. Brass Ensemble.** (1) I, II, S.

**257 295. Wind Ensemble.** (1) I, II, S.

**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.

**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.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**257 501. Half Recital.** (0) I, II, S. Public performance; vocal or instrumental with suggested performing time of 25 minutes.

**257 502. Full Recital.** (0) I, II, S. Public performance; vocal or instrumental with suggested performing time of 50 minutes.



## Courses in Applied Music

### UNDERGRADUATE CREDIT

257 060. **Piano Proficiency.** (0) I, II, S. Required for graduation of all music majors.

257 203. **Voice Class I.** (1) I, II. (Not for Voice Majors.)

257 204. **Voice Class II.** (1) I, II. (Not for Voice Majors.)

257 206. **Piano Class I.** (1) I, II, S. For freshmen and transfer music students with no piano background.

257 207. **Piano Class II.** (1) I, II, S. For freshmen and transfer students with some piano background, as well as those who have failed some or all of the Piano Proficiency Exam.

257 208. **Keyboard Improvisation.** (1) I, II, S. A survey of the basic principles of melodic, harmonic and rhythmic improvisation, including period and style imitation, transportation patterns, etc. Open to all music students who have passed the proficiency exam.

257 209. **Piano Ensemble.** (1) I, II, S. A study of standard repertoire for Piano Ensemble culminating in a recital. Open to music students who have passed the Proficiency Exam — Music Education Majors given priority.

257 210. **Voice Class III.** (1) I, II. (Not for Voice Majors.)

257 211. **Voice Class IV.** (1) I, II. (Not for Voice Majors.)

257 212. **Remedial Class Piano** (1) I, II, S. For Music Majors who have completed Class Piano I and II, but have not yet passed the proficiency exam.

257 232. **Woodwind Techniques and Materials.** (1) I, II, S. A beginning course designed to teach the fundamentals of playing and methods for teaching woodwind instruments. (For Music Majors only, and not open to woodwind Music Majors.)

257 233. **Brass Techniques and Materials.** (1) I, II, S. A beginning course designed to teach the fundamentals of playing and methods for teaching brass instruments. (For Music Majors only, and not open to Brass Music Majors.)

257 234. **String Techniques and Materials.** (1) I, II, S. A beginning course designed to teach the fundamentals of playing and methods for teaching string instruments. (For Music Majors only, and not open to String Music Majors.)

257 235. **Percussion Techniques and Materials.** (1) I, II, S. The fundamentals of playing and methods of teaching percussion instruments. (For Music Majors only, and not open to Percussion Music Majors.)

257 251. **Pre-Applied Study.** (Variable) I, II, S. For students who do not meet standards for regular applied study.

The following undergraduate courses in Applied Music are offered each semester and summer. The student may earn 1 to 4 hours per semester, with a maximum of 16 hours in any one applicable to a degree.

#### Lower Level Applied (Freshman-Sophomore)

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**

257 285. **Italian Diction.** (1) I. Rules for pronouncing and translating Italian Vocal Texts. (One Semester required.)

257 287. **German Diction.** (1) I. Rules for pronouncing and translating German Vocal Texts. (One Semester required.)

257 306. **Voice Class V.** (1) I, II. (Not for Voice Majors.)

257 307. **Voice Class VI.** (1) I, II. (Not for Voice Majors.)

257 308. **Voice Class VII.** (1) I, II. (Not for Voice Majors.)

257 309. **Voice Class VIII.** (1) I, II. (Not for Voice Majors.)

257 427. **Advanced String 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 brass and woodwind majors in the Music Education program. Pr.: Music (Applied) 234.

257 428. **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) 232.

257 429. **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.

The following undergraduate courses in Applied Music are offered each semester and summer. The student may earn one to four hours per semester, with a maximum of 16 hours in any one applicable to a degree.

#### Upper Level Applied (Junior-Senior).

257 432. **Baritone**

257 434. **Bassoon**

257 436. **Clarinet**

257 438. **Double Bass**

257 440. **Flute**

257 442. **French Horn**

257 443. **Harpsichord**

257 444. **Oboe**

257 446. **Organ**

257 447. **Harp**

257 448. **Percussion**

257 450. **Piano**

257 452. **Saxophone**

257 454. **Trombone**

257 456. **Trumpet**

257 458. **Tuba**

257 460. **Viola**

257 462. **Violin**

257 464. **Violoncello**

257 466. **Voice**

**257 465. French Diction I.** (1) I. Rules for pronouncing and translating French Vocal Texts. (One Semester required.)

**257 467. French Diction II.** (1) II. Rules for pronouncing and translating French Vocal Texts. Pr.: Music 465.

#### UNDERGRADUATE AND GRADUATE CREDIT

**257 637. Literature for Pipe Organ I.** (2) 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).

**257 642. 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. Practical application through supervised studio teaching.

**257 740. Ensemble.** (1) I, II, S. A graduate course in ensemble techniques and materials. Pr.: Consent of instructor.

#### 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 (pending availability of staff and facilities) by paying fees as listed on page 14 of this catalog.

## PHILOSOPHY

B. R. Tilghman,\* Head of Department

Professor Tilghman;\* Associate Professor Scheer;\* Assistant Professors Greenberg and Reagan;\* Instructors Exdell and Hamilton; Emeritus Professor Miller.

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. 220, 300, 301 and 440. At least 15 of the 30 hours must be in courses numbered 400 or above.

### Courses in Philosophy

#### UNDERGRADUATE CREDIT

**259 100. 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.

**259 101. Honors Introduction to Philosophy.** (4) I, II. An introduction to the main problems of philosophy. For freshmen and sophomores in the Honors Program.

**259 110. 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.

**259 200. 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.

**259 210. Introduction to Ethics.** (3) I, II, S. An introduction to philosophy and techniques of philosophical inquiry with special attention paid to the problems of moral philosophy. Considers problems concerning the nature of moral values and the justification of moral decisions.

**259 220. Symbolic Logic I.** (3) I, II, S. A systematic introduction to modern logic. Truth-functions, truth tables, and calculus of propositions, classes and relations.

**259 300. History of Ancient Philosophy.** (3) I. The development of philosophical ideas in the West through the medieval period, with special emphasis on ancient Greek philosophy.



**259 301. History of Modern Philosophy.** (3) II. The development of philosophical ideas from the Renaissance to the nineteenth century.

**259 310. Comparative Religion.** (3) II. An introduction to the central beliefs of the major religions of both East and West and an examination of philosophical problems that arise in the comparative study of religions (for example, the problems of the relativity of religious belief). Pr.: one course in philosophy.

**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.

**259 400. 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.

**259 410. 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.

**259 420. 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.

**259 425. 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. Existentialism.** (3) I or II. A study of prominent thinkers in the existentialist tradition. Pr.: One course in philosophy or permission from the instructor.

**259 440. Ethical Theories.** (3) I or II. A systematic survey of the major literature of moral philosophy, e.g., Plato, Aristotle, Hobbes, Hume, Kant, Mill, Moore, Prichard. Pr.: One course in philosophy.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**259 505. 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.

**259 510. Symbolic Logic II.** (3) I. An advanced study of logical systems and problems in logical theory. Pr.: Phil. 171 or consent of instructor.

**259 520. 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.

**259 530. 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.

**259 540. 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.

**259 550. 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.

**259 560. Advanced Ethics.** (3) I or II in alt. years. Detailed examination of selected topics in contemporary ethical theory. Pr.: Phil. 440 or consent of instructor.

**259 570. Recent Aesthetic Theory.** (3) II. A study of selected work of current importance in the philosophy of art. Pr.: Phil. 420 or consent of instructor.

#### GRADUATE AND UNDERGRADUATE CREDIT

**259 600. 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. 300 or consent of instructor.

**259 605. 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. 301 or consent of instructor.

**259 610. 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.

**259 620. 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. 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.

**259 680. Problems in Philosophy.** Credit arranged. I, II, S. Independent study for qualified students. Pr.: Background of courses required for problem undertaken.

#### GRADUATE CREDIT

**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.

#### PHYSICS

Charles Hathaway,\* Head of Department

Professors Bark,\* Bhalla,\* Curnutte,\* Dale,\* Dragsdorf,\* Ellsworth,\* Leachman,\* Richard\* and Williams,\* Associate Professors Folland,\* Hathaway,\* Legg,\* Macdonald,\* Manney,\* Seaman,\* Spangler,\* Thompson (visiting); Assistant Professors Brown, Cocke,\* Eck,\* Evans,\* Jack,\* Lee,\* McGuire,\* Rosenkilde,\* Weaver,\* Zollman;\* Research Associates Bird, Brown, Hopkins, Laumer, Palmer, Robertson, Tubbs; Emeritus: Professor Cardwell,\* 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 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 interdisciplinary research, in applied research and management, in basic research or in teaching. The physics curriculum provides a broad science background suitable for the creative application of science and mathematics to interdisciplinary problems which will be of increasing importance to society and the individual. 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. 100, 150, 213, 214, 551, 522, 532, 506, 636; Chem. 210, 230; Math. 220, 221, 222, 240, and nine additional hours of science electives.

The nine hours of science electives may be selected with approval of the physics department undergraduate adviser from courses, 400 level or higher, in the departments of Chemistry, Computer Science, Geology, Mathematics, Physics, Statistics, the Division of Biology, the College of Engineering and other departments as appropriate to the student's program. The courses selected to satisfy the science elective requirement should contribute to the students' educational goals and must be approved by the department of physics.

### 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 high school or junior college level should consult with the College of Education for information on programs in physics and physical science teaching.

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 un-

dergraduate 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 16.

### Courses in Physics

**265 017. Colloquium in Physics.** (0) I, II. Required of graduate majors and undergraduate majors.

### UNDERGRADUATE CREDIT

**265 100. Undergraduate 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.

**265 101. 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.

**265 102. Man's Physical World II.** (3) I, II, S. 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, S. Two hours lab. a week. Pr.: Phys. 102 or conc. enrollment.

**265 113. General Physics I.** (4) I, II, S. Mechanics, heat electricity and magnetism. Two hours lec., one hour rec., one hour quiz and two hours lab. a week. Pr.: Math 150.

**265 114. General Physics II.** (4) I, II, S. Wave motion, light, and modern physics. Two hours lec., one hour rec., one hour quiz, and two hours lab. a week. Pr.: Phys. 113.

**265 115. Descriptive Physics.** (4) I, II. Three hours lec., one hour quiz, and two hours lab. a week. Pr.: High School algebra.

**265 125. Physics for Musicians.** (3) II. Selected topics applied to the physics of music and musical instruments.

**265 150. Undergraduate Physics Seminar II.** (1) II. Continuation of 265 100.

**265 191. 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.

**265 193. Descriptive Meteorology.** (3) II, S. Nontechnical treatment of the fundamentals of modern meteorology and associated physical processes.

**265 213. 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.

**265 214. Engineering Physics II.** (5) I, II, S. Magnetism, electricity, and light; for technical students. Two hours lec., and two hours rec., one hour quiz, and two hours lab. a week. Pr.: Phys. 213, Math 221.

**265 300. Physics in Relation to Other Disciplines.** (1-3) on demand. A course of variable content, offered only by prearrangement with the physics department and with the instructor. A brief syllabus will be available for each offering of Physics 300 outlining the objectives and organization of the course for the semester in which offered. Pr.: Consent of instructor.



**265 301. Junior Honors Colloquium.** Variable credit. Open only to juniors in the Arts and Sciences Honors Program.

**265 400. 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.

**265 451. Modern Physics.** (3) I. A qualitative introduction to contemporary theories and problems in physics. Pr.: Phys. or consent of instructor.

**265 460. Undergraduate Topics in Physics.** (1-6). Special topics in physics not completely treated in other courses. Offered on sufficient demand. Pr.: Phys. 114 or equivalent.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**265 506. Physics Laboratory I.** (3) I. See Physics 616. One hour rec. and six hours lab. a week. Pr.: One year of college physics.

**265 515. Physics for Science Teachers.** (1-6) Apparatus and demonstration methods in teaching physics. Offered on sufficient demand. Pr.: Phys. 114 or 214.

**265 516. Physics Laboratory II.** (3) II. Cont. of Phys. 506. See Phys. 616. One hour rec. and six hours lab. a week. Pr.: Phys. 506.

**265 521. 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. 114 or 214. Math. 222 or conc. enrollment.

**265 522. Mechanics I.** (3) I. Principles of statics and dynamics of particles and rigid bodies by the methods of the calculus. Pr.: Phys. 214 or 521; Math. 240 or conc. enrollment.

**265 531. Intermediate Physics II.** (3) II. Cont. of Phys. 521. Pr.: Phys. 521.

**265 532. Electricity and Magnetism I.** (3) II. A study of electric and magnetic fields using the calculus. The development and uses of Maxwell's equations. Pr.: Phys. 214 or 521; Math. 240 or conc. enrollment.

**265 546. Radioactive Tracer Techniques.** (3) (See Chem. 546.) 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.

**265 551. Atomic Physics.** (3) I, II, S. An introduction to contemporary theories and problems in physics. Pr.: Phys. 214; Math. 222.

**265 552. Instrumental Optics.** (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. Pr.: Physics 114 or equiv. or consent of instructor.

**265 561. Geophysics.** (3) II. Alt. years. Principles and methods of exploration geology by physical methods. Pr.: Phys. 114 or 214; Math. 221.

**265 591. Microclimatology.** (3) I. (See Agron. 591). A description of the climatological conditions near the ground and their application to the biological sciences. Pr.: Phys. 113; Math. 100.

**265 595. 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. 114 or 214; Math. 221.

#### UNDERGRADUATE AND GRADUATE CREDIT

**265 611. 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. 522, 551; Math. 240.

**265 612. Introductory Quantum Mechanics II.** (3) II. Cont. of Phys. 611. Pr.: Phys. 611.

**265 616. Advanced Physics Laboratory.** (1-3) I, II. The courses Phys. 506, 516 and 616 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.

**265 621. Mechanics II.** (5) II. Cont. of Physics 522. Pr.: Phys. 522.

**265 631. Electricity and Magnetism II.** (3) I. Cont. of Phys. 532. Pr.: Phys. 532.

**265 636. 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. 214 or consent of instructor.

**265 641. Nuclear Physics.** (3) II. Modern theories of nuclear physics. Pr.: Phys. 611.

**265 651. Introduction to Optics.** (3) 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 each week. Students desiring simultaneous laboratory experience with the phenomena discussed should enroll for 1 or 2 hours in Phys. 616. Pr.: Phys. 532 or E. E. 497.

**265 671. Thermodynamics and Statistical Physics.** (3) II. Pr.: Phys. 522; Math. 240.

**265 681. Semiconductor Physics.** (3) I. 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.

**265 691. 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. 522, 532.

**265 701. Journal Club.** Credit arranged. I, II. Seminar in current topics in physics. Pr.: Consent of instructor.

**265 707. Topics in Physics.** Credit arranged. I, II, S.

**265 711. Introduction to Theoretical Physics.** (3) I. Pr.: Phys. 621.

**265 731. Electrodynamics I.** (3) II. Pr.: Phys. 631.

**265 751. Atomic Spectra.** (3) I. Atomic energy levels and the origin of spectra. Pr.: Phys. 611.

**265 752. Molecular Spectra.** (3) II. Molecular energy levels and the origin of spectra. Pr.: Phys. 611.

**265 781. X-ray and Crystal Physics.** (3) II. Alt. years. Pr.: Phys. 532.

**265 782. Introduction to Solid State Physics.** (3) I. Pr.: Phys. 611.

**265 786. X-ray Laboratory.** (1) II. Alt. years. Three hours lab. a week. Pr.: Phys. 781 or conc. enrollment.

**265 791. 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 gases; plasma spectroscopy. Pr.: Phys. 611, 671 or conc. enrollment; Phys. 691 recommended.

## GRADUATE CREDIT

**265 800. Problems in Physics I.** (1) II. 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.

**265 811. Quantum Mechanics I.** (3) I. Pr.: Physics 611, 711, 821.

**265 821. Advanced Dynamics.** (3) II. Pr.: Phys. 711.

**265 892. 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. 751, 791.

**265 893. 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. 711, 791, 811.

**265 899. Research in Physics.** Credit arranged. I, II, S. Masters level research. Consent of instructor.

**265 910. 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. 800 and consent of instructor.

**265 911. Quantum Mechanics II.** (3) II. Pr.: Phys. 811.

**265 912. Advanced Quantum Mechanics.** (3) I. Relativistic quantum mechanics; scattering theory; second quantization and the many-body problem; introduction to quantum electrodynamics. Pr.: Phys. 911.

**265 913. Advanced Topics in Mathematical Physics.** (3) II. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

**265 914. Quantum Field Theory.** (3) Offered on sufficient demand. Pr.: Consent of instructor.

**265 931. Electrodynamics II.** (3) I. Pr.: 731.

**265 941. Advanced Nuclear Physics I.** (3) I. Pr.: Phys. 641, 811.

**265 942. Advanced Nuclear Physics II.** (3) II. Cont. of Phys. 941. Pr.: Phys. 941.

**265 943. Advanced Topics in Nuclear Physics.** (3) I. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

**265 951. Advanced Topics in Molecular Spectroscopy.** (3) I. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

**265 952. Advanced Topics in Optics.** (3) II. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

**265 971. Statistical Mechanics.** (3) I. Pr.: Phys. 611, 671, 821.

**265 972. Advanced Statistical Mechanics.** (3). Offered on sufficient demand. Pr.: Phys. 971, 811.

**265 981. Solid State Physics.** (3) I. Pr.: Phys. 782, 971, 911 or conc. enrollment.

**265 982. Advanced Topics in Solid State Physics.** (3) II. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor.

**265 983. Advanced X-ray Physics.** (3). Offered on sufficient demand. Pr.: Phys. 781, Math. 240.

**265 999. Research in Physics.** Credit arranged. I, II, S. Doctoral level research. Pr.: Consent of instructor.

## POLITICAL SCIENCE

H. Pierre Secher,\* Head of Department

Professors Secher,\* Douglas,\* and Suleiman;\* Associate Professors Gustafson,\* Hajda,\* and Williams;\* Assistant Professors Althoff,\* Born, Iyengar, 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 prelaw 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 80).

**Armed Forces and Society.** Political science and several other departments offer coordinated course-work 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 are in history, geography, sociology, economics, and nuclear engineering.

**Requirements for the Major.** Fundamental courses. Principles of Political Science (269 110 or 269 111). It is suggested that either United States Politics (269 225) or World Politics (269 233) should normally be taken during freshman or sophomore year. Another third fundamental course, Political Behavior (269 201) or an acceptable substitute, should normally be taken during sophomore or junior year after completing at least six hours in political science.

**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 freshmen and sophomores—majors, non-majors, and undeclared majors. United States Politics (269 225) and World Politics (269 233) are not normally open to juniors and seniors.

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; he also must 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. Pr.: 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 subnational 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).

**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).

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**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 in-

cluding 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-Saharan 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).

**269 898. Master's Report.** (2).

**269 899. Master's Thesis.** (6).

### PSYCHOLOGY

E. Jerry Phares,\* Head of Department

Professors Brown,\* Danskin,\* Hoyt,\* Perkins,\* Phares,\* Rohles,\* Samelson,\* Sinnett,\* and Thompson;\* Associate Professors Cowan,\* Griffitt,\* Mitchell,\* and Rappoport;\* Assistant Professors Frieman,\* Press,\* Shanteau,\* Spear,\* and Uhlarik;\* Emeritus Professors Alm and Langford.

#### 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 707 and an additional 22 hours of course work, including Psych. 110, 250, and either Psych. 460, 475, or 480, and either Psych. 605 or 620. 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. 76.

Students interested in the industrial relations field should take relevant electives in economics, business administration, and sociology, selected in consultation with their advisers. Students interested in teaching or guidance work in the secondary schools should prepare for teacher certification with a major in psychology. Such students should consult with the College of Education.

#### 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, especially 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.

**273 115. General Psychology (Honors).** (4) I, II, S. An introduction to the study of behavior. Pr.: Participation in Honors Program or consent of instructor.

**273 200. Applications of Research to Human Behavior.** (2). Interim Sem. Applications and evaluation of psychological research findings in such areas as education, psychotherapy, psychopathology, childrearing, etc. Pr.: Psych. 110 and consent of instructor.

**273 202. 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. P.: Psych. 110 and consent of instructor.

**273 250. 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.

**273 280. Psychology of Childhood and Adolescence.** (3). Survey of behavioral development from birth through adolescence. Pr.: Sophomore standing; Psych. 110.

**273 290. 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.

**273 299. Honors Seminar in Psychology.** (1-3). Selected topics. Open to non-majors in the Honors Program.

**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.

**273 435. 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.

**273 460. Fundamentals of Learning.** (3). I. Empirical and theoretical approaches to the study of human and animal learning. Pr.: Psych. 250 or consent of instructor.

**273 461. Laboratory in Learning.** (1) I. May be taken only in conjunction with Psych. 460. Supervised experimentation in learning. Pr.: Conc. enrollment in Psych. 460.

**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.

**273 470. 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. 198, Psych. 110, or consent of instructor.

**273 475. Principles of Motivation.** (3) II. Empirical and theoretical approaches to the study of motivation, including its physiological basis. Pr.: Psych. 250 or consent of instructor.

**273 476. Laboratory in Motivation.** (1) II. May be taken only in conjunction with Psych. 475. Supervised experimentation in motivation. Pr.: Conc. enrollment in Psych. 475.

**273 480. Fundamentals of Perception and Sensation.** (3) I. Empirical and theoretical approaches to phenomena of sensation and perception. Pr.: Psych. 250 or consent of instructor.

**273 481. Laboratory in Perception and Sensation.** (1) I. May be taken only in conjunction with Psych. 480. Supervised experimentation in perception and sensation. Pr.: Conc. enrollment in Psych. 480.

**UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD**

**273 505. 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.

**273 510. 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.

**273 590. Experimental Psychology Seminar.** (2-3). Intensive discussion of selected topics. May be repeated. Pr.: Either Psych. 460, 475, 480 or consent of instructor.

**273 595. Personality-Social Seminar.** (2-3). Intensive discussion of selected topics. May be repeated. Pr.: Either Psych. 605, 620, or consent of instructor.

**273 598. Basic Concepts in Clinical Psychology.** (3). Critical analysis of the profession. Review of theoretical and empirical bases of such areas as intelligence and its measurement, personality and diagnosis, psychotherapy, and other modes of behavioral change. Pr.: Psych. 250 and 505.

**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. 460, 475, 480, or consent of instructor.

**273 606. Laboratory in Social Behavior.** (1) II. May be taken only in conjunction with Psych. 605. Supervised research in social behavior phenomena. Pr.: Conc. enrollment in Psych. 605.

**273 616. Comparative Psychology.** (3). Behavior at different phylogenetic levels as an aid to the clarification of behavioral principles. Pr.: Consent of instructor.

**273 620. Psychology of Personality.** (3). Discussion of different approaches to the study of personality. Pr.: Any of the following: either Psych. 460, 475, 480, or consent of instructor.

**273 621. Laboratory in Personality Research.** (1). May be taken only in conjunction with Psych. 620. Supervised research in personality phenomena. Pr.: Conc. enrollment in Psych. 620.



**273 622. 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. 280 or Educ. 405 215.

**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 707 and consent of 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.

**273 790. 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

**273 801. 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.

**273 802. 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 707 or equiv.

**273 803. 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. Pr.: Biol. 198 and Psych. 110 or consent of instructor.

**273 804. Laboratory in Physiological Psychology.** (1). May be taken only in conjunction with Psych. 803. Supervised research in physiological correlates of behavior. Pr.: Conc. enrollment in Psych. 803.

**273 805. Experimental Design in Psychology.** (3). Introduction to techniques of research planning and experimental design, including critical evaluation of selected experiments. Pr.: Psych. 802 or Stat. 708 or consent of instructor.

**273 806. 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. 707.

**273 810. Motivation and Learning.** (3). Experimental study of learning and motivation, with emphasis on recent developments in the field. Pr.: Psych. 250 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. 250 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. 250 or consent of instructor.

**273 820. Personality Theory.** (3). A comparative examination of contemporary theories of personality structure. Pr.: Psych. 620 or consent of instructor.

**273 830. Pro-seminar in Social Psychology.** (3). Discussion of empirical findings and theoretical approaches to selected problem areas, such as attitude change, personality and social structure, person perception, small group processes. Pr.: Psych. 435.

**273 860. Practicum in Counseling Psychology.** Credit arranged. Supervised practical experience in counseling. Pr.: Consent of instructor.

**273 899. Research in Psychology (M.S.).** Credit arranged. Pr.: Consent of supervisory committee.

**273 908. Advanced Physiological Psychology.** (3). A study of the neural and endocrinological correlates of behavior. Pr.: Psych. 803 and consent of instructor.

**273 909. Sensory Processes.** (3). Experimental study of sensory and perceptual processes, with emphasis on recent developments in the field. Pr.: Psych. 250 or consent of instructor.

**273 911. 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. 250 or 909 or consent of instructor.

**273 915. 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.

**273 919. Advanced Measurement.** (3). The logic of measurement, scaling theory, psychophysics and psychometrics, and problems in classification and prediction. Pr.: Psych. 806.

**273 921. 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.

**273 922. Psychopathology.** (3). A systematic review of behavior disorders, their etiology and treatment. Pr.: Psych. 505 and 620 or consent of instructor.

**273 925. 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. 280 or equiv. and consent of instructor.

**273 931. 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.

**273 947. 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, 810, 909, or consent of instructor.

**273 951. Seminar in Physiological Psychology.** (1-3). Selected topics in physiological psychology. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

**273 952. Seminar in Sensory Processes.** (1-3). Selected topics in sensory psychology. May be repeated with consent of supervisory committee. Pr.: Consent of instructor.

**273 953. 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.

**273 954. 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. 810 or 909, or consent of instructor.

**273 955. 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.

**273 956. 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.

**273 957. 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.

**273 959. 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.

**273 968. 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.

**273 970. 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.

**273 990. Internship in Psychology.** Credit arranged. Pr.: Consent of the supervisory committee.

**273 999. Research in Psychology Ph.D.** Credit arranged. Pr.: Consent of supervisory committee.

## SOCIOLOGY AND ANTHROPOLOGY

Eugene A. Friedmann, Head of Department

Professors Friedmann,\* Rohrer,\* Schnur,\* Associate Professors Edelman,\* O'Brien,\* Peters,\* Taylor,\* Assistant Professors Benson, Brede, Camp, Cross, Dushkin, Finnegan, C. Flora,\* J. Flora,\* Miley,\* H. Ottenheimer, M. Ottenheimer, Pelletier, and Lecturer Orbach.

### 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, corrections and law enforcement careers, social welfare careers and social research. Training in sociology also is a desirable background for further professional training in law, social work, city planning, public administration, hospital administration and, of course, for advanced

graduate work in sociology or other social sciences. 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.

**The Undergraduate Program.** The student who desires to major in sociology should refer to the general requirements for the AB or BS degree (see page 76). He has his choice of three options in the undergraduate sociology major: (1) the General Sociology option; (2) the Correctional Administration option; and, (3) the Social Work option. The student interested in sociology who desires to teach in secondary schools should prepare for teacher certification with a major in sociology (see page 175).

Students enrolled in the General Sociology option will be required to take 27 semester hours of sociology to include Soc. 211, 420 and 460. In addition to the other requirements nine hours of electives in sociology are to be taken at the 500 level or above.

Students enrolled in the Correctional Administration option will be required to take 30 semester hours of sociology to include Soc. 211, 420, 460, 658, 659 and two of the following: Sociology 660, 661, 662, 663, or 761. Students preparing for professional careers in correctional administration are advised to enroll in this 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 officers, reformatory counselors, juvenile institution case managers, 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 enrolled in the Social Work option will be required to take 30 semester hours of sociology to include Sociology 211, 260, 420, 510, 560 and six credits of 465. Three additional credit hours in sociology at the 400 level or above and another three at the 500 level or above are required. Students preparing to enter professional careers in social work after obtaining their bachelor's degree or who are planning to apply for admission to a MSW program are advised to enroll in this option. These courses represent an integrated professional program of study and field experience which correspond to the standards for undergraduate training programs as set forth by national and state level professional social work groups and in keeping with the qualifications sought by social welfare agency



employers and by graduate schools of social work.

**The Graduate Program.** 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. Of these, 9 semester hours are to be taken in 800 level seminar courses in sociology.

## Courses in Sociology

### UNDERGRADUATE CREDIT

**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. (Cross listed as 560 260).

**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.

**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.

**277 411. 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.

**277 420. 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.

**277 430. 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.** (3) I. Principles and processes of the organization and structure of human societies. Analysis of social groups and institutions and theories of social structure. Pr.: Soc. 211 or consent of instructor.

**277 450. Group Processes and Social Behavior.** (3) I, II. Analysis of processes of group formation, maintenance and change and their interrelationships with individual social behavior. Consideration of major theoretical approaches and their empirical foundations. Pr.: Soc. 211 or consent of instructor.

**277 460. Comparative Social Theories.** (3) I. Investigations of a range of current sociological theories concerning the socialization process, group behavior and social organization. Pr.: Soc. 211.

**277 465. Field Experience.** (3). Supervised field experience in community agencies and programs as a practical application of social work knowledge and skills gained from introductory courses. Emphasis on direct work with clients, whether individuals, groups, or communities. Weekly seminar makes use of students' experience to analyze social work theory and practice. Pr.: Soc. 260, 510, and 560. (May be taken in two consecutive semesters for six hours credit.) Cross listed as 560 465.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**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. Race and Ethnic Relations in the U.S.A.** (3) I, II, some S. Racial and cultural groups; attitudes, prejudices, conflicts; approaches to understanding race and minority group relations in the U.S.A. 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. Consideration 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.

**277 590. Senior Seminar in Sociology.** (3) I and II. Summarization and integration of courses in sociology. Pr.: Soc. 211 or consent of instructor.

**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.

**277 621. 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.

**277 645. Sociology of Sport.** (3) I and II. A critical analysis of sport and leisure activity in contemporary American society focusing on such issues as sport participation and social mobility, race and sports, women and sports, and audience involvement. Pr.: Soc. 211 or consent of instructor. (Cross-listed as 261 645.)

**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.

**277 678. Sociology of Dominant-Minority Relations.** (1-3). Advanced sociological views of race or ethnic relations in industrialized societies; comparative, evolving and contemporary perspectives on dominant-minority relations. Pr.: Soc. 211 and consent of instructor.

**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.

**277 761. 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 or 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.

**277 898. Master's Report Research.** Credit arranged. I, II, S.

**277 899. Master's Thesis Research.** Credit arranged I, II, S.

**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.

**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 IN MINOR FIELD

**278 520. Senior Seminar.** (3). Intensive exploration of anthropological problems for both majors and non-majors of sufficient background. High levels of individual participation. Pr.: Senior standing and 9 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.

**278 616. Music and Culture.** (3). Music as an aspect of human behavior. Exploration of structural and functional relationships between music and other aspects of culture. Style area survey. Pr.: Anthropology 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.

**278 636. Cultures of Afro-America.** (3). Description and comparison of African-derived cultural patterns in the Americas, stressing culture contact and acculturation, retention and syncretism, social and economic organization, religion, language, the arts. Pr.: Anthropology 200 or consent of instructor.

**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.

## SPEECH

Norma D. Bunton,\* Head of Department

Professors Bunton,\* Dace,\* Engler,\* and Flanagan;\* Associate Professors Burke,\* Climenhaga,\* Fedder,\* and Rainbolt;\* Assistant Professors Cleary, Hinrichs,\* Longhurst,\* Nichols,\* Ollington, and Van Tassel;\* Instructors Aseneta, Atkins, Barnes, Knowles, Molineux, 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. See Speech SED requirements, College of Education for teacher certification.

Students intending to attempt to quiz out of Oral Communications IA for credit should enroll in the line number in the current Line Schedule which is designated for Speech "Quiz Out." To receive credit by quiz out, a student must receive an A, B, or C. Rental fee for test materials is \$12.50.

### 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. 80).

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 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

**281 080. Speech Seminar.** (0). Special topics and lectures for speech majors. Required of all majors each semester.

**281 101\* Spoken English for International Students.** (3) I, II. Semi-intensive aural-oral familiarization in American English as a second language.

**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.

Three hours of credit for Oral Comm IA may be earned by "Quiz Out" with an A, B, or C. See description of "Quiz Out" in Speech under Undergraduate Study in Speech.

**281 107. Oral Communication Ib.** (3). Speaking, reading, and writing for international student whose linguistic ability in American English is below that of the native American student; emphasis on aural-oral approach to structural patterns of spoken English. Pr.: Satisfactory score on the Speech Proficiency examinations and English Readiness Examinations for International Students.

**281 108. Oral Communication IH.** (2) Honors—Participation in and analysis of oral message situations, with emphasis on communication purposes, message design and presentations.

**281 109. Oral Communication IaH.** (4). Honors Speech preparation and delivery; a survey of topics basic to rhetoric, communication and linguistics. For Arts and Sciences Honors students.

**281 210. Debate and Drama Participation.** (1 or 2). Four hours maximum credit. Pr.: Consent of director of the activity.

\* Three hours academic credit, not applicable toward degree requirements. Student in curriculum requiring 120 credit hours must therefore accumulate 123 or 124 hours when taking this course. Hours will apply toward grade-point average.

**281 220. 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.

**281 226. Argumentation and Debate.** (3). Basic theories of argumentation, with emphasis on their application in academic debate. Pr.: Spch. 105 or 106.

**281 235. Introduction to the Art of Film.** (3). Examination of the means of creating film art. Attention to techniques employed by successful directors, writers, and producers.

**281 320. Introduction to General Semantics.** (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.

**281 499. 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

**281 520. 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 hours in speech.

#### UNDERGRADUATE AND GRADUATE CREDIT

**281 720. 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.: 320.

**281 725. 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.

**281 726. Persuasion.** (3). The study of communication as persuasion; examination of contemporary approaches to persuasion.

**281 727. 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.

**281 728. Discussion and Conference Leadership.** (3). Principles and functions of leadership in face-to-face groups.

**281 730. Rhetorical Theory and Criticism.** (3). Study of rhetorical theory and criticism from early Greek to modern times.

**281 731. Medieval and Renaissance Rhetoric.** (3). A study of the influential works of rhetoric from St. Augustine to Thomas Wilson. Pr.: 281 730.

**281 732. Modern Rhetoric.** (3). Readings in the rhetorical theories of Kenneth Burke and other twentieth century contributors. Pr.: 730.

**281 735. History of the Art of the Film.** (3). History, critical theory, and techniques of the film as an art form from its inception to the present. Pr.: 281 235.

**281 736. Film Theory and Criticism.** (3). Studies in film criticism based on the writings of Kracauer, Balasz, Eisenstein, Spottiswoode, and others. Pr.: 281 235.

**281 740. Silence.** (2). The role of silence in social interaction, rhetorical effectiveness, philosophical, religious, and artistic tradition.

**281 799. Problems in Speech.** Credit arranged. Open to students in any speech area. Pr.: Junior standing and consent of instructor.

#### GRADUATE CREDIT

**281 899. Research in Speech.** Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken and consent of instructor.

#### Linguistics

#### UNDERGRADUATE CREDIT

**282 280. 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.

#### UNDERGRADUATE AND GRADUATE CREDIT

**282 680. 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. 680 and Mod. Lang. 680).

**282 780. Introduction to Linguistics.** (3). Study of the basic concepts of modern descriptive linguistics. (Same as Engl. 780 and Mod. Lang. 780).

**282 781. 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. 781, Mod. Lang. 781).

**282 782. Language Typology.** (3). Presentation and discussion of the languages of the world and the variant methods of their classification. (Same as Engl. 782 and Mod. Lang. 782).

**282 783. 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. 680 and 780 or consent of instructor and junior standing. (Same as Engl. 783 and Mod. Lang. 783).

**282 784. 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. 530 or Spch., English, or Mod. Lang. 780 (Same as Engl. 784 and Mod. Lang. 784).

**282 785. 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. 780 and 784 or consent of instructor and junior standing. (Same as Engl. 785 and Mod. Lang. 785).

**282 786. 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 680 and 783.

**282 787. 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 780, Mod. Lang. 780, or English 780. (Same as Engl. 787 and Mod. Lang. 787).



**282 788. 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. 780. (Same as Engl. 788 and Mod. Lang. 788).

**282 789. 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. 680 and 780, or consent of the instructor. (Same as Mod. Lang. 789).

#### GRADUATE CREDIT

**282 842. Experimental Phonetics.** (3). Methods and logic for experimental analysis of the physical and perceptual properties of speech signals; function relation of the sub-structures 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. 350 and 780.

**282 890. 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

**283 115. Teach Your Child to Talk.** (1). The information presented and discussed is designed to clarify how normal children learn to talk and to explain how parents can aid the development of their child's speech and language.

**283 140. 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.

**283 240. 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.

**283 243. 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.

**283 250. 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.

**283 255. Language Development.** (3). Basic review of the development of speech and language skills in children.

**283 350. Speech and Hearing Mechanisms I.** (3). Anatomy and physiology of normal and abnormal speech mechanisms, including respiration, phonation, resonance and articulation.

**283 351. Speech and Hearing Mechanisms II.** (3). Study of the ear and the mechanics of hearing. Pr.: Spch. 350.

##### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**283 546. 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

**283 640. 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. 351.

**283 642. Developmental Psycholinguistics.** (3). Research and theory of early development of vocalization, phonology, morphology, syntax, and semantics are reviewed. Variables which influence acquisition are discussed.

**283 644. Communication Problems of the Hearing Impaired.** (3). Problems in speech and language habilitation of individuals having hearing losses from mild to profound within appropriate educational and habilitative settings. Pr.: 283 640 and 745.

**283 645. 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.

**283 646. Disorders of Articulation.** (3). Research, theories, and principles concerning the diagnosis and management of articulation disorders. Pr.: Spch. 243.

**283 649. Diagnostic Methods in Speech Pathology.** (3). Study of diagnostic and appraisal procedures utilized in the evaluation of speech and language disorders.

**283 650. Laboratory in Speech Pathology.** (2-3). Supervised practice in the use of the materials and methods of speech pathology. Pr.: Spch. 645, 646, and 649.

**283 655. Functional Analysis of Language Retardation.** (3). Application of behavior modification principles to communication habilitation of language retarded children. Pr.: Spch. 642 or 645, or consent of instructor.

**283 660. Laboratory in Audiology.** (2-3). Supervised practice in the use of the equipment, materials and methods of audiology. Pr.: Spch. 351 and 640.

**283 740. Hearing Conservation and Rehabilitation.** (3). Principles and practices involved in conservation, preservation, and rehabilitation of hearing. Pr.: Spch. 640.

**283 742. 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. 350 and 646.

**283 745. Audiology.** (3). Theory and techniques of audiometric evaluation including supervised practice in a simulated clinical setting with selected auditory tests. Pr.: Spch. 640.

**283 750. Speech Disorders of the Orthopedically Handicapped.** (3). Diagnostic and therapeutic aspects of speech, hearing, and language disorders associated with cerebral palsy. Pr.: Speech 350 and 646.

**283 752. Practicum in Speech Pathology.** (3-5). Supervised clinical methods in speech pathology. Experience in screening, diagnosis, organization, and administration of therapy. May be repeated for a maximum of 15 hours credit. Pr.: Senior or graduate standing in Speech Pathology or Audiology.

**283 757. 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.

**283 768. 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. 640.

## GRADUATE CREDIT

**283 840. Neuropathologies of Speech and Language.** (3). Research and theory concerning nature, etiologies, evaluation, and principles of neuropathologies. Pr.: Spch. 645.

**283 843. Advanced Audiometry and Hearing Aids.** (3). Special speech and pure tone audiometric techniques for differentiating neural from conductive impairments, for identifying recruitment, malingering, and other hearing problems; administration of test for hearing aid evaluations. Pr.: Spch. 745.

**283 845. 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. 745.

**283 846. Stuttering.** (3). Research and theory concerned with stuttering behavior, causes, developmental factors, evaluation, and remedial procedures. Pr.: Spch. 645.

**283 847. Practicum in Audiology.** (3-5). 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 15 credit hours. Pr.: Senior or graduate standing in Audiology.

**283 849. 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.

**283 855. 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. 642.

## 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, C (as described on page 149). 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): General Speech 210, 735, 736; 736, 284 160, 165, 560, 563, 564, 710, 712, 760, 779.

## Courses in Theatre and Interpretation

### UNDERGRADUATE CREDIT

**284 050. Theatre Laboratory.** (0). Required each semester for all students enrolled in acting and/or directing courses. Planning and rehearsal sessions for student productions.



**284 160. Introduction to Theatre.** (3). Consideration of the basic elements of theatre: aesthetics, dramatic literature, theatre technology, and producing organizations.

**284 165. 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.

**284 260. Stage Movement.** (3). An investigation of the techniques of movement in dramatic and musical productions. Major emphasis is placed on practical application.

**284 261. Fundamentals of Acting.** (3). Theory and practice of acting with emphasis on voice building, stage movement, fencing, and oral interpretation of dramatic literature.

**284 262. 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.

**284 263. 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.

**284 266. 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.

**284 267. Fundamentals of Costuming for the Theatre.** (3). A lecture-laboratory course covering the principles and techniques of construction and design of stage costuming.

**284 268. Techniques of Makeup.** (3). Techniques of makeup for stage, movies, and television.

**284 370. Dramatic Structure.** (3) To be offered in Fall 1974. Fundamentals of play analysis for directors with emphasis upon concepts of form, style, characterization, discovery, and reversal. Includes practice in analyzing plays of various forms and styles.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**264 560. 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.

**284 561. 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.

**284 563. 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.

**284 565. 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.

**284 570. History of the Theatre.** (3). A survey of the development of the theatre from ancient times to the present day.

#### UNDERGRADUATE AND GRADUATE CREDIT

**284 664. Creative Dramatics.** (3). Study of techniques for the training and development of creative imagination in primary and secondary school children by means of group im-

provisation of plays. Emphasis placed on both skillful guidance of the children and the pursuit of original research.

**284 710. 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. 261, Spch. 266, Spch. 262, Spch. 565, and consent of the instructor. (For transfer students equivalent background will be required.)

**284 712. Theatre Management.** (3). Theatre management, promotion, finance, organization; emphasis on contract negotiations and use of facilities.

**284 760. 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.

**284 761. 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.

**284 762. 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.

**284 763. 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.

**284 764. 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. 262 or its equivalent and consent of the instructor.

**284 765. 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.

**284 766. 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.

**284 767. 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. 267 or consent of the instructor.

**284 768. 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.

**284 769. Stage Lighting.** (3). History and technique of lighting for the stage and television.

**284 770. Greek Theatre.** (3). Studies in the drama and stagecraft of the Greek period.

**284 771. Roman, Medieval, and Baroque Theatre.** (3). Studies in the drama and stagecraft of the Roman, Medieval, and Baroque periods.

**284 772. Romantic Theatre.** (3). Studies in the drama and stagecraft of the Romantic era.

**284 773. Modern European Theatre.** (3). Studies in the

European drama and stagecraft of the period from 1876 to the end of World War II.

**284 774. Avant-Garde Theatre.** (3). Studies in Avant-Garde drama and stagecraft since World War II.

**284 775. Oriental Theatre.** (3). Studies in the drama and stagecraft of India, China, and Japan.

**284 776. Slavic Theatre.** (3). Studies in the drama and stagecraft of the Slavic countries from 1800 to the present. Pr.: Junior standing.

**284 777. Aesthetics of the Theatre.** (3). Principal emphasis on theoretical problems of dramatic art.

**284 778. 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. 266.

**284 779. 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.

## GRADUATE CREDIT

**284 870. 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,\* Perng,\* and Waller,\* Assistant Professors McDonald\* and Milliken.\*

### 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 past 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, a teacher, 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. 76), completing Math 240 and doing one of the following:

(a) Take one of Stat. 320, 330, 340, or 350; and either Stat. 341 or 351; and either Stat. 510 and 511 or Stat. 770 and 771; and one additional statistics course; or

(b) Take Stat. 703, 704 and 705, and also take either Stat. 510 and 511 or Stat. 770 and 771 and one additional statistics course. Each statistics major also must take Fundamentals of Computer Programming. A student may seek a Bachelor of Science degree by

satisfying the general requirements of that degree (p. 76) and the same requirements as noted for the Bachelor of Arts degree. It also is recommended that such a student take extra courses in computer science, or otherwise gain extra experience in programming. Each student must 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.

A student may work toward a Doctor of Philosophy degree either in mathematical probability and statistics or in applied probability and statistics. The former includes more of the advanced theory whereas the latter replaces some of the advanced theory with instruction and experience in the uses to which the basic theory can be put.

Teaching and research assistantships are available on a competitive basis. Federal fellowships also are available to excellent students, usually after the student has been here a year.

### 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.

**285 200. Appreciation of Statistics.** (3) I, II, S. A relatively non-technical coverage of the many roles played by probability and statistics in everyday life: appropriate history, descriptive uses, "scientific" distortion of facts, legal uses, opinion and other survey sampling, cryptography, demography, sports, insurance, and games. Two hours of lecture-recitation and two hours of laboratory inside and outside the classroom. Not acceptable as a prerequisite for any other statistics course.

**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, in-



cluding 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). 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

**285 510. 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.

**285 511. 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. 510.

#### UNDERGRADUATE AND GRADUATE CREDIT

**285 703. Statistical Methods for Natural Scientists.** (3) I, II, S. Statistical concepts and methods basic to experimental research in the natural sciences; hypothetical populations; estimation of parameters; and confidence intervals; parametric and nonparametric tests of hypotheses; linear regression; correlation; one-way analysis of variance; t-test; chi-square test. Pr.: Junior standing and equivalent of college algebra.

**285 704. Analysis of Variance and Covariance.** (2) I, II, S. Computation and interpretation for two- and three-way analyses of variance; multiple comparisons; analysis of covariance; applications including use of computers. Meets four times per week during first half of semester. Pr.: Stat. 703.

**285 705. Regression and Correlation Analyses.** (2) I, II, S. Multiple regression and correlation concepts and methods; curvilinear regression; applications including use of computers. Meets four times per week during second half of semester. Pr.: Stat. 703.

**285 710. Sample Survey Methods.** (3) II, S. Design, conduct, and interpretation of sample surveys. Pr.: Stat. 703.

**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.** (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. 704 and 705.

**285 725. 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. 771 or concurrent enrollment in Stat. 771.

**285 730. 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. 771, course in matrices.

**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. 770.

**285 770. 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. 510 and 511. Pr.: Math. 222.

**285 771. Theory of Statistics II.** (3) II, S. Introduction to multivariate distributions; sampling distributions, derivation and use; estimation of parameters, testing hypothesis;

#### 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.: Grad. standing and at least two grad. courses in statistics.

**285 820. Experimental Design Theory.** (3) II, S. Incomplete block designs; theory of the construction and analysis of experimental designs. Pr.: Stat. 720 and course in matrices.

**285 830. Statistical Population and Quantitative Genetics I.** (3) I. Equilibrium law of gene frequencies; forces that change gene frequency; gene frequency distributions; prediction equations for selection. Pr.: Stat. 704 and 705 and six semester hours of genetics.

**285 831. Statistical Population and Quantitative Genetics II.** (3) II. Estimation of genetics parameters; inbreeding, heterosis, level of dominance; epistasis, genetic load linkage; experimental approaches to statistical genetics. Pr.: Stat. 830.

**285 840. Theory of Statistics II.** (3). Functional forms and properties of selected distribution functions. Characteristic functions. Limiting distributions. Pr.: Stat. 770.

**285 841. Theory of Statistics IV.** (3) II. Convolutions of distributions. Theory of Runs. Distributions of order statistics. Sequential analysis. Pr.: Stat. 840.

**285 860. Linear Models I.** (3) I. 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. 704, 705, 771; course in matrices.

**285 861. Linear Models II.** (3) II. Generalized inverses; polynomial regression; experimental design, variance-component, and mixed models. Pr.: Stat. 860.

**285 898. Master's Report.** (2) I, II, S. Pr.: Consent of instructor.

**285 899. Master's Thesis Research.** Credit Arranged. I, II, S. Pr.: Consent of instructor.

**285 945. 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. 725 and 771.

**285 950. 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. 771 and consent of instructor.

**285 965. Multivariate Analysis I.** (3) I. Matrix formulas, Jacobian of matrix transformations, likelihood estimates; Hotelling's  $T^2$ ; 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.

**285 966. Multivariate Analysis II.** (3) II. Classification and discrimination; canonical correlations; distribution of roots of determinantal equations; multivariate analysis of variance; union-intersection principles; simultaneous confidence estimation; multiple comparisons; non-parametric multivariate inference. Pr.: Stat. 965.

**285 990. 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. 840.

**285 991. Foundations of Probability II.** (3) II. Conditional random variables, martingales, ergodic theorems. Pr.: Stat. 990.

**285 995. 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. 841.

**285 996. 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. 995.

**285 999. Research in Statistics.** Credit arranged. I, II, S. Pr.: Consent of instructor.









## THE COLLEGE OF

# Business Administration

Robert A. Lynn,\* Dean  
Mildred E. Buzenberg, Assistant Dean

Professors Allen,\* Barton-Dobenin,\* Jones,\* Laughlin,\* and Lynn,\* Associate Professors Coleman,\* Fox,\* Gugler,\* Mulanax,\* and Richards; Assistant Professors Brown, Buzenberg, Donnelly,\* Finley, Graham,\* Gudgell, King,\* McManis, Nix, Miller, Riley, Thiessen, and Vaden;\* Instructors Hollinger, May, Stewart, and Stockard; Emeritus: Professor Clark, Associate Professor Eriksen and Assistant Professor Rapp.

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. Seven majors are available for selection by Business Administration students.

The College has two internship programs which provide valuable practical experience. The accounting internship is designed for accounting majors in their senior year and operates in cooperation with certified public accounting firms during January and February. The business administration internship is for students between their junior and senior years. This is a summer program offered in cooperation with numerous business firms throughout the midwest.

## 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

**Curriculum Requirements.** The curriculum in Business Administration is designed from a general management viewpoint. Prior to or during the first semester of the junior year, students select their major field of study. These fields are: Accounting, Finance, General Business, Industrial Relations, Management, Marketing, and Office Administration.

The following curriculum is effective for all students entering the College after August 1, 1973 or graduating after August 1, 1977.

<b>Communications</b>	
229 100 English Composition I	3
229 120 English Composition II	3
281 106 Oral Communications Ia	3
Communication Electives	2-3
	11-12
<b>Social Science</b>	
269 325 U.S. Politics	3
273 110 General Psychology	3
277 220 Introduction to Sociology	3
	9
<b>Quantitative</b>	
245 100 College Algebra	3
245 500 Introduction to Analytic Processes	3
285 350 Business and Economic Statistics I	3
285 451 Business and Economic Statistics II	3
286 200 Fundamentals of Computer Programming	3
	15
<b>General Electives</b>	
Social Science	3
Humanities	6
Natural Science*	6
Social Science, Humanities or Natural Sciences	6
	21

<b>Business and Economics</b>	
225 110 Economics I	3
225 120 Economics II	3
305 260 Fundamentals of Accounting	4
305 270 Mgr. and Cost Controls	3
305 292 Business Law I	3
305 420 Management Concepts	3
305 421 Production Management	3
305 440 Marketing	3
305 450 Business Finance	3
305 495 Business Policy	3
305 496 Business and Society	3
Economics Electives	6
Major field (see below)	18
	58

<b>Other</b>	
Physical Education (two semesters)	0
Free Electives	11-12
Total credit hours required for graduation	126

## MAJOR FIELDS

### Accounting

<b>Required:</b>	
305 261 Intermediate Accounting 1	3
305 271 Cost Accounting	3
305 361 Intermediate Accounting 2	3
305 460 Advanced Accounting	3
<b>Plus six credit hours selected from:</b>	
305 461 Taxation*	3
305 465 Accounting Internship	3
305 660 CPA Problems	3
305 661 CPA Theory and Law	3
305 662 Auditing 1*	3
305 663 Auditing 2	3

### Finance

<b>Required:</b>	
305 550 Financial Institutions	3
305 551 Investments	3
305 650 Capital Budgeting	3
305 651 Financial Management	3
<b>Plus six hours selected from:</b>	
305 261 Intermediate Accounting 1	3
305 350 Insurance	3
305 361 Intermediate Accounting 2	3
305 552 Real Estate	3
305 770 Controllorship	3
225 510 Intermediate Macro	3
225 520 Intermediate Micro	3
225 530 Money and Banking	3
225 531 Public Finance	3
225 681 International Trade	3

### General Business

18 credit hours required to be taken from courses offered by the College of Business Administration and distributed as follows:  
12 of the 18 hours must be selected from among the required courses in the Finance, Labor Relations, Management or Marketing majors representing at least three of those four major areas.  
The remaining six hours must be selected from the courses listed in either the required or the elective courses listed for those four majors.

### Labor Relations

<b>Required:</b>	
305 530 Labor Legislation	3
305 531 Personnel and Wage Administration	3
305 630 Industrial Relations	3
305 631 Labor Arbitration	3
<b>Plus six hours selected from:</b>	
305 520 Organizational Behavior	3
305 632 Contemporary Issues in Labor Relations	3
225 620 Labor Economics	3
227 627 Contemporary Manpower Problems	3
277 643 Sociology of Occupation and Professions	3
550 551 Work Measurement	3

\*Students must take at least one scientific laboratory.

\*Students wishing to qualify to sit for the CPA examination in Kansas must take Taxation and Auditing 1.



**Marketing****Required:**

305 540	Consumer Behavior .....	3
305 640	Marketing Research .....	3
305 642	Marketing Strategy .....	3
305 643	Promotional Administration .....	3

**Plus six hours selected from:**

305 541	Retailing .....	3
305 542	Sales Management .....	3
305 543	Sales Communications .....	3
305 641	Marketing Logistics .....	3

**Management****Required:**

305 520	Organizational Behavior .....	3
305 521	Quantitative Management .....	3
305 531	Personnel and Wage Administration .....	3
305 622	Decision Analysis .....	3

**Plus six hours selected from:**

305 261	Intermediate Accounting I .....	3
305 271	Cost Accounting .....	3
305 530	Labor Legislation .....	3
305 630	Industrial Relations .....	3
305 631	Labor Arbitration .....	3
305 632	Contemporary Issues in Labor Relations .....	3
225 520	Intermediate Micro .....	3
273 510	Psychology in Business & Industry .....	3
286 390	COBOL .....	3
550 554	Industrial Facilities Layout & Design .....	3
550 609	Occupational Health and Safety .....	3

**Office Administration****Required:**

305 111	Production Typing .....	3
305 213	Transcription .....	3
305 310	Office Practice and Techniques .....	3
305 311	Office Management .....	3

**Plus six hours selected from:**

305 210	Office Machines .....	3
305 350	Insurance .....	3
305 391	Administrative Communications .....	3
305 392	Business Law 2 .....	3
305 531	Personnel and Wage Administration .....	3
305 552	Real Estate .....	3
305 590	Women in Business .....	3

**PRE-BUSINESS EDUCATION**

Students preparing to teach business education in the junior and senior high schools are enrolled in a Pre-Business Education curriculum in the College of Business Administration for the freshman and sophomore years. Students will fulfill requirements for the B.S. Degree in the College of Education. During the four years, the adviser in the College of Business Administration aids in the selection of courses in the major. When students are accepted into the College of Education they are assigned to advisers in the College of Education.

Students must 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 (See College of Education section for details).

**PRE-LAW**

Law schools emphasize various objectives in pre-law study for the development of basic skills and insights. These objectives are: (1) the acquisition of skills in comprehension and expression, (2) understanding human institutions, and (3) the ability to think clearly, carefully and independently. The stated purpose of the

undergraduate program in Business Administration is to achieve these objectives. A pre-law student enrolled in the College of Business Administration not only achieves these important goals, but also obtains a broad business background that is desirable preparation for the study of law.

**DUAL DEGREE IN BUSINESS ADMINISTRATION**

The dual degree programs allow a student to earn the Bachelor of Science in Business Administration degree in addition to his non-business degree. Because of course sequence requirements, the program should be commenced during a student's junior year. Students must be enrolled in both the College offering their non-business degree and the College of Business Administration. Advising for Business Administration courses must be done in the dean's offices in the College of Business Administration. The program is not intended for students who have completed their non-business degree.

The following requirements are effective for all students entering the program after January 1, 1971, or all students graduating after June 1, 1976. Any student who wishes to take a dual degree must take a minimum of 150 credit hours and satisfy the requirements for both degrees. The following requirements must be completed either as part of the student's non-business degree or in addition to it.

305 260	Fundamentals of Accounting .....	4
305 270	Mgr. and Cost Controls .....	3
305 292	Business Law 1 .....	3
305 420	Management Concepts .....	3
305 421	Production Management .....	3
305 440	Marketing .....	3
305 450	Business Finance .....	3
305 695	Business Policy .....	3
305 696	Business and Society .....	3
225 110	Economics I .....	3
225 120	Economics II .....	3
245 500	Introduction to Analytic Processes .....	3
286 200	Fundamentals of Computer Programming .....	3
	Field of Specialization .....	9

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**INFORMATION FOR PRE-BUSINESS STUDENTS TRANSFERRING TO KANSAS STATE UNIVERSITY**

Many of the fundamental courses required for a degree in Business Administration may be obtained through pre-business programs at other four-year institutions or junior colleges. In general, two years of course work will be transferrable. Below are some suggested courses to be taken the first two years to transfer to Kansas State University for a degree in Business Administration without loss of credit.

First Semester	Credit Hours
English Composition I .....	3
Oral Communications (speech) .....	3
College Algebra* .....	3
Accounting I .....	3
General Psychology .....	3
Physical Education .....	0

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\*The pre-requisite of College Algebra for Business Administration students is high school geometry and two units of high school algebra. If a student has had one unit of high school algebra only, he must take intermediate algebra as a first semester freshman and College Algebra as a second semester freshman. Intermediate Algebra credit cannot be applied to a degree. If a student takes Analytic Geometry and Calculus I, it will substitute for 245 500 Introduction to Analytic Processes and his College Algebra requirement will be waived.

Second Semester	Credit Hours
English Composition II .....	3
American Government .....	3
Accounting II .....	3
Humanities Elective .....	3
Social Science Electives .....	3
Physical Education .....	0
	<hr/> 15

Third Semester	Credit Hours
Economics I .....	3
Managerial and Cost Controls .....	3
Fund. Computer Programming .....	3
Natural Science Electives .....	3 or 4
Humanities Electives .....	3
	<hr/> 15 or 16

Fourth Semester	Credit Hours
Economics II .....	3
Business Law I .....	3
Introduction to Sociology .....	3
Natural Science Electives .....	3 or 4
Soph. English or Business Letter Writing .....	2 or 3
	<hr/> 14 or 16

## GRADUATE STUDY

The College of Business Administration provides graduate work leading to a Master of Business Administration (MBA) degree in business administration and in accounting. All graduate programs require study in behavioral management, quantitative techniques and the decision making processes. Specialization in a particular field is provided through the use of electives.

Admission to graduate study at Kansas State University is granted on three bases: (1) full standing, (2) provisional, or (3) probational. Recommendations concerning an applicant's qualifications and admission are made to the dean of the Graduate School by a faculty committee of the College of Business Administration. The final decision regarding admission of an applicant is made by the dean of Graduate School.

Admission in full standing to graduate study in business and accounting normally requires a minimum grade point average of 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 with the College of Business Administration at least 60 days

prior to requested enrollment date. For international students the completed application should be on file 120 days prior to requested enrollment date.

## MASTER OF BUSINESS ADMINISTRATION

The program leading to the MBA 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 MBA 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.

305 820 Behavioral Management Theory .....	3
305 840 Marketing Systems Analysis .....	3
305 850 Financial Controls for Business .....	3
305 870 Accounting Controls for Business .....	3
305 890 Decision Theory of the Firm .....	3
305 891 Legal and Social Environment of Business .....	3
305 892 Research Methods in Business .....	3
305 893 Business Operations Analysis .....	3

Total required core .....

Option A:	
Required core .....	24
Elective area* .....	6
Written comprehensive exams required .....	0

Hours required for graduation .....

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 .....

### MBA IN ACCOUNTING

The program is designed to prepare graduate students for careers in public, industrial, or governmental accounting.

**Admission Requirements:** In addition to the general admission requirements set forth above, the student must have completed work in the following areas:

Area	Credit Hrs.
Accounting .....	14
Economics .....	9
Business Finance .....	3
Business Law .....	3
Management .....	3
Marketing .....	3
Statistics .....	3
Math through Calculus .....	-



**The Program of Study:** Generally, each candidate must complete one of the following options. Other programs must be arranged with the advice of the graduate committee. Candidates who wish to qualify for a C.P.A. certificate after passing the Uniform C.P.A. Exam, upon completion of their degree requirements must consult with the Director of Graduate Programs concerning the regulations of the State of Kansas. Individual copies of these regulations may be obtained from the Board of Accountancy, First National Bank Tower, Topeka, Kansas 66603.

<b>Required:</b>		
305 820	Behavioral Management Theory .....	3
305 850	Financial Controls for Business .....	3
305 860	Accounting Theory 1 .....	3
305 890	Decision Theory of the Firm .....	3
305 891	Legal and Social Environment .....	3
		<hr/> 15
<b>Select one:</b>		
305 892	Research Methods in Business .....	(3)
305 893	Business Operations Analysis .....	(3) 3
<b>Select four:</b>		
305 660	CPA Problems .....	(3)
305 661	CPA Theory and Law .....	(3)
305 663	Auditing 2 .....	(3)
305 861	Accounting Theory 2 .....	(3)
305 862	Tax Planning and Research .....	(3) 12
Written comprehensive exams required .....		0
		<hr/> 30

## Courses in Business and Accounting

### UNDERGRADUATE CREDIT

**305 101. 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.

**305 110. 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.

**305 111. Production Typing.** (3) I, II. Develop increased speed and accuracy in production typing — legal forms, statistical materials and letters — within acceptable time limits. Pr.: 305 110.

**305 112. 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.

**305 202. 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.

**305 210. Office Machines.** (3) II. Instruction in electronic and 10-key calculators, techniques in machine dictation and transcription, and layout planning and production on duplicating machines.

**305 212. Intermediate Shorthand.** (3) I, II. Emphasis on writing speed and the introduction of transcription. Pr.: 305 110 or concurrent enrollment and 305 112 or one unit of high school shorthand.

**305 213. 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.: 305 110 and 212.

**305 260. Fundamentals of Accounting.** (4) I, II, S. The preparation and use of accounting records for individual, partnership and corporate business organizations. Pr.: Sophomore standing.

**305 261. 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.: 305 260.

**305 270. Managerial and Cost Controls.** (3) I, II, S. Development and use of accounting information for management control. Covers statement analysis, cash and funds flows, cost analysis and budgeting. Pr.: 305 260.

**305 271. 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.: 305 260.

**305 292. 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.

**305 293. Black Business Studies.** (2-3) Intercession, 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.

**305 294. World Business - A Field Study.** (2) Spring Intercession. A concentrated study tour of businesses in selected world industrial centers outside the continental United States.

**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.

**305 310. 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.: 305 213.

**305 311. 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.

**305 350. 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.

**305 361. Intermediate Accounting II.** (3) I, II, S. Statement analysis and special problems peculiar to the corporate form of organization. Pr.: 305 261.

**305 391. Administrative Communications.** (3) I, II. Preparation of business communications, reports and correspondence, and analysis of communication systems within an enterprise structure. Pr.: 229 120 and 281 106.

**305 392. 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.: 305 292.

**305 399. Honors Seminar in Business.** (1) I, II. Readings and discussions on selected topics. A maximum of four hours credit may be obtained.

**305 420. 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.

**305 421. Production Management.** (3) I, II, S. Production management as it relates to capital investment, inventory control, purchasing, plant layout and site location. Pr.: 225 120, 285 350 and 305 260.

**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.

**305 450. Business Finance.** (3) I, II, S. Emphasis on analyzing the timing, risk and return of the different forms of financing. Pr.: 225 120, 285 350 and 305 270.

**305 460. Advanced Accounting.** (3) II. Accounting for partnerships, installment sales, consignments, consolidated statements, and other special topics. Pr.: 305 260.

**305 461. 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.: 305 260 and junior standing.

**305 465. 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.: 305 361, 461, 662, and consent of instructor.

**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.: 305 420, 440, 450, completion of junior year and consent of instructor.

#### UNDERGRADUATE AND GRADUATE CREDIT

**305 520. Organizational Behavior.** (3) I. Examination of psychological and sociological variables important in understanding individual motivation, group functioning, change, creativity and leadership in organizations. Pr.: 305 420 or 531 or consent of instructor.

**305 521. Quantitative Management.** (3) I. Emphasis on quantitative techniques, models and the integrative nature of management systems. Includes PERT, CPM, linear programming and decision risk analysis. Pr.: 245 500 or 220, 285 350 and 305 420.

**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.: Junior standing.

**305 531. Personnel and Wage Administration.** (3) I, II. Personnel program and its operational processes of manpower planning, recruiting, testing, development, and wage administration. Analysis of role of personnel department in the organization with emphasis on problem solving.

**305 540. 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.

**305 541. 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.

**305 543. 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.

**305 550. Financial Institutions.** (3) I. 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.: 305 450.

**305 551. 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.: 245 500 or 220, 285 350 and 305 450.

**305 552. 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.

**305 590. Women In Business.** (3) I. A study of the legal and economic impact of women in the work force. The social and sexual dimensions of occupations and personnel procedures relating to women in modern industrial society. Pr.: Junior standing.

**305 622. Decision Analysis.** (3) II. Systematic application of decision theory, input-output analysis and quantitative techniques to business problems and policy. Includes cases that integrate concepts and techniques, develop analytic skills and creative investigation. Pr.: 305 521.

**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. Labor Arbitration.** (3) II. Role of arbitration and mediation in settling labor-management disputes. Intensive analytical probe into disputed areas including discipline, wages, discrimination and working conditions. Role playing and case research emphasized. Pr.: 305 630.

**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.

**305 641. Marketing Logistics.** (3) II. Operational analysis of the logistics system including locational analysis, inventory control, production scheduling and transportation. Utilizes concepts and techniques from economics and operations research to analyze logistics systems. Pr.: 305 540 or 640.

**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.: 305 640, or concurrent enrollment in 540 or 640.

**305 643. Promotional Administration.** (3) II. Focuses on decisions made in managing the promotional mix. Relies on the concepts of economics, behavioral science and mathematics. Stresses analytical decision-making techniques in dealing with promotional problems. Pr.: 305 540.



**305 650. Capitol Budgeting.** (3) II. 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.: 245 500, 285 350 and 305 450.

**305 651. Financial Management.** (3) II. Analysis of problems in advanced financial planning and control. Pr.: 245 500, 285 350 and 305 450.

**305 660. C.P.A. Problems.** (3) I. A study of problems in various C.P.A. examinations. Pr.: 305 361 and consent of instructor.

**305 661. 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.: 305 292 and 361.

**305 662. Auditing I.** (3) I. Theory and procedure used in balance sheet audits. Pr.: 305 361.

**305 663. 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.: 305 662 and consent of instructor.

**305 690. 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.

**305 691. 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.: 285 350 or consent of instructor.

**305 695. 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; 305 420, 440 and 450.

**305 696. 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.

**305 698. Problems in Business Administration.** Credit arranged. I, II, S. Pr.: Background of courses needed for the problem undertaken.

**305 699. Problems in Accounting.** Credit arranged. I, II, S. Pr.: Background of courses needed for the problem undertaken.

**305 770. Controllorship.** (3) I. Emphasis on control of operation through cost analysis, internal and external reporting, and income determination concepts. Pr.: 305 270.

## GRADUATE CREDIT

**305 820. Behavioral Management Theory.** (3) I, S. The development of the behavioral bases of individual and group

functioning in business, governmental, educational and other organizations. Pr.: 305 420 or 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. Financial Controls for Business.** (3) II, S. 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.: 305 450.

**305 860. 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.

**305 861. 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.

**305 862. 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 305 461.

**305 870. 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 305 260.

**305 890. 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, 285 350 and 305 260.

**305 891. 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.

**305 892. 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.: 285 350 and 305 420.

**305 893. 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.

**305 898. Research in Business Administration.** Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken.

**305 899. Thesis Research.** Credit arranged. I, II, S. Pr.: Sufficient background to pursue line of research undertaken and consent of instructor.





## THE COLLEGE OF

## Education

Samuel R. Keys, Dean

Margaret C. Bloomquist, Assistant to the Dean and  
Director of Student Personnel 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.

**Pre-Education.** For the freshman and sophomore years, students preparing to teach in the elementary school will enroll in the Pre-Elementary Education Curriculum (270) in the College of Arts and Sciences.

For the freshman and sophomore years, students preparing to teach in the secondary school will enroll in the Pre-Secondary Education Curriculum (271) in the College of Arts and Sciences or the Pre-Business Education Curriculum (376) in the College of Business Administration. Exceptions are students majoring in agricultural education, home economics education, music education, and physical education who must enroll in a curriculum within another college. Refer to the section on Secondary Education Major Fields.

Freshmen and sophomores are advised by a College of Education pre-education advisor in Room 110 Holton Hall. Refer to the sections Bachelor of Science in Elementary Education and Bachelor of Sciences page 169 for further information.

**Transfer Students.** Students transferring as freshmen or sophomores will be enrolled in the Pre-Education Curriculum as outlined in the Pre-Education paragraph. Students transferring as juniors or seniors (53 hours minimum) will enroll directly into the College of Education. Elementary education majors will enroll in Curriculum 410. Secondary education majors will enroll in an appropriate curriculum as indicated in the Section Secondary Education Major Fields.

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 the selection of courses which will meet Kansas State University degree requirements.

Students planning to transfer are invited to write to either the Director of the Pre-Education Advisement Center, Holton Hall Room 110, or the Director of Student Personnel Services, Holton Hall Room 111.

## PROGRAMS IN TEACHER EDUCATION

The Teacher Education Programs are designed to develop competencies essential for teaching. The Programs in elementary education and in secondary education require (1) General education studies (2) Professional education studies and (3) Major studies, as specifically outlined in the sections entitled Bachelor of Science in Elementary Education and Bachelor of Science. All Programs have met program approval by the Kansas State Department of Education.

*All students wishing to teach in elementary or secondary schools must fully complete one of the Approved Programs.*

Students completing a Teacher Education Program in secondary education which may be part of requirements for a degree granted by another college at KSU must complete all requirements of the Approved Teacher Education Program. Elementary education is a degree program in the College of Education only.

## ADMISSION TO THE TEACHER EDUCATION PROGRAMS

Any student intending to teach in elementary or secondary schools must have the Application for Admission to a Teacher Education Program filed and approved before the student may enroll in any of the following courses:

405 315	Educational Psychology II
415 316	Introduction to Instructional Media
415 470	Science for Elementary Schools
415 471	Language Arts for Elementary Schools
415 472	Social Studies for Elementary Schools
415 473	Mathematics for Elementary Schools
also any course which is a part of the Professional Semester	

The Application for Admission to a Teacher Education Program must be approved before a change in curriculum into the College of Education may be

completed for pre-education majors. The application forms are available in the Office of Student Personnel Services, College of Education, Holton Hall Room 111.

**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 only when the application is filed at the time of initial 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 only when the application is filed at the time of initial 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, 220.
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.

## BACHELOR OF SCIENCE IN ELEMENTARY EDUCATION

Students preparing to teach in the elementary school are enrolled in the Pre-Elementary Education Curriculum (270) 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 ap-



plications are approved, students are accepted into the Teacher Education Program and into the College of Education. Students are reassigned from a pre-education adviser to an elementary education adviser.

#### GENERAL EDUCATION REQUIREMENTS

<b>Communications</b>	
229 100 English Composition I .....	3
229 120 English Composition II .....	3
Speech .....	2
<b>Social Sciences</b>	
273 110 General Psychology .....	3
Courses selected from Economics, Geography (except Physical Geography 220 and 221), History, Political Science, and Sociology and Anthropology .....	
	9
<b>Literature or Language</b>	
Courses selected from Literature or Modern Language (A combination of the two is not acceptable.) .....	
	5
<b>Natural Sciences</b>	
Biological Sciences .....	8
Physical Sciences (Mathematics may not apply) .....	8
(One laboratory course is required.)	
<b>Mathematics</b>	
Mathematics .....	3
(Topics in Mathematics for Elementary School Teachers 245 508 is recommended.)	
<b>Physical Education</b>	
261 001 Concepts in Physical Education .....	0
261 Lifetime Sports Activity .....	0
<b>General Education Electives</b>	
May be additional courses from the above and / or general religion, philosophy, and art and music history, literature, and appreciation of art and music .....	
	6
<hr/>	
Total hours required in General Education .....	50

#### PROFESSIONAL AND SPECIALIZED COURSES

Following courses may be taken before student is admitted to the Teacher Education Program:

405 215 Educational Psychology I .....	3
415 300 Principles of Elementary Education .....	3
209 170 Art for Elementary Schools .....	3
257 405 Music for Elementary Teachers .....	3
229 540 Literature for Children .....	3
261 201 Personal and Community Health .....	3
261 369 P.E. for Elem. School Teachers .....	3

Student must be admitted to the Teacher Education Program before enrolling in the following courses:

405 315 Educational Psychology II .....	3
415 316 Introduction to Instructional Media .....	1
415 470 Science for Elementary Schools .....	3
415 471 Language Arts for Elementary Schools .....	3
415 472 Social Studies for Elementary Schools .....	3
415 473 Mathematics for Elementary Schools .....	3
415 474 Elementary School Reading .....	3
415 475 Elementary School Reading Lab. ....	1
405 611 Educational Sociology .....	3

<b>Clinical Experiences:</b>	
415 585 Teaching Participation in Elementary School .....	8

Total hours required in Professional and Specialized courses .... 49

#### AREA OF CONCENTRATION

The hours selected from the field of concentration are in addition to those taken to meet General Education Requirements. Concentrations are offered in 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)	
Learning Disabilities, Emotionally Disturbed	
Total hours required in the Area of Concentration ....	15

#### ELECTIVES

Remaining hours in the degree may be taken as additional hours in the major, general education and related courses, and free electives.

Total hours required in Electives .....

Total credit hours required for graduation .....

#### BACHELOR OF SCIENCE

**Curricula in Secondary Education.** For the freshman and sophomore years, students preparing to teach in the secondary school are enrolled in the Pre-Secondary Education Curriculum (271) in the College of Arts and Sciences or the Pre-Business Education Curriculum (376) in the College of Business Administration. Exceptions are students majoring in agricultural education, home economics education, music education, and physical education who do not enroll in a pre-education curriculum. Refer to section on Secondary Education Major Fields.

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 from the Pre-Education Adviser to a Secondary Education adviser 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.

#### GENERAL EDUCATION REQUIREMENTS

<b>Communications</b>	
229 100 English Composition I .....	3
229 120 English Composition II .....	3
Speech .....	2
<b>Social Sciences</b>	
273 110 General Psychology .....	3
Courses selected from Economics, Geography (except Physical Geography 220 and 221), History, Political Science, and Sociology and Anthropology .....	
	9
<b>Literature or Language</b>	
Courses selected from Literature or Modern Language .....	
(A combination of the two is not acceptable.)	
	5
<b>Natural Sciences</b>	
At least one course in Biological Science and one course in Physical Science. May include up to four hours in Mathematics, but Mathematics will not substitute for the Physical Science course. (One laboratory course is required.) .....	
	16
<b>Physical Education</b>	
261 001 Concepts in Physical Education .....	0
261 Lifetime Sports Activity .....	0
<b>General Education Electives</b>	
May be additional courses from the above and / or general religion, philosophy, and art and music history, literature, and appreciation of art and music.	
<hr/>	
Total hours required in General Education .....	50

#### MAJOR

(Refer to section Secondary Education Major Fields) ..... Credit Variable.

#### PROFESSIONAL EDUCATION

(Completion of these professional education hours alone will not qualify a student for certification. The entire Approved Teacher Education Program must be completed. See page 168.)

The following course may be taken before student is admitted to the Teacher Education Program:

405 215 Educational Psychology I .....	3
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(Professional Education courses continued next page)

A student must be admitted to the Teacher Education Program before enrolling in the following courses:

405 315	Educational Psychology II .....	3
415 316	Introduction to Instructional Media .....	1
405 611	Educational Sociology .....	3
415 451	Principles of Secondary Education .....	3
415 476	Methods of Teaching in the Secondary School .....	3

**Clinical Experiences:**

415 586	Teaching Participation in the Secondary School .....	8
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Total hours required in Professional Education .....

**ELECTIVES**

Remaining hours in the degree may be taken in additional hours in the major, general education and related courses, and free electives.

Total hours required in electives .....	Credit Variable.
Total hours required in electives .....	Credit Variable.

Total credit hours required for graduation .....

**SECONDARY EDUCATION MAJOR FIELDS**

**AGRICULTURAL EDUCATION (AED 075)**

Students planning to be agricultural education majors will be enrolled in and receive their degree from the College of Agriculture. See page 27.

**ART EDUCATION (SED 420)**

Art	209 095	Art Assembly .....	0
Art	209 096	Art Education Sem. ....	0
Art	209 100	Design I .....	2
Art	209 190	Drawing I .....	2
Art	209 195	Survey Art History I .....	3
Art	209 196	Survey Art History II .....	3
Art	209 200	Design II .....	2
Art	209 205	Commercial Art Tech. ....	2
Art	209 210	Drawing II .....	2
Art	209 220	Water Color I .....	2
Art	209 225	Figure Drawing I .....	2
Art	209 230	Sculpture I .....	2
Art	209 235	Printmaking I .....	2
Art	209 245	Oil Painting I .....	2
Art	209 265	Ceramics I .....	2
Art	209 270	Metalcrafts and Jewelry ....	2
Art	209 290	Lettering .....	2
Art	209 545	Twentieth Century Art .....	3
Art	209 600	History I .....	3
Art	209 690	Design III .....	2
Art	209 690	Techniques in Teaching Art ..	2

Additional hours in one of the following specialized art subjects: oil, prints, ceramics, sculpture, art history, metalcrafts and jewelry .....

**BUSINESS EDUCATION (SED 421)**

The following four courses may satisfy the social science general education requirements. (See page 169.)

Econ.	225 110	Economics I .....	3
Econ.	225 120	Economics II .....	3
Pol. Sci.	269 225	U.S. Politics .....	3
Soc.	277 211	Intro. to Sociology .....	3
Math.	245 100	College Algebra .....	3
C. Sci.	286 200	Fund. of Computer .....	3
		Programming .....	3
Fam. Econ.	630	Family Economics electives ..	3
B.A.	305 110	Intermediate Typing .....	3
B.A.	305 111	Production Typing .....	3
B.A.	305 210	Office Machines .....	3
B.A.	305 260	Fund. of Accounting .....	3
B.A.	305 270	Managerial Accounting .....	3
B.A.	305 292	Business Law I .....	3
B.A.	305 310	Office Practice .....	3
B.A.	305 311	Office Management .....	3
B.A.	305 392	Business Law II .....	3
B.A.	305 420	Management Concepts .....	3
B.A.	305 440	Marketing .....	3
B.A.	305 450	Business Finance .....	3
		OR	
Econ.	225 530	Money and Banking .....	3

Minimum of 6 hours from one of the following options:

B.A.	305 112	Shorthand .....	4
B.A.	305 212	Intermediate Shorthand .....	3
B.A.	305 213	Transcription I .....	3
		OR	
B.A.	305	Additional hours of .....	6
		Accounting .....	6

**ENGLISH (SED 422)**

Three of the following four courses:

Engl.	229 260	English Survey I .....	3
Engl.	229 265	English Survey II .....	3
Engl.	229 280	American Survey I .....	3
Engl.	229 285	American Survey II .....	3
Engl.	229 400	Advanced Comp. ....	3
Engl.	229 500	English Comprehensive .....	0
Engl.	229 530	Modern English Grammar ..	3
Engl.	229 545	Literature for Adolescents ..	3
Engl.	229 650	Shakespearean Drama I .....	3
		OR	
Engl.	229 652	Shakespearean Drama II .....	3
Engl.	229	Literature electives, 6 hours at .....	9
		600 level and above .....	9

For English majors who need 12 hours for certification to teach Journalism, the following courses are suggested:

Journ.	289 235	Reporting I .....	3
Journ.	289 285	Reporting II .....	3
Journ.	289 330	Editing I .....	3
Journ.	289 665	Law of Mass Communications ..	3

**HOME ECONOMICS EDUCATION (HED 672)**

Students will be enrolled in and receive their degree from the College of Home Economics. See page 219. Completion of this Program satisfies State of Kansas requirements for Vocational Home Economics certification.

**JOURNALISM (SED 422)**

Journ.	289 235	Reporting I .....	3
Journ.	289 285	Reporting II .....	3
Journ.	289 330	Editing I .....	3
Journ.	289 665	Law of Mass Communications ..	3

18 hours of Journalism electives; the following courses are suggested:

Journ.	289 310	Photojournalism I .....	3
Journ.	289 320	Principles of Advertising .....	3
Journ.	289 335	Editing II .....	3
Journ.	289 360	Publications Practice .....	1-4
Journ.	289 510	Yearbook Editing and .....	2
		Management .....	2
Journ.	289 555	Advertising Copy and Layout ..	3
Journ.	289 605	Supervision of School .....	3
		Publications .....	3
Journ.	289 610	Interpretation of Contemp. ..	3
		Affairs .....	3
Journ.	289 660	History of Journalism .....	3
Journ.	289 685	The Journalist in a .....	3
		Free Society .....	3

**MATHEMATICS (SED 424)**

Stat.	285 320	Elements of Statistics .....	3
		OR	
Stat.	285 510	Introductory Probability and ..	3
		Statistics I .....	3
Math.	245 220	Analytic Geo. and Calc. I .....	4
Math.	245 221	Analytic Geo. and Calc. II .....	4
Math.	245 222	Analytic Geo. and Calc. III .....	4
Math.	245 240	Series and Differential .....	4
		Equations .....	4

18 hours of Mathematics courses numbered 400-799; the following courses are recommended:

Math.	245 511	Intro. to Algebraic Systems ..	3
Math.	245 512	Intro. to Modern Algebra I .....	3
Math.	245 513	Intro. to Modern Algebra II ..	3
Math.	245 570	History of Mathematics .....	3
Math.	245 572	Modern Geometry .....	3
Math.	245 573	Foundations of Geometry .....	3
Math.	245 619	Foundations of Analysis .....	3
Math.	245 717	The Real Number System .....	3
Math.	245 791	Topics in Mathematics for .....	3
		High School Teachers .....	3

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.

**PSYCHOLOGY (SED 426)**

Stat.	285 320	Elements of Statistics .....	3
		OR	
Stat.	285 330	Stat. for Soc. Sc. Majors .....	3
A&F	405 721	Mental Hygiene in the .....	3
		School Community .....	3
Psych.	273 110	General Psychology .....	3
Psych.	273 250	Experimental Methods in .....	3
		Psychology .....	3
Psych.	273 420	Personality Development .....	3
Psych.	273 435	Social Psychology .....	3
Psych.	273 460	Fundamentals of Learning .....	3
		OR	
Psych.	273 475	Principles in Motivation .....	3
		OR	
Psych.	273 480	Fundamentals of Perception ..	3
Psych.	273	Psychology electives .....	6
		(excluding Ed. Psych. I & II)	

Completion of a second teaching field based on minimum College of Education requirements.



**MODERN LANGUAGES (SED 425)**

30 hours in one language at 200 level and above.  
A second teaching field is recommended.

**MUSIC EDUCATION (MED 272)**

Students planning to be music education majors will be enrolled in and receive their degree from the College of Arts and Sciences. See page 75.

**PHYSICAL EDUCATION (MPE 273 and WPE 274)**

Students planning to be physical education majors will be enrolled in and receive their degree from the College of Arts and Sciences. See page 75.

**SPEECH (SED 429)**

30 hours in Speech to include the following:

**A. 21 hours from one of the following major areas of interest:**

Speech	281	General Speech
Speech	282	Linguistics
Speech	283	Speech Pathology / Audiology
Speech	284	Theatre and Interpretation

**B. 9 hours in Speech courses outside the major area of interest.**

Note: To satisfy Kansas State certification requirements, each candidate must complete one course in each of the following four areas:

Speech	281	Public speaking
Speech	281	Discussion and debate
Speech	284	Theatre
Speech	284	Oral interpretation

**NATURAL SCIENCE MAJORS****BIOLOGICAL SCIENCE (SED 427)**

AS&I	005 500	Genetics	3
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**Supporting Courses:****Chemistry Option A:**

Chem.	221 110	General Chemistry	5
Chem.	221 190	Elem. Organic Chemistry	3
Chem.	221 191	Elem. Organic Chem. Lab.	2
Biochem.	020 200	Elem. Biochemistry	5

**Chemistry Option B:**

Chem.	221 210	Chemistry I	5
Chem.	221 230	Chemistry II	3
Chem.	221 250	Chemistry II Lab.	2
Chem.	221 350	General Organic Chemistry	3

Geol.	234 512	Earth Science	4
Phys.	265 115	Descriptive Physics	4

Biol.	215 198	Principles of Biology	4
Biol.	215 201	Organismic Biology	4
Biol.	215 450	Microbiology	4
Biol.	215 530	Environmental Biology	3
Biol.	215 535	Cell Biology	4

**7 hours of Biology electives which may be selected from the following:**

Entom.	030 311	Gen. Entomology	3
Biol.	215 420	Developmental Biology I	3
Biol.	215 640	Human Heredity and Evolution	2
Biol.	215 660	Evolution	3

**CHEMISTRY (SED 427)**

Biol.	215 198	Principles of Biology	4
Biol.	215 201	Organismic Biology	4
Math.	245 220	Analytic Geo. and Calc. I	4
Math.	245 221	Analytic Geo. and Calc. II	4

**Physics Option A:**

Phys.	265 113	General Physics I	4
Phys.	265 114	General Physics II	4

**Physics Option B:**

Phys.	265 214	Engineering Physics II	4
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Chem.	221 210	Chemistry I	5
Chem.	221 230	Chemistry II	3
Chem.	221 271	Chemical Analysis	4
Chem.	221 350	Gen. Organic Chemistry	3
Chem.	221 351	Gen. Organic Chemistry Lab.	2
Chem.	221 500	Descriptive Phys. Chemistry	3

(A substitution may be Phys. Chem. 585 & 586.)			
Chem.	221	Chemistry electives	5

**Additional courses highly recommended:**

Math.	245 222	Analytic Geo. and Calc. III	4
Chem.	221 799	Problems In Chemistry	Credit Variable

**EARTH SCIENCE (SED 427)**

Biol.	215 198	Principles of Biology	4
Biol.	215 201	Organismic Biology	4
Chem.	221 210	Chemistry I	5
Chem.	221 230	Chemistry II	3
Chem.	221 250	Chemistry II Lab.	2
Geol.	234 100	Geology I	3
Geol.	234 130	Elem. Geol. Lab.	1
Geol.	234 512	Earth Science	4
Geol.	234 520	Geomorphology	4
Geol.	234 560	Mineralogy	4
Geog.	235 220	Physical Geography I	4
Math.	245 100	College Algebra	3
Math.	245 150	Plane Trigonometry	3
Phys.	265 113	General Physics I	4
Phys.	265 114	General Physics II	4
Phys.	265 191	Descriptive Astronomy	3
Phys.	265 193	Descriptive Meteorology	3

**PHYSICAL SCIENCE (SED 427)**

Biol.	215 198	Principles of Biology	4
Biol.	215 201	Organismic Biology	4
Chem.	221 210	Chemistry I	5
Chem.	221 230	Chemistry II	3
Chem.	221 250	Chemistry II Lab.	2
Chem.	221 350	General Organic Chem.	3
Chem.	221 351	General Organic Chem. Lab.	2
Geol.	234 100	Geology I	3
Geol.	234 512	Earth Science	4
Math.	245 220	Analytic Geo. and Calc. I	4
Math.	245 221	Analytic Geo. and Calc. II	4

**Physics Option A:**

Phys.	265 113	General Physics I	4
Phys.	265 114	General Physics II	4

**Physics Option B:**

Phys.	265 213	Engineering Physics I	5
Phys.	265 214	Engineering Physics II	5

**6 hours Physics electives selected from the following:**

Phys.	265 191	Descriptive Astronomy	3
Phys.	265 193	Descriptive Meteorology	3
Phys.	265 451	Modern Physics	3
Phys.	265 506	Physics Lab. I	3

**PHYSICS (SED 427)**

Biol.	215	One Biology course	3-4 (selection must be approved by the Education adviser)
Chem.	221 210	Chemistry I	5
Chem.	221 230	Chemistry II	3
Chem.	221 250	Chemistry II Lab.	2
Math.	245 220	Analytic Geo. and Calc. I	4
Math.	245 221	Analytic Geo. and Calc. II	4
Math.	245 222	Analytic Geo. and Calc. III	4
Math.	245 240	Series & Differential Equations	4
Phys.	265 017	Colloquium in Physics	0
Phys.	265 213	Engineering Physics I	5
Phys.	265 214	Engineering Physics II	5
Phys.	265 506	Physics Lab. I	3
Phys.	265 516	Physics Lab. II	3
Phys.	265 522	Mechanics I	3
Phys.	265 532	Electricity and Magnetism	3
Phys.	265 551	Atomic Physics	3

**SOCIAL SCIENCE MAJORS****ECONOMICS (SED 428)\***

Geog.	235 100	World Regional Geography	3
OR			
Geog.	235 300	Geography of the Extractive Industries	3
OR			
Geog.	235 310	Geography of Manufacturing and Commerce	3
Hist.	241 251	U.S. History to 1877	3
Hist.	241 252	U.S. History since 1877	3
Math.	245 100	College Algebra	3
Pol. Sci.	269 110	Principles of Pol. Sci.	3
Soc.	277 211	Intro. to Sociology	3
Stat.	285 320	Elements of Statistics	3
Econ.	225 110	Economics I	3
Econ.	225 120	Economics II	3
Econ.	225 510	Inter. Macroeconomics	3
Econ.	225 520	Inter. Microeconomics	3

13 hours of Economics courses numbered 500 and above, selected with advice of Economics and Education advisers.

(Economics Curriculum on next page)

\*Note: At least 12 hours of U.S. History or 12 hours of Political Science or 12 hours of World History must be completed prior to Student Teaching.

## One of the following four courses:

B.A.	305 260	Fund. of Accounting	4
Math.	245 220	Analytic Geo. and Calc. I	4
Math.	245 500	Intro. to Analytic Processes	3
Stat.	285 701	Statistical Methods II	3

## Social Science electives:

Hist.	241	Additional courses in U.S. History	6
Pol. Sci.	269	OR Political Science courses	9

**GEOGRAPHY (SED 428)\***

Hist.	241 101	Western Civ. I	3
Hist.	241 102	Western Civ. II	3
Hist.	241 251	U.S. History to 1877	3
Hist.	241 252	U.S. History since 1877	3
Hist.	241	World History courses	6
Geog.	235 220	Phys. Geography I	4
Geog.	235 221	Phys. Geography II	4
Geog.	235 300	Geography of Extractive Industry	3
Geog.	235 310	Geography of Manufacturing and Commerce	3
Geog.	235 360	Cartography	3
Geog.	235 480	Pro-Seminar in Geography	2
Geog.	235	Additional Geography courses 400 level and above	9
Pol. Sci.	269 110	Principles of Pol. Sci.	3
Soc.	277 211	Intro. to Sociology	3

**HISTORY (SED 428)\***

Econ.	225 110	Economics I	3
Geog.	235 100	World Regional Geog.	3
Pol. Sci.	269 110	Principles of Pol. Sci.	3
Pol. Sci.	269	Pol. Sci. elective	3
Soc.	277 211	Intro. to Sociology	3
Hist.	241 101	Western Civ. I	3
Hist.	241 102	Western Civ. II	3
Hist.	241 251	U.S. History to 1877	3
Hist.	241 252	U.S. History since 1877	3
Hist.	241 397	Pro-Seminar in Historiography	3
Hist.	241 398	Senior Seminar	3
Hist.	241	OR Approved Alternative	3
Hist.	241	OR History Comprehensive	0

12 hours of courses numbered 400 and above distributed in three of the following fields:

- Ancient, Medieval and Early Modern Europe
- Modern Europe including Britain
- Third World (Asia, Africa, Latin America)
- The United States
- History of Science, History of Technology, Military History

**POLITICAL SCIENCE (SED 428)\***

Econ.	225 110	Economics I	3
Geog.	235 100	World Regional Geography	3
Hist.	241 101	Western Civ. I	3
Hist.	241 102	Western Civ. II	3
Hist.	241 251	U.S. History to 1877	3
Hist.	241 252	U.S. History since 1877	3
Soc.	277 211	Intro. to Sociology	3
Pol. Sci.	269 110	Principles of Pol. Sci.	3
Pol. Sci.	269	Political Science courses	21

**SOCIOLOGY (SED 428)\***

Econ.	225 110	Economics I	3
Geog.	235 100	World Regional Geog.	3
Hist.	241 251	U.S. History to 1877	3
Hist.	241 252	U.S. History since 1877	3
Pol. Sci.	269 110	Principles of Pol. Sci.	3
Pol. Sci.	269	Political Science elective*	3
Stat.	285 320	Elements of Statistics	3
Soc.	277 211	Intro. to Sociology	3
Soc.	277 420	Methods of Soc. Res. I	4
Soc.	277 460	Contemp. Soc. Theory	3
Soc.	277	Sociology electives 400 level and above	9**
Soc.	277	Sociology electives numbered 500-799**	9

Social Science electives (all either U.S. Hist. or Pol. Sci.) ..... 6

\*Note: At least 12 hours of U.S. History or 12 hours of Political Science or 12 hours of World History must be completed prior to Student Teaching.

\*\*Selected in consultation with Education adviser.

**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 usually occurs in the fall or spring semester of the senior year. There is no Teaching Participation experience offered during summer sessions.

Students desiring to be recommended for certification by KSU must earn credit for Teaching Participation in residence. Those students who have had any secondary methods course in another college or university will be required to audit the equivalent course at Kansas State University.

**APPLICATION FOR STUDENT TEACHING**

Each student who plans to enroll in Teaching Participation in the Elementary or Secondary School must submit an "Application for Student Teaching" to the College of Education Coordinator of Student Teaching not later than December 20 of the year preceding the professional semester. This application must be made even though all admission requirements are not satisfied at the time of the application. The application will be obtained from the College of Education adviser and returned to the Coordinator of Student Teaching. Junior and senior transfer students from other educational institutions should file the application immediately upon enrollment.

**ADMISSION TO THE PROFESSIONAL SEMESTER**

The Coordinator of Student Teaching will notify applicants of their admission to the Professional Semester. Students will be approved for the Professional Semester when the requirements listed below have been met. If the Coordinator of Student Teaching notifies a student that all requirements for the professional semester have not been satisfied, the student may request through the College of Education Adviser that his application be postponed for one semester. Only one postponement is permitted without filing a new "Application for Student Teaching."

**A. Requirements for ALL applicants to the Professional Semester:**

- Full admittance to a Teacher Education Program.
- Completion of 90 semester hours.
- An overall grade-point average of 2.2 in all course work attempted at KSU.
- Satisfactory completion of:
  - 405 215 Educational Psychology I
  - 405 315 Educational Psychology II
  - 415 316 Introduction to Instructional Media
- Recommendation by the College of Education Adviser.
- Clearance by the Dean of Students. (Obtained by the Coordinator of Student Teaching.)
- Physical Examination by the Student Health Center.
  - Physicals are taken the semester preceding the professional semester.
  - Appointments will be made according to a published schedule.

**B. Additional requirements:****1. Applicants to the SECONDARY PROFESSIONAL SEMESTER:**

A grade-point average of 2.5 in all resident work attempted at KSU in the teaching field is required. Psychology majors must have the 2.5 grade-point average in the required second teaching field.

**2. Applicants to the ELEMENTARY PROFESSIONAL SEMESTER:**

Satisfactory completion of the following courses is required:

- |         |  |
|---------|--|
| 415 470 | Science for the Elementary School        |
| 415 471 | Language Arts for the Elementary School  |
| 415 472 | Social Studies for the Elementary School |
| 415 473 | Mathematics for the Elementary School    |



## PROFESSIONAL SEMESTER OPTIONS

**CONVENTIONAL PROFESSIONAL SEMESTER.** This semester involves eight weeks in the classroom on campus and eight weeks in student teaching. Normally, students will commute from Manhattan to student teaching positions, except in the case of Vocational Agriculture and Vocational Home Economics and when students choose to live off campus.

The Conventional Professional Semesters are shown below:

### ELEMENTARY PROFESSIONAL SEMESTER

415 474	Elementary School Reading .....	3
415 475	Reading Laboratory .....	1
405 611	Educational Sociology .....	3
415 585	Teaching Participation in Elementary School .....	8
		15

### SECONDARY PROFESSIONAL SEMESTER

415 586	Teaching Participation in Secondary School .....	8
415 451	Principles of Secondary Education .....	3
405 611	Educational Sociology .....	3
415 476	Methods of Teaching in Secondary School .....	3
		17

### AGRICULTURAL EDUCATION PROFESSIONAL SEMESTER

410 586	Teaching Participation in Secondary School .....	8
410 621	Program Planning in Vocational Education .....	3
410 500	Methods of Teaching Agriculture .....	2
506 599 & 506 553	Courses in Major .....	6
		19

### HOME ECONOMICS EDUCATION PROFESSIONAL SEMESTER

410 586	Teaching Participation in Secondary School .....	8
410 621	Program Planning in Vocational Education .....	3
410 550	Methods of Teaching Home Economics .....	2
415 316	Introduction to Instructional Media .....	1
		14

### MUSIC EDUCATION PROFESSIONAL SEMESTER

415 583	Teaching Participation in Elementary Music .....	4
415 584	Teaching Participation in Secondary Music .....	4
415 451	Principles of Secondary Education .....	3
405 611	Educational Sociology .....	3
415 316	Introduction to Instructional Media .....	1
	Courses in Major .....	2
		17

### PHYSICAL EDUCATION PROFESSIONAL SEMESTER (SECONDARY)

415 586	Teaching Participation in Secondary Schools .....	8
415 451	Principles of Secondary Education .....	3
405 611	Educational Sociology .....	3
415 476	Methods of Teaching in Secondary Schools .....	3
		17

### PHYSICAL EDUCATION PROFESSIONAL SEMESTER (ELEMENTARY)

415 585	Teaching Participation in Elementary Schools .....	8
405 611	Educational Sociology .....	3
415 469	Physical Education for the Elementary Schools .....	3
		14

The following Professional Semester options are experimental programs being evaluated at the present time, with all components to be offered on the credit/no credit basis only.

**The EEST Program.** The Early Experience in Student Teaching Program is a semester-long elementary program with emphasis in reading. Information about the program is disseminated to all elementary education majors the semester prior to Student Teaching. Special applications are necessary.

**The MITEC Program.** There are Multi-Institutional Teacher Education Centers located in Topeka and

Kansas City. The Kansas City Center includes both Kansas City, Kansas, and Shawnee Mission. This is a voluntary, full semester off-campus program. The professional semester is completed in the Centers. Students must make special application for this program.

**The CUTE Program.** The Cooperative Urban Teacher Education Program is in an urban educational setting in Wichita in which the students spend a full semester off campus. Only five or six students are selected by application for this program.

**The Off-Campus English Program.** This is a program in which students in English, speech and journalism are placed in the Manhattan, Junction City and Chapman school systems for the entire semester. This program involves practical experience on both the junior and the senior high school levels and in both a small and a large school situation.

**The Competency-Based KSU Teacher Education Program.** The secondary mathematics and science students are experimenting with a professional semester which focuses on the development of specific teacher competencies, the implementation of those competencies in the classroom where they will student teach, and early participation in those classrooms. The schedule is flexible and a basic objective of the program is to provide alternative ways of developing competencies.

## STUDENT TEACHING ASSIGNMENT REQUEST

All options require a special application, "Student Teaching Assignment Request." This form should be obtained from and returned to the College of Education Adviser by

September 25: Students participating in the Spring Professional Semester

February 25: Students participating in the Fall Professional Semester

NOTE: Should either of these dates fall on a Saturday, Sunday, or holiday, the next working day will be considered as the due date.

## SPECIAL INFORMATION 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.

## 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.

**Professional Certification and Renewal.** Those students who are primarily interested in graduate study to meet certification and/or renewal of teaching skills and do not wish to seek an advanced degree may apply to admission as a special student. Admission in this category is consistent with Graduate School standards for special students. Refer to the section Professional Certification.

**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 Instruction, 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. 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.
4. Undergraduate preparation in closely related or supporting subjects adequate to support advanced work in the field of the applicant's choice.
5. 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, 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.

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 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) 817 and (c) A&F 917. 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 student must secure a member of the graduate faculty in the student's area of study to serve as major professor. The faculty member must agree in conference with the department head to serve as major professor.

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.

## PROFESSIONAL CERTIFICATION

**Initial 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. The degrees earned in the College of Education will fulfill certification requirements. Pre-school, elementary and secondary teaching certification may be accomplished through the completion of the Approved Program and the B.S. or B.A. degrees. 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.

Persons seeking initial certification who present degrees from other accredited institutions must meet all requirements of the Teacher Education Program.

**Recertification.** Kansas State University continues to act as the parent institution for persons who have been recommended for initial certification. The renewal requirements as established by the State Board of Education as well as requirements of the College of Education must be satisfied. Junior College credit or credit earned through correspondence study may not be used for recertification.

Kansas State University may become the recommending agent for recertification of individuals presenting degrees from other accredited institutions. These persons must complete eight hours in residence, a portion of which must be earned in the College of Education.

**Certification requiring work beyond the Bachelor's Degree.** The College of Education will recommend for certification individuals satisfying program requirements for the following:

1. **Junior College Teaching.** Students preparing for junior college teaching have the following options: (1) Completion of a Teacher Education Program in secondary education plus a Master's Degree which includes the requirements for junior college certification; (2) Completion of a Master's Degree program designed specifically for junior college certification.
2. **Guidance and Counseling.** The Approved M.S. Programs in Elementary or Secondary Guidance and Counseling satisfy the State of Kansas certification requirements. An applicant must hold a degree-teaching certificate at the level he plans to counsel and have two years teaching experience or must satisfy these requirements concurrently with the program.
3. **Speech Clinician.** The Speech Pathology-Audiology program at Kansas State University has been designed to meet the 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. The Approved Program requires the M.A. degree in the College of Arts and Sciences.
4. **Administrator.** A graduate degree is required for any of the three administrative certificates granted by the State of Kansas. In addition, specific areas of study are required according to the certification desired. The KSU College of Education may be designated as the parent institution for recommending administrative certification when a student completes a minimum of eight graduate hours at KSU with some work taken in the College of Education. The Department of Administration and Foundations should be contacted regarding advisement for specific administrative certification.
5. **Special Education.** Students at Kansas State University wishing to prepare as Special Education teachers may meet all academic requirements for certification as teachers of classes of Mentally Retarded, Learning Disabled, and Emotionally and Socially Disturbed. Each program is considered as being primarily one that leads to a Masters Degree. Completion of academic requirements for permanent certification will usually require from 8 to 10 hours of graduate work if the undergraduate degree included an area of concentration in Special Education. Added coursework to complete the Masters Degree will involve work in other areas of Special Education.
6. **Reading Specialist.** Special certification requirements exist for both elementary and secondary school teachers of special reading classes in Kansas. In addition to degree certification and teaching experience, a minimum of 12 semester hours in a planned sequence of graduate reading courses is required. (A master's degree is not required for certification.) The College of Education offers a variety of courses which meet these requirements.

## TEACHER AIDE PROGRAM

The Teacher Aide Program is designed to give the student early contact with the teaching effort of the public school system. There are both learning and observation situations provided for the student. Providing the aide with this experience hopefully will lead to an earlier and deeper commitment to the teaching profession. As the program has become well established it has become a greater part of the experience desired for a more complete understanding of the problems and concepts of teacher education.

Students wishing to participate in the teacher aide

program should enroll in 400-100. This course directs itself to supervised experiences designed to facilitate orientation and investigation of teaching. The student may acquire credit not to exceed three hours. The student may not enroll in more than one hour of credit per semester.

## DEPARTMENTS AND COURSE OFFERINGS

### ADMINISTRATION AND FOUNDATIONS

Alfred P. Wilson, Head of Department

Professors Danskin,\* DeMand,\* Flanagan,\* Hoyt,\* McCain,\* Associate Professors Hanna,\* Hollis,\* Kaiser,\* Kasper,\* Neeley,\* Nordin,\* Sarthory,\* and Wilson;\* Assistant Professors Bradley,\* Holen,\* Litz,\* McIlvaine,\* Newhouse,\* Odom,\* Steffen,\* and Van Meter;\* Instructors Gillund,\* Heinrich,\* Hudson;\* Emeritus Professors Baker,\* Green,\* Moggie,\* 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 and Special Education.

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 supporting 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, universities and community settings. Students may choose coursework emphasizing such dimensions as learning and human development, statistics and measurement, guidance and counseling, student personnel work, career development 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

**405 111. 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.

**405 211. 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.

**405 215. 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.

**405 315. 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 215, junior standing, and admission to Teacher Education.

**405 511. Independent Study in Education.** (1-3) I, II, S. Selected topics in professional education. Maximum of 3 hrs. applicable toward degree requirements. Pr.: Consent of Department Head.

**405 550. Art for Exceptional Children.** (Same as Art 560).

### UNDERGRADUATE AND GRADUATE CREDIT

**405 611. 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.

**405 622. 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. 280 or A&F 215.

**405 631. Characteristics of 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 causes and their characteristics. Pr.: A&F 622 or A&F 663.

**405 632. Remediation Education for the Emotionally Disturbed.** (3) On sufficient demand. Educational planning, instructional methods, behavioral management, curricula



modification, and use of appropriate media and materials with the emotionally disturbed. Pr.: A&F 754.

**405 633. Remediation of Learning Disabilities.** (3) On sufficient demand. Educational planning, instructional methods, behavioral management, curricula modifications and use of appropriate media and materials with the learning disabled. Pr.: A&F 631.

**405 634. Instructional Materials for Special Education.** (3) On sufficient demand. Evaluation and adaptation of instructional materials and media appropriate to the education of the exceptional child. Special materials and media for specific exceptionalities will be considered.

**405 663. 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 215 and C&I 300 or 451.

**405 687. 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 622 or A&F 663.

**405 715. Principles of Measurement.** (3) I, II, S. Principles of constructing, administering and evaluating tests used in schools. Pr.: Teaching certificate or senior standing.

**405 720. 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 585 or 586 or consent of instructor.

**405 721. 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. 280 or A&F 215.

**405 726. 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.

**405 730. 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 611 or consent of instructor. (See A&O 730 and C&I 730.)

**405 752. 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.

**405 753. 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 663.

**405 754. Characteristics 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.: A&F 622 or A&F 663 and/or consent of instructor.

**405 786. 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.

**405 795. 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

**405 810. Methodology in Student Personnel Work.** (3) II. Study of the methods and procedures to plan, implement, and evaluate a total student personnel program in a higher education setting. Special attention will be given to the environmental, sociological, and psychological influences on the personal and educational development of students. Pr.: A&F 859 and consent of instructor.

**405 811. 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.

**405 812. 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.

**405 813. History of American Education.** (3) II. Historical study of the educational endeavor in the United States with special attention to problems that have relevance to contemporary education. Readings, discussion, presentations by instruction leader and students. Pr.: A&F 611 or consent of instructor.

**405 814. International Education.** (3) On sufficient demand. Developing, administering, conducting, and evaluating educational programs from a world perspective. Pr.: Teaching experience or consent of instructor.

**405 815. 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 720 and A&F 715.

**405 816. 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.

**405 817. 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. 703 or A&F 715.

**405 818. 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.

**405 819. 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.

**405 820. 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 720, Psych. 405 and consent of instructor.

**405 822. Mental Retardation.** (3) On sufficient demand. Etiological, psychological, sociological, and educational aspects of mental retardation. Pr.: A&F 663.

**405 823. Counseling Theory.** (3) II, S. Theories, methods, and problems in counseling, relating the counseling process to dynamics of human behavior. Pr.: A&F 815 or Psych. 420 or equivalent and conc. enrollment.

**405 825. 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.: A&F 611 or A&F 812 or consent of instructor.

**405 830. 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.

**405 831. 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 818 or consent of instructor.

**405 832. 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 315 and consent of instructor.

**405 834. 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 818 or 857, or C&I 831.

**405 835. The Principalship.** (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.

**405 836. 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 818 for graduate students in educational administration. One year of teaching experience for all others.

**405 856. 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 585, A&F 720 and consent of instructor.

**405 857. 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.

**405 858. Group Guidance.** (3) II. Designed to acquaint students with group procedures as basic tools in counseling, guidance, and other education services. Pr.: A&F 823 and Psych. 550.

**405 859. Principles of Student Personnel Administration.** (2) On sufficient demand. Principles, administrative organization, procedures, and problems of student personnel work in higher education; analysis of policy formation, staff relationships, finance and controls, and physical plant needs; an introduction to the personnel services: health, housing, food, union, placement, counseling, and activities program. Pr.: Graduate standing and consent of instructor.

**405 863. Vocational Psychology.** (3) On sufficient demand. Environment and human factors in occupational adjustment; appraisal of vocational fitness. Pr.: Consent of instructor.

**405 885. Practicum in Student Personnel Work.** (3) I, II, S. Supervised professional experience in the various agencies that comprise a total program of student personnel services within a post-secondary, college, or university setting. Pr.: A&F 859 and consent of instructor.

**405 886. 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 823 and consent of instructor.

**405 887. Practicum in Counseling.** (3) I, II. Supervised practical experience in counseling. Pr.: A&F 823 and consent of instructor. (Same as Psych. 860).

**405 888. 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.

**405 889. 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.

**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.

**405 890. Educational Administration.**

**405 891. Social Foundations.**

**405 892. Guidance Services.**

**405 893. Special Education.**

**405 898. Masters Report.** Credit arranged. I, II, S. Pr.: Consent of instructor.

**405 899. Masters Research.** Credit arranged. I, II, S. Pr.: Consent of instructor.

**405 910. 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.: A&F 818.

**405 915. 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 715.

**405 917. 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 817.

**405 920. 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 315 or its equivalent.



**405 921. 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 315.

**405 924. 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.: A&F 752 and A&F 823.

**405 925. 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 818 or consent of instructor.

**405 926. 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 818.

**405 927. 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 812.

**405 928. Educational Governance.** (1-3) 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.: A&F 818 and 6 additional hours in Educational Administration.

**405 933. 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.: A&F 818.

**405 986. 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 823 and consent of instructor.

**405 987. 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.

**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.

**405 989. Education Administration.**

**405 990. 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.

**405 991. Educational Administration.**

**405 992. Educational Psychology.**

**405 993. Research in Student Personnel.**

**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, Meisner,\* and Prawl;\* Associate Professors Albracht,\* Bradley,\* Field,\* Griffith, and Scott;\* Assistant Professors Campbell,\* Harris,\* Julian, Kittleson,\* and R. Wilson; Instructors Miller, Sumner, and 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 34 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 each Vocational Agriculture in Kansas.

The Home Economics Education curriculum offered in cooperation with the College of Home Economics, is described on page 225. 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 specializations in Adult Education, Career Education, and Vocational-Technical Education Administration is available. The Doctor of Philosophy Degree in Education is offered in the comprehensive areas of Adult and Occupational Education. Refer to Graduate Study section page 173 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

**410 500. 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 315.

**410 501. Independent Study in Education.** (1-3). Selected topics in professional education. Maximum of 3 hrs. applicable toward degree requirements. Pr.: Consent of Department Head.

**410 550. Methods of Teaching Home Economics.** (2) I, II. Selection of techniques and organization, preparation, and presentation of materials for teaching secondary programs. One hour rec. and two hours lab. a week. Pr.: Junior standing; A&O 621 or conc. enrollment; taken semester prior to A&O 586.

**410 560. 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.

**410 586. 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 C&I 586).

## 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.

**410 620. Principles and Philosophy of Vocational Education.** (3) I, II, S. Provision for vocational education in Kansas and other states and countries; principles and philosophy underlying such education, relation of vocational education to school objectives and community, state and national needs. Pr.: A&F 315.

**410 621. Program Planning in Vocational Education.** (3) I, II, S. The program development and planning process; development of guides for teaching and evaluating reimbursable secondary programs. Pr.: A&O 620.

**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.**

**410 639. Coordination of Cooperative Vocational Education.** (3) I, II, S. Emphasis on the legal aspects and other minimum requirements essential to conducting cooperative vocational education programs at the secondary and post-secondary levels. Pr.: A&O 620, or conc.

**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.

**410 703. 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 620.

**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.: A&O 586.

**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.

**410 713. Occupational Analysis.** (3) I, II, S. An introduction to various techniques used in analyzing occupations and jobs. Emphasis on developing and organizing related instructional materials and content. Pr.: A&O 620, or conc.

**410 730. Education of the Disadvantaged.** (3) On sufficient demand. Consideration of the life-space of the disadvantaged learner and its relationship to curriculum, organization and interpersonal relationships in schools. The development of realistic, relevant goals for the teacher of the disadvantaged. Pr.: A&F 611 or consent of instructor. (See A&F 730, and C&I 730).

**410 750. Practical Arts Education.** (3) I, S. Emphasis on designing unified practical arts programs for exploration; occupational clusters; and curricular innovation relevant to Career Education. Pr.: Teaching experience.

**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.

**410 788. 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.

**410 791. 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. 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 620 and consent of instructor.

**410 811. 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. 400 or consent of instructor. (See F.Ec. 811).

**410 820. 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.

**410 822. 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.

**410 830. 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.

**410 834. 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 621 and teaching experience.

**410 840. 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.

**410 842. Curriculum in Agriculture II.** (2 or 3) S. Cont. of A&O 840. Pr.: A&O 840 or consent of instructor.

**410 845. 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.

**410 850. 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.

**410 854. Occupational Home Economics Education.** Credit arranged. I, II, S. Development of programs and teaching materials pertinent to the programs for job training in home and community service occupations. Pr.: A&O 701.

**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.

**410 890. Home Economics Education.**

**410 891. Agricultural Education.**

**410 892. Adult Education.**

**410 898. Masters Report.** Credit arranged. I, II, S. Pr.: Consent of instructor.

**410 899. Masters Research.** Credit arranged. I, II, S. Pr.: Consent of instructor.

**410 910. 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.

**410 914. 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.

**410 916. 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.

**410 929. 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.

**410 930. 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.

**410 937. 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.

**410 940. 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 701 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,\* Moore,\* and Utsey;\* Associate Professors Bartel,\* Boyer,\* Hause,\* James,\* Kurtz,\* McAnarney,\* Owens,\* Price,\* Schell,\* Teague,\* and Trennepohl;\* Assistant Professors Alexander, Bailey, Byars,\* Caine,\* Clark,\* Hellebust, Loeb,\* Paul, Peterson, Wilson,\* and Zollman; Instructors Calvano, Clore, Deeter, Hazlett, Johnson, Kaupp, Merrell, Rankin, Repogle, and Sullivan; Assistant Instructor Goodenow; Emeritus Professors Craig and Smethers.

## 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.

**415 328. 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 215, C&I 325, a valid driver's license, and good driving record.

**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.

**415 331. Problem in Driver Education.** (1) Pr.: Consent of instructor.

**415 415. 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 Art 415.

**415 451. 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 315.

**415 469. Physical Education in Elementary Schools.** (3) I, II, S. Methods of teaching and organization of materials in a progression for an elementary physical education program. Pr.: Admission to Teacher Education or consent of instructor.

**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 to 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. Elementary School Reading Lab.** (1) I, II, S. Application of topics selected from and correlated with Elementary School Reading. Pr.: C&I 474 or concurrent enrollment.

**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.

## UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**415 502. Independent Study in Education.** (1-3) Selected topics in professional education. Maximum of 3 hrs. applicable toward degree requirements. Pr.: Consent of Department Head.

**415 530. Education and the Black American.** (3) II, S. An examination of curriculum implementation in light of race relations and economic-educational development. Modules related to the role of the Black American in education as seen from a Black perspective will be employed. (Interracial school studies) Pr.: Junior or Senior standing or consent of instructor.

**415 583. 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.

**415 584. 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.

**415 585. 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.

**415 586. 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 A&O 586).

**415 614. Laboratory Techniques in Teaching Science.** (2) I, II. Rationale for Laboratory in secondary school science. The design and implementation of laboratory activities and demonstrations in a high school science program. Pr.: Junior or Senior standing and consent of instructor.

**415 617. Corrective Reading Instruction.** (1-3) I, II, S. Supervised tutoring of children with reading difficulties. Not open to students with credit in C&I 847. Pr.: Student teaching experience or consent of instructor.

**415 630. Curriculum Materials for Ethnic Diversity.** (3) I, II, S. An examination and analysis of recent materials and practices of schools serving multi-ethnic student bodies, particularly minorities from disadvantaged backgrounds. Materials include any items utilized by the school in implementing the curriculum. Pr.: Senior standing or higher.

**415 640. Motorcycle Safety Education.** (2) II, S. Curriculum development, teaching practices, and administration of motorcycle safety education. Laboratory activities: teaching learners in classroom, on range and street. Pr.: C&I 330.

**415 645. Driving Ranges and Simulators.** (2) I, S. Principles and practices of teaching on multiple-car driving ranges and with driving simulators; administration of multi-phase programs in driver and traffic safety education. Two hours lab. a week. Pr.: C&I 330.

**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 Jrn. 662).

**415 704. 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.

**415 706. Aerospace Education Workshop.** (3) S. To provide Elementary and Secondary teachers with knowledge, skills, and attitudes about aerospace activities and the total impact of air and space vehicles upon society. Pr.: C&I 475, C&I 586 or teaching experience.

**415 715. Reading in the Secondary School Subjects.** On sufficient demand. 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.

**415 719. Economic Education Workshop.** (3) S. Basic economic concepts and how to integrate them into elementary and secondary curriculums and an examination of recent economic education materials. Pr.: Consent of instructor.

**415 730. 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 schools. The development of realistic, relevant goals for the teacher of the disadvantaged. Pr.: A&F 611 or consent of instructor. (See A&F 730, and A&O 730).

**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.

**415 737. Drug Abuse Education.** (3) On sufficient demand. Emphasis on the development of effective drug abuse education programs with attention given to the role delineation for schools and teachers. Materials and

procedures for developing values and attitudes in an education setting. Pr.: Senior standing and consent of instructor.

**415 756. Instructional Communication Processes.** (3) I, S. Processing of information via the auditory and visual perceptual systems and implications for the design and utilization of instructional technology. Pr.: Consent of instructor.

**415 760. 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.

**415 765. 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 760 or consent of instructor.

**415 779. 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.: A&F 315 and/or consent of instructor.

**415 780. 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 215, C&I 300 and junior standing.

**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.

**415 808. 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.: C&I 803 and/or consent of instructor.

**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.

**415 820. 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.

**415 821. 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.

**415 822. 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.

**415 831. 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.

**415 832. 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.

**415 833. 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.

**415 835. 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.: C&I 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 715 or 888 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.

**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 715 or 845 or consent of instructor.

**415 860. 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 760 or consent of instructor.

**415 864. Programmed Instructional Materials.** (3) On sufficient demand. Design, testing and instructional applications of programmed instructional materials, teaching machines and automated systems of instruction with emphasis on multi-media formats. Pr.: C&I 760 and A&F 920 or consent of instructor.

**415 866. Selecting and Evaluating Instructional Materials.** (3) On sufficient demand. Principles and procedures for evaluating graphic, photographic, and audio instructional materials. Development of evaluative criteria, instruments, and utilization guides. Sources for selecting instructional materials. Pr.: C&I 760 or consent of instructor.

**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 715 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.

**415 879. 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.: A&F 832 and/or consent of 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.

**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.

**415 886. Curriculum and Improvement of Instruction.**

**415 887. Elementary Education.**

**415 888. Secondary Education.**

**415 898. Masters Report.** Credit arranged. I, II, S. Pr.: Consent of instructor.

**415 899. Masters Research.** Credit arranged. I, II, S. Pr.: Consent of 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 831, A&F 920, and consent of instructor.

**415 920. The Analysis and Evaluation of Curriculum and Instruction.** (3) On sufficient demand. Data matrices, formative and summative evaluation, and other models as bases

for decision making about educational programs. Consideration of criterion problems in instructional evaluation. Pr.: C&I 803, A&F 816 and/or consent of instructor.

**415 986. 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.

**415 990. 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.

**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.

**415 991. Curriculum Development.**

**415 992. Improvement of Instruction.**

**415 999. Research in Curriculum and Instruction.** Credit arranged. I, II, S. Pr.: A&F 817 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 189  
 Chemical Engineering — curriculum on page 189  
 Civil Engineering — curriculum on page 190  
 Electrical Engineering — curriculum on page 190  
 Industrial Engineering — curriculum on page 191  
 Mechanical Engineering — curriculum on page 192  
 Nuclear Engineering — curriculum on page 192

A general description of each of these curriculums, including a list of the faculty and departmental course offerings, is presented on pages 195 through 214. 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 247.

## 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

English	229	100
Chemistry	221	210
Mathematics	245	220
Gen. Engg.	500	160

Physical Education	261	001
Gen. Engg.	500	010

Course	Sem. Hrs.
English Composition I	3
Chemistry I	5
Anal. Geometry & Calculus I	4
Engineering Concepts	2
Humanities or Soc. Sci. Elective	3
Concepts In Phys. Ed.	0
Engineering Lectures	0
	17

### Spring Semester

English	229	120
Chemistry	221	230
Mathematics	245	221
Economics	225	110

Physical Education	261	
Gen. Engin.	500	010

Course	Sem. Hrs.
English Composition II	3
Chemistry II	3
Anal. Geometry & Calculus II	4
Economics I	3
Humanities or Soc. Sci. Elective	3
Lifetime Sport	0
Engineering Lectures	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 Co-operative 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		Course	Sem. Hrs.
English	229 100	English Composition I	3
Chemistry	221 210	Chemistry I	5
Mathematics	245 220	Anal. Geometry & Calculus I	4
Mech. Engg.	560 212	Graph. Comm., Anal. & Des. I	2
Agr. Engg.	505 160	Ag. Engg. Concepts	2
Physical Education	261 001	Concepts in Phys. Ed.	0
Gen. Engg.	500 010	Engineering Lectures	0
			16
Spring Semester			
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
		Humanities or Soc. Sci.	3
		Elect.*	0
Physical Education	261	Lifetime Sport	0
			16

**SOPHOMORE**

Fall Semester			
Mathematics	245 222	Anal. Geometry & Calculus III	4
Physics	265 213	Engineering Physics I	5
Biology	215 198	Principles of Biology	4
Appl. Mech.	510 350	Statics	3
			16
Spring Semester			
Mathematics	245 240	Series & Diff. Equations	4
Physics	265 214	Engineering Physics II	5
Agr. Engg.	505 312	Biol. Materials & Machine Functions in Ag.	3
		Comp. and Data Processing	2
Ind. Engg.	550 372	Dynamics	3
Appl. Mech.	510 512		17

**JUNIOR**

Fall Semester			
Agr. Engg.	505 510	Environmental Analysis for Plant and Animal Systems	3
		Thermodynamics I	3
Mech. Engg.	560 513	Circuit Theory I	3
Elec. Engg.	530 510	Oral Communications I	2
Speech	281 105	Mechanics of Materials	3
Appl. Mech.	510 515	Humanities or Soc. Sci.	3
		Elect.*	0
			17
Spring Semester			
Appl. Mech.	510 518	Mech. of Materials Lab.	1
Agr. Engg.	505 566	Anal. of Ag. Structures	3
Agr. Engg.	505 520	Energy Use & Control in Ag. Systems I	3
		Fluid Mechanics	3
Appl. Mech.	510 571	Humanities or Soc. Sci.	3
		Elect.*	0
Civil Engg.	525 522	Soil Mechanics I or	3
Agronomy	015 735	Soil Physics	3
			16

**SENIOR**

Fall Semester			
Agr. Engg.	505 530	Soil and Water Engg.	3
Agr. Engg.	505 536	Design of Ag. Machines	3
		Humanities or Soc. Sci.	3
		Elect.*	0
		Technical Elective**	7
			16
Spring Semester			
Agr. Engg.	505 570	Energy Use and Control in Ag. Systems II	3
		Prof. Prac. in Ag. E.	1
Agr. Engg.	505 581	Humanities or Soc. Sci.	3
		Elect.*	0
		Technical Elective**	9
			16

Number of hours required for graduation 130\*\*\*

\*Humanities and Social Science Electives are to be selected from the list on page 193 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 193 will be satisfied by the required courses in this curriculum. Any 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	261 001	Concepts in Phys. Ed.	0
Gen. Engg.	500 010	Engineering Lectures	0
			17
Spring Semester			
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	261	Lifetime Sport	0
Chem. Engg.	520 015	Engineering Assembly	0
			17

**SOPHOMORE**

Fall Semester			
Mathematics	245 222	Anal. Geometry & Calculus III	4
Physics	265 213	Engineering Physics I	5
Chemistry	221 531	Organic Chemistry I	3
Chemistry	221 532	Organic Chemistry I Lab.	2
		Elective*	3
Chem. Engg.	520 015	Engineering Assembly	0
			17
Spring Semester			
Mathematics	245 240	Series & Diff. Equations	4
Physics	265 214	Engineering Physics II	5
Chemistry	221 550	Organic Chemistry II	3
Chem. Engg.	520 314	Intro. to Proc. Anal.	3
Chem. Engg.	520 316	Chem. Engg. Comp. Tech.	1
Chem. Engg.	520 015	Engineering Assembly	0
			16

**JUNIOR**

Fall Semester			
Chemistry	221 585	Physical Chemistry I	3
Chemistry	221 586	Physical Chemistry I Lab.	2
Chem. Engg.	520 520	Ch. E. Thermodynamics I	2
Chem. Engg.	520 530	Transport Phenomena I	3
		Elective*	6
Chem. Engg.	520 015	Engineering Assembly	0
			16
Spring Semester			
Chemistry	221 595	Physical Chemistry II	3
Chem. Engg.	520 522	Chem. Engg. Lab. I	2
Chem. Engg.	520 521	Ch. E. Thermodynamics II	3
Chem. Engg.	520 531	Transport Phenomena II	3
		Elective*	6
Chem. Engg.	520 015	Engineering Assembly	0
			17

**SENIOR**

Fall Semester			
Chem. Engg.	520 532	Chem. Engg. Lab. II	2
Chem. Engg.	520 560	Separational Process Design	2
Chem. Engg.	520 550	Chemical Reaction Engg.	3
Chem. Engg.	520 570	Ch. E. Systems Design I	3
		Elective*	6
Chem. Engg.	520 015	Engineering Assembly	0
			16
Spring Semester			
Chem. Engg.	520 542	Chem. Engg. Lab. III	2
Chem. Engg.	520 561	Ch. Proc. Dyn. & Cont.	3
Chem. Engg.	520 571	Ch. E. Systems Design II	3
		Elective*	9
Chem. Engg.	520 015	Engineering Assembly	0
			17

Number of hours required for graduation 133\*\*

\*Fifteen hours of electives must be selected from the list of Humanities and Social Science electives on page 193. 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 193.

\*\*Any 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	Sem. Hrs.
Mathematics	245 220	Anal. Geom. & Calc. I	4
Chemistry	221 210	Chemistry I	5
English	229 100	English Composition I	3
Speech	281 105	Oral Communications I	2
Mech. Engg.	560 212	Graphical Comm. Anal. & Des. I	2
Phys. Educ.	261 001	Concepts of Phys. Ed.	0
Gen. Engg.	500 010	Engineering Lectures	0
			16
Spring Semester		Course	Sem. Hrs.
Mathematics	245 221	Anal. Geom. & Calc. II	4
Chemistry	221 230	Chemistry II	3
English	229 120	English Composition II	3
Economics	225 110	Engg. Elective**	2
Phys. Educ.	261	Economics I	3
C.E.	525 010	Lifetime Sport	0
		Freshman Assembly	0
			15

**SOPHOMORE**

Fall Semester		Course	Sem. Hrs.
Mathematics	245 222	Anal. Geometry & Calc. III	4
Physics	265 213	Engineering Physics I	5
Appl. Mech.	510 350	Statics	3
Civil Engg.	525 212	Engg. Elective**	2
Civil Engg.	525 015	Elementary Surveying Engg.	3
		Engineering Assembly	0
			17
Spring Semester		Course	Sem. Hrs.
Mathematics	245 240	Series & Diff. Equations	4
Physics	265 214	Engineering Physics II	5
Appl. Mech.	510 515	Mechanics of Materials	3
Chemistry	221 250	Chemistry II Laboratory	2
C.E.	525 214	Route Surveying	3
Civil Engg.	525 015	Engineering Assembly	0
			17

**JUNIOR**

Fall Semester		Course	Sem. Hrs.
C.E.	525 531	Analysis of Statics	3
Ap.M.	510 512	Determinate Structures	3
M.E.	560 513	Dynamics	3
Geology	234 100	Thermodynamics I	3
Geology	234 130	Geology I	3
Ap. M.	510 518	Elem. Geology Lab.	1
C.E.	525 015	Mechanics of Materials Lab.	1
		Humanities or Soc. Sci. Elec.*	3
		Engineering Assembly	0
			17
Spring Semester		Course	Sem. Hrs.
C.E.	525 532	Analysis of Statics	3
Ap.M.	510 571	Indeterminate Structures	3
C.E.	525 522	Fluid Mechanics	3
C.E.	525 563	Soil Mechanics I	3
C.E.	525 015	Sanitary Engg. Fund.	3
		Engg. Elective**	4
		Engineering Assembly	0
			16

**SENIOR**

Fall Semester		Course	Sem. Hrs.
C.E.	525 542	Structural Engg. in Steel	3
C.E.	525 551	Hydrology	2
C.E.	525 571	Transportation Engineering	3
C.E.	525 015	Humanities or Soc. Sci. Elec.*	9
		Engineering Assembly	0
			17
Spring Semester		Course	Sem. Hrs.
C.E.	525 544	Structural Engg. in Concrete	3
C.E.	525 552	Hydraulic Engineering	3
C.E.	525 565	Sanitary Engg. Design	3
C.E.	525 528	Foundation Engineering	3
C.E.	525 015	Engg. Elective**	3
		Humanities or Soc. Sci. Elec.*	2
		Engineering Assembly	0
			17

Number of hours required for graduation, 132\*\*

\*Humanities and Social Science Electives are to be selected from list on page 193 and need not be taken in the order listed in the curriculum.

\*\*Eleven hours of engineering electives are required. One course in computer programming or equivalent programming experience and one course from either the Engineering Materials or the Circuits, Fields and Electronics Engineering Sciences groups are required. The remaining hours may be chosen upon consultation with the student's faculty advisor.

\*\*\*Any 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	Sem. Hrs.
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	261 001	Concepts in Phys. Ed.	0
			16
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
Gen. Engg.	500 160	Engineering Concepts	2
Computer Science	286 200	Fund. of Comp. Prog.	2
Computer Science	286	Language Lab	1
Physical Education	261	Lifetime Sport	0
			15

**SOPHOMORE**

Fall Semester		Course	Sem. Hrs.
Physics	265 213	Engineering Physics I	5
Mathematics	245 222	Anal. Geometry & Calc. III	4
Appl. Mech.	510 350	Statics	3
Elec. Engg.	530 241	Intro. to Computer Engg.	3
Economics	225 110	Economics I	3
			18
Spring Semester		Course	Sem. Hrs.
Physics	265 214	Engineering Physics II	5
Mathematics	245 240	Series & Diff. Equations	4
Appl. Mech.	510 512	Dynamics	3
Elec. Engg.	530 510	Circuit Theory I	3
		Humanities or Soc. Sci. Elec.*	3
			18

**JUNIOR**

Fall Semester		Course	Sem. Hrs.
Elec. Engg.	530 511	Circuit Theory II	4
Elec. Engg.	530 557	Electromagnetic Theory I	3
Elec. Engg.	530 525	Electronics I	3
Elec. Engg.	530 501	E.E. Laboratory I	2
		Complementary Elective**	3
		Humanities or Soc. Sci. Elec.*	3
			18
Spring Semester		Course	Sem. Hrs.
Elec. Engg.	530 526	Electronics II	3
Elec. Engg.	530 581	Energy Conversion I	3
Elec. Engg.	530 502	E.E. Laboratory II	2
		Option Elective+	3
		Complementary Elective**	3
		Humanities or Social Science Elective *	3
			17

**SENIOR**

Fall Semester		Course	Sem. Hrs.
Mech. Engg.	560 513	Thermodynamics I	3
Elec. Engg.	530 530	Control Systems Design	3
		Option Elective+	3
		Complementary Elective**	3
		Humanities or Soc. Sci. Elec.*	3
			15
Spring Semester		Course	Sem. Hrs.
Elec. Engg.	530 590	E.E. Seminar	1
		Option Elective+	6
		Complementary Elective**	5
		Humanities or Soc. Sci. Elec.*	3
			15

Number of hours required for graduation 132+ +

\*Humanities and Social Science Electives are to be selected from the list on page 193 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 193.

+12 semester hours of Option Electives must be selected from Electrical Engineering courses upon consultation with adviser.

+ Any 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.



**ELECTRICAL ENGINEERING OPTIONS****General**

In the general option a set of specializations is possible. The student is expected to select a set of interrelated courses which will enable him to concentrate in one area. Examples of such areas are communication systems, digital systems, electromagnetic theory and applications, electronics, electric energy systems, linear systems theory and microelectronics.

**Bioengineering**

A student pursuing the option of Bioengineering within the Electrical Engineering Department can fulfill the requirements for a B.S. in Electrical Engineering by following the outlined core curriculum listed for Electrical Engineering. A suggested set of life science courses which should be included in the Bioengineering option follows:

**Life Science Component of Bioengineering Option**

Chemistry	221 350	General Organic Chemistry . . .	3
Chemistry	221 351	General Organic Chem. Lab. . .	2
*Biochemistry	211 521	General Biochemistry . . . . .	3
Biology	215 405	Comp. Anat. of Vertebrates . .	4
		OR	
Physiology	740 825	Special Anatomy . . . . . Cr. Arr.	
		OR	
Biology	215 425	Human Physiology . . . . .	4
*Physiology	740 530	Anatomy and Physiology . . . .	4

\*Minimum set of 10 semester hours that should be included in the Complementary Electives.

The above courses will be used as Complementary Electives in the Electrical Engineering Curriculum. Upon consultation with his academic adviser the student must select from the list of Option Electives those which would complement a strong Electrical Engineering core curriculum and the Bioengineering Option.

**Computer Engineering**

A student pursuing the option of Computer Engineering within the Electrical Engineering Department can fulfill the requirements for a B.S. in Electrical Engineering by following the outlined core curriculum listed for Electrical Engineering. The following courses will be required as Complementary and Option Electives.

C. Sci.	286 305	Comp. Org. & Prog. . . . .	4
E.E.	530 649	Analog Computation . . . . .	3
E.E.	530 641	Design of Digital Systems I . .	3
E.E.	530 643	Comp. Logic Lab. . . . .	1
		OR	
E.E.	530 503	Elec. Engr. Lab. III . . . . .	2

**CURRICULUM IN INDUSTRIAL ENGINEERING**

B.S. in Industrial Engineering

**FRESHMAN**

Fall Semester		Course	Sem. Hrs.
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	261 001	Concepts in Phys. Ed. . . . .	0
Gen. Engg.	500 010	Engineering Lectures . . . . .	0

17

Spring Semester		Course	Sem. Hrs.
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.	550 120	Intro. to Ind. E. . . . .	2
		Humanities or Soc. Sci. Elect.*	3
Physical Education	261	Lifetime Sport . . . . .	0
Ind. Engg.	550 015	Engineering Assembly . . . . .	0

17

**SOPHOMORE**

Fall Semester		Course	Sem. Hrs.
Physics	265 213	Engineering Physics I . . . . .	5
Mathematics	245 222	Anal. Geo. & Calc. III . . . . .	4
Bus. Ad.	305 260	Fund. of Accounting . . . . .	4
Ind. Engg.	550 241	Production Processes . . . . .	3
Ind. Engg.	550 372	Computers & Data Processing . . . . .	2
Ind. Engg.	550 015	Engineering Assembly . . . . .	0

18

Spring Semester		Course	Sem. Hrs.
Physics	265 214	Engineering Physics II . . . . .	5
Mathematics	245 240	Series & Diff. Equations . . . .	4
Ind. Engg.	550 352	Tool Engineering . . . . .	3
		Humanities or Soc. Sci. Elect.*	3
Ind. Engg.	550 015	Engineering Assembly . . . . .	0

15

**JUNIOR**

Fall Semester		Course	Sem. Hrs.
Mech. Engg.	560 513	Thermodynamics I . . . . .	3
Statistics	285 510	Intro. Prob. & Stat. I . . . . .	3
Ind. Engg.	550 350	Engineering Materials . . . . .	2
Ind. Engg.	550 351	Engineering Materials Lab. . . .	1
Ind. Engg.	550 551	Work Design . . . . .	3
Appl. Mech.	510 513	Statics & Dynamics . . . . .	4
Ind. Engg.	550 015	Engineering Assembly . . . . .	0

16

Spring Semester		Course	Sem. Hrs.
Appl. Mech.	510 515	Mechanics of Materials . . . . .	3
Elec. Engg.	530 519	Elect. Circuits and Control . . .	4
Ind. Engg.	550 541	E. Reliability & Qual. Assur. I .	3
Ind. Engg.	550 530	Ind. Project Evaluation . . . . .	3
Ind. Engg.	550 501	Industrial Management . . . . .	3
		Technical Elective . . . . .	2
Ind. Engg.	550 015	Engineering Assembly . . . . .	0
Ind. Engg.	550 050	Industrial Plant Studies . . . .	0

18

**SENIOR**

Fall Semester		Course	Sem. Hrs.
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 Oper. Research I . . .	3
Ind. Engg.	550 502	Ind. Management II . . . . .	2
		Soc. Sci. or Humanities Elect.*	6
Ind. Engg.	550 050	Engineering Assembly . . . . .	0

17

Spring Semester		Course	Sem. Hrs.
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.	550 015	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 193 and need not be taken in the order listed in the curriculum.

\*\* The engineering science requirements on page 193 will be satisfied by the required courses in this curriculum. Any 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	261 001	Concepts in Phys. Ed. .... 0
Gen. Engg.	500 010	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
		Humanities or Soc. Sci. Elec.* ..... 3
Physical Education	261	Lifetime Sport ..... 0
Mech. Engg.	560 015	Engineering Assembly ..... 0

**SOPHOMORE**

15		
Fall Semester	Course	Sem. Hrs.
Physics	265 213	Engineering Physics I ..... 5
Mathematics	245 222	Anal. Geo. & Calc. III ..... 4
Economics	225 110	Economics I ..... 3
Mech. Engg.	560 217	Graph. Comm. Anal. & Des. II ..... 3
Ind. Engg.	550 241	Production Processes ..... 3
Mech. Engg.	560 015	Engineering Assembly ..... 0

18		
Spring Semester	Course	Sem. Hrs.
Physics	265 214	Engineering Physics II ..... 5
Mathematics	245 240	Series & Diff. Equations ..... 4
Appl. Mech.	510 350	Statics ..... 3
Ind. Engg.	550 350	Engg. Materials ..... 2
		Humanities or Soc. Sci. Elec.* ..... 3
Mech. Engg.	560 015	Engineering Assembly ..... 0

**JUNIOR**

17		
Fall Semester	Course	Sem. Hrs.
Mech. Engg.	560 513	Thermodynamics I ..... 3
Elec. Engg.	530 510	Circuit Theory I ..... 3
Ind. Engg.	550 351	Engg. Materials Lab. .... 1
Appl. Mech.	510 512	Dynamics ..... 3
Appl. Mech.	510 515	Mech. of Materials ..... 3
		Humanities or Soc. Sci. Elec.* ..... 3
Mech. Engg.	560 015	Engineering Assembly ..... 0

16		
Spring Semester	Course	Sem. Hrs.
Mech. Engg.	560 523	Thermodynamics II ..... 3
Elec. Engg.	530 525	Electronics I ..... 3
Ind. Engg.	550 372	Comp. and Data Proc. .... 2
Appl. Mech.	510 571	Fluid Mechanics ..... 3
Physics	265 551	Atomic Physics or ..... 3
Nuc. Engg.	580 410	Intro. to Nuclear Engg. .... 3
		Humanities or Soc. Sci. Elec.* ..... 3
Mech. Engg.	560 015	Engineering Assembly ..... 0

**SENIOR**

17		
Fall Semester	Course	Sem. Hrs.
Mech. Engg.	560 533	Machine Design I ..... 3
Mech. Engg.	560 527	Heat Transfer ..... 3
Mech. Engg.	560 535	Mech. Engg. Lab. I ..... 3
Mech. Engg.	560 560	Engg. Economics ..... 3
		Technical Elective** ..... 5
Mech. Engg.	560 015	Engineering Assembly ..... 0

17		
Spring Semester	Course	Sem. Hrs.
Mech. Engg.	560 575	Mech. Engg. Design Lab. .... 2
Mech. Engg.	560 563	Machine Design II ..... 3
Mech. Engg.	560 583	Mech. Engg. Lab. II ..... 2
Mech. Engg.	560 656	Mach. Vibration I or ..... 3
Mech. Engg.	560 622	Environmental Engg. I ..... 3
		Humanities or Soc. Sci. Elec.* ..... 3
		Technical Elective** ..... 3
Mech. Engg.	560 015	Engineering Assembly ..... 0

Number of hours required for graduation 132\*\*\*

\*Humanities and Social Science Electives are to be selected from the list on page 193 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 193 will be satisfied by the required courses in this curriculum. Any 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.
Nuc. Engg.	580 110	Nuclear Engineering Concepts ..... 2
English	229 100	English Composition I ..... 3
Economics	225 110	Economics I ..... 3
Chemistry	221 210	Chemistry I ..... 5
Mathematics	245 220	Anal. Geometry & Calculus I ..... 4
Phys. Educ.	261 001	Concepts in Phys. Ed. .... 0

17		
Spring Semester	Course	Sem. Hrs.
Nuc. 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	265 213	Engineering Physics I ..... 5
Mathematics	245 221	Anal. Geometry & Calculus II ..... 4
Phys. Educ.	261	Lifetime Sport ..... 0

**SOPHOMORE**

18		
Fall Semester	Course	Sem. Hrs.
Physics	265 214	Engineering Physics II ..... 5
Mathematics	245 222	Anal. Geo. & Calc. III ..... 4
Appl. Mech.	510 513	Statics & Dynamics ..... 4
		Humanities or Soc. Sci. Elec.* ..... 3

16		
Spring Semester	Course	Sem. Hrs.
Nuc. Engg.	580 290	Intro. to Nuc. Engg. Analysis ..... 3
Nuc. Engg.	580 295	Elements of Nuc. Engg. .... 3
Elec. Engg.	530 510	Circuit Theory I ..... 3
Chem. Engg.	520 314	Intro. to Process Analysis ..... 3
		Humanities or Soc. Sci. Elec.* ..... 3

**JUNIOR**

15		
Fall Semester	Course	Sem. Hrs.
Nuc. Engg.	580 500	Applied N.E. Analysis ..... 3
Nuc. Engg.	580 511	Radioisotope Appl. Engg. .... 2
Mech. Engg.	560 513	Thermodynamics I ..... 3
Elec. Engg.	530 525	Electronics I ..... 3
		Technical Elective** ..... 3
		Humanities or Soc. Sci. Elec.* ..... 3

17		
Spring Semester	Course	Sem. Hrs.
Nuc. Engg.	580 515	Nuclear Engg. Materials .... 3
Nuc. Engg.	580 555	Nuclear Reactor Fundamentals ..... 3
Appl. Mech.	510 571	Fluid Mechanics ..... 3
Nuc. Engg.	580 599	Neut. & Part. Inter. .... 3
		Technical Elective** ..... 3

**SENIOR**

15		
Fall Semester	Course	Sem. Hrs.
Nuc. Engg.	580 630	Applied Reactor Theory ..... 3
Nuc. Engg.	580 590	Nuclear Fuel Cycle ..... 3
		Technical Elective** ..... 7
		Humanities or Soc. Sci. Elec.* ..... 3

16		
Spring Semester	Course	Sem. Hrs.
Nuc. Engg.	580 692	Nuclear Reactor Technology ..... 3
Nuc. Engg.	580 695	Nuclear Reactor Tech. Lab. .. 2
		Technical Elective** ..... 8
		Humanities or Soc. Sci. Elec.* ..... 3

Number of hours required for graduation 130\*\*\*

\*Humanities and Social Science Electives are to be selected from the list on page 193 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 193 will be satisfied by the required courses in this curriculum. Any 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 515 Nuclear Engineering Materials (3)
- c. EE 695 Solid State Engineering (3)

### Analytical Mechanics

- a. ApM 350 Statics (3)
- ApM 512 Dynamics (3)
- b. ApM 513 Statics and Dynamics (4)

### Circuits, Fields, & Electronics

- a. EE 510 Circuit Theory I (3)
- b. EE 519 Elect. Circuits & Controls (4)
- c. EE 557 Electromagnetic Theory (3)

### Thermodynamics

- a. ChE 520 Chem. Engg. Thermo I (2)
- b. ME 513 Thermodynamics I (3)

### Flow & Rate Processes

- a. ApM 571 Fluid Mechanics (3)
- b. ChE 530 Transport Phenomena I (3)

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 220

**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.

## INTERDISCIPLINARY STUDY

Although engineering curriculums are generally highly structured, it is possible to pursue a secondary field of interest through the judicious selection of electives. If added flexibility is needed to pursue specific goals, the student may petition his adviser and department head for the substitution of required courses. Some of the more popular secondary fields are:

**Business Administration.** Increasing numbers of engineers are assuming managerial positions in all phases of industrial operations. Some of the courses listed in the section on dual degrees could be appropriate technical electives for students with goals in the management area.

**Pre-Medicine.** Many of the recent advances in medical research techniques, patient monitoring systems, artificial limbs and organs, aerospace and undersea medicine have developed from a partnership of medicine and engineering. This interrelationship will continue to grow and an education in both fields will be highly desirable. Engineering students wishing to satisfy entrance requirements to the KU School of Medicine must take Chemical Analysis, two semesters of organic chemistry, and two semesters of biology (215-198 plus one of the following: 215-410, 215-535, 215-650). Association with the KSU Pre-Med Club is recommended.

**Pre-Law.** A graduate degree in law can be desirable for engineers wishing to pursue careers in industrial management or patent law. While there are no specific courses required for entry to law school, appropriate elective areas are: Economics, Political Science, History, Sociology, Psychology, Anthropology, Accounting, and Finance.

**Computer Science.** Modern electronic computers are powerful tools for the solution of complex engineering and/or management problems. An individual with training in both engineering and computer science possesses the background to attack problems over a broad range. Appropriate courses include:

### Languages:

286 200	Fundamentals of Computer Programming
286 300	Algorithmic Processes
286 305	Computer Organization and Programming
286 405	Introduction to Programming Language

### Design:

530 241	Introduction to Computer Engineering
530 643	Computer Logic Design
530 644	Digital Circuits Laboratory
530 641	Design of Digital Systems I

### Computational Techniques:

520 316	Ch.E. Computational Techniques
530 649	Analog Computation
550 571	Introduction to Operations Research
550 573	Industrial Simulation
560 760	Engineering Analysis I
580 720	Nuclear Systems Analysis

**Mathematics, Physics, Chemistry.** Engineering students with interests in research should plan on graduate study. Preparation at the B.S. level can be enhanced by additional courses in mathematics and the basic sciences. Refer to the departmental listings on pages 119, 135, and 90 for possible electives.

**Bio-Engineering.** Bio-engineering is a very broad field overlapping the life sciences with many engineering disciplines. Some of the subareas are bio-mechanics, ergonomics, bio-instrumentation, bio-materials, bio-energetics, water and waste treatment, food engineering, and environmental engineering. In addition to the courses listed in the pre-medicine section, other courses of interest are:

505 312	Biological Materials and Machine Functions in Agriculture
505 510	Environmental Analysis for Plant and Animal Systems
505 520	Energy Use and Control in Agricultural Systems I
505 570	Energy Use and Control in Agricultural Systems II
505 700	Agricultural Process Engineering
520 715	Biochemical Engineering
520 725	Bioprocess Phenomena
525 563	Sanitary Engineering Fundamentals
525 565	Sanitary Engineering Design
525 761	Sanitary Engineering Chemistry
525 762	Water Supply and Quality Control
525 766	Waste Treatment Systems
530 771	Control Theory Applied to Bioengineering
530 772	Theory and Techniques of Bioinstrumentation
550 551	Work Design
550 609	Occupational Safety and Health
550 625	The Man-Environment System
560 622	Environmental Engineering I
560 722	Environmental Engineering II
560 742	Fine Particle Technology

**Food Engineering.** Engineers are needed in the food industry for process development and design, equipment design and management of operations. Students with this interest should select technical electives to augment their background in: Chemistry, Microbiology, Agricultural and Food Sciences, and Process Engineering.

**Energy Systems Engineering.** The increasing demand for energy is one of the major problems confronting all nations of the world. New energy sources are needed in addition to more effective use of present resources. Interested students should select courses from the following areas: Thermodynamics, Energy Conversion, Nuclear Reactor Technology, Electric Energy Systems, and Engineering Economics.

## DUAL DEGREE PROGRAMS

Students who want to pursue interdisciplinary interests in depth may wish to enroll in a dual degree program. In general, the second degree may be earned with an additional year of study. A minimum of 150 semester hours is required for two B.S. degrees. Since there are many possible combinations, questions should be referred to the Dean's Office. 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.	305 260	Fund. of Accounting	4
Bus. Admin.	305 270	Managerial & Cost Controls	3
Economics	225 110	Economics I	3
Economics	225 120	Economics II	3
Bus. Admin.	305 292	Business Law I	3
Comp. Science	286 200	Fund. of Comp. Prog.*	3
Bus. Admin.	305 420	Management Concepts	3
Bus. Admin.	305 421	Production Management	3
Bus. Admin.	305 450	Business Finance	3
Bus. Admin.	305 440	Marketing	3
Bus. Admin.	305 695	Business Policy	3
Bus. Admin.	305 696	Business and Society	3
		Business electives	9

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\* including lab.

**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 B.S. degree in Geology.

1. General requirements for B.S. degree in Arts and Sciences (see page 76).

2. Complete the following courses in Geology.

	Course	Sem. Hrs.
234 200	Geology II	4
234 560	Mineralogy I	4
234 561	Mineralogy II	4
234 520	Geomorphology	4
234 630	Structural Geology	4
234 703	Stratigraphic Geology	4
234 718	Field Geology	6
		30

**Chemistry and Chemical Engineering.** In addition to the required courses in Chemical Engineering, interested students should take:

Course		Sem. Hrs.
221 551	Organic Chemistry II Lab.	2
221 597	Inorganic Chemistry	3
221 545	Chemical Separations	2
221 666	Instrumental Analysis	4
221 599	Undergraduate Research	3
253 121	German I	4
253 122	German II	4

Electives should be chosen to satisfy the humanities and social sciences requirement on page 193 and the engineering science requirements on page 193.

## 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 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	6
English Composition	3
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		

\*Technical Elective in the curriculum.



**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

## Departments and Course Offerings

### AGRICULTURAL ENGINEERING

William H. Johnson,\* Head of Department

Professors Fairbanks,\* Foster, Herpich, Hodges,\* Johnson,\* Larson,\* Lipper,\* and Wendling; Associate Professors Chung,\* Clark,\* Converse, Holmes, Manges,\* Schindler, Selby, and Stevenson;\* Assistant Professors Baugher, Hay, Jepsen, McGinty, Murphy, Pope, Spillman,\* Stephens, and TenEyck; Instructors Axthelm, Clark, and Wright; 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; and 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.

Excellent opportunities and capabilities exist for advanced study. In addition to modern departmental facilities, the U.S.D.A. Grain Marketing Research Center offers unique possibilities for specialization in the engineering of grain processing and handling systems.

### 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

**505 510. 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. 214, Pr. or conc.: M.E. 513.

**505 520. 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. 513, E.E. 510.

**505 530. 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. 571, Ag.E. 510, C.E. 522, or Agron. 735.

**505 536. Design of Agricultural Machinery.** (3) I. Analysis and design of agricultural machines. Two hours rec. and three hours lab. a week. Pr.: Phys. 214; Pr. or conc.: Ap.M. 515, Ag.E. 312.

**505 566. 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. 515.

**505 570. 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. 214 and Ag.E. 520.

**505 581. Professional Practice in Agricultural Engineering.** (1) II. Professional attitudes and ethics. Post-degree career planning and social responsibilities. One hour rec. a week. Pr.: Senior standing.

#### UNDERGRADUATE AND GRADUATE CREDIT

**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.

**505 650. 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. 536, 566.

**505 700. Agricultural Process Engineering.** (3) I. Theory, equipment, and design techniques in processing agricultural products. Two hours rec. and three hours lab. a week. Pr.: Ap.M. 571, M.E. 513.

**505 705. Irrigation and Drainage.** (3) 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. 522, Ap.M. 571, Ag.E. 510.

**505 710. Advanced Farm Power and Machinery.** (3) I. 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. 536.

**505 780. Measurement Systems.** (3) II. 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. 510.

#### 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. 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.

**505 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**505 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**505 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

#### 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.

**506 300. 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) II. Selection, adjustment, operation, servicing, economics, and application of agricultural machines. Two hours rec. and three hours lab. a week. Pr.: Phys. 113.

**506 351. 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.

**506 352. Agricultural Machinery Construction.** (3) I, II. Advanced shop processes and techniques for constructing and maintaining agricultural machinery; advanced welding, hard surfacing, and metallurgy; selection of materials for

construction. One hr. rec. and five hrs. 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. 114.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**506 551. Planning and Management of Agricultural Buildings.** (3) II. Farmstead planning; requirements of livestock production systems; environment control; waste management. Three hours rec. Pr.: Phys. 113 or 115 and Math. 100.

**506 552. Farm Building Construction** (3) 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. One hr. rec., five hrs. lab. a week. Pr.: Math. 100.

**506 553. Agricultural Machinery Operation and Maintenance** (3) 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. One hr. rec., five hours lab a week. Pr.: Ag.E. 151, 352 or equiv. and junior standing.

**506 555. 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.

**506 558. 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.

**506 559. 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

**506 615. 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. 353 and 551.

**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. 205, Ag.E. 300 or 558.

**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. 205, Ag.E. 300 or 558.

**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.

**506 700. 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, 559 or equiv. plus one year's teaching experience or approval of instructor.

**506 703. 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. 351 or equiv.

## APPLIED MECHANICS

Philip G. Kirmser,\* Head of Department

Professors Best,\* Haft,\* Kirmser,\* 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

**510 275. 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. 113, Math. 220.

**510 306. 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. 275.

**510 307. 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. 306.

**510 350. 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; center of gravity; moments of inertia. Three hours rec. a week. Pr. or conc.: Math. 221.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**510 512. 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. 350, Math. 222.

**510 513. 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.

**510 515. 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. 350; Pr. or conc.: Math. 222.

**510 518. 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. 515.

**510 571. 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. 512; Pr. or conc.: M.E. 513.

**510 595 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. 512 or 513, or consent of instructor.

### UNDERGRADUATE AND GRADUATE CREDIT

**510 701. 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. 515, Math. 240 or equiv.

**510 710. Experimental Stress Analysis.** (3) I. Experimental methods of investigating stress distribution. Photoelastic models, photoelastic coatings, brittle coatings, and resistance strain gages applied to static and dynamic problems. Two

hours rec. and three hours lab. a week. Pr. or conc.: Ap.M. 701 or approval of instructor.

**510 712. 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.

**510 715. Intermediate Dynamics.** (3) II. General vector principles of the dynamics of particles and rigid bodies; applications to orbital calculations, gyrostatics and rocket performance; introduction to the energy methods of advanced dynamics. Three hours rec. a week. Pr.: Ap.M. 512, Math. 240 or equiv.

**510 718. 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. 512, Math. 240 or equiv.

**510 720. 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. 571, Math. 240 or equiv.

**510 725. 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. 515.

**510 730. 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. 515, Math. 240 or equiv.

**510 735. 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. 701.

**510 740. 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.

**510 745. Applied Nonlinear Analysis.** (3) II. Study of mechanical or electrical systems governed by nonlinear equations, elliptic integrals, geometry of integral curves, the phase plane, Liénard's graphical construction, Poincaré's classification of singular points, stability and instability. Three hours rec. a week. Pr.: Math. 240 or equiv.

**510 750. 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. 735 or 740 or equiv.

**510 760. 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. 718, 735, or 740 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.

**510 822. 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. 718.

**510 830. Thermoelasticity.** (3) I. Theory and analysis of thermal stresses in elastic and inelastic systems. Pr.: Ap.M. 735 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. 701.

**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. 735 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. 701.

**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. 718 or 720, Math 551.

**510 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**510 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**510 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

## CHEMICAL ENGINEERING

Dr. L. T. Fan,\* Head of Department

Professors Bates,\* Erickson,\* Fan,\* Honstead,\* and Kyle;\* Associate Professors Akins,\* and Matthews;\* Assistant Professors Hall,\* Retzlaff,\* and Walawender;\* Instructor Snyder.

The chemical engineer contributes to society through the useful application of his knowledge and understanding of chemistry, physics, and mathematics.



He devises and develops new products, designs new processes, improves and manages existing manufacturing processes, sells chemical products and processing equipment, and provides liaison between industry and the consumer.

Employment opportunities exist in the chemical, petroleum, pharmaceutical, plastics, paper, and food processing industries, as well as in government service. During his career the chemical engineer can expect to participate in many decisions crucial to the preservation and improvement of society, especially in the areas of energy and food production, resource management, and the specification and design of pollution control processes.

The Chemical Engineering curriculum is designed to give students the necessary breadth and depth of knowledge and scientific tools to perform these functions. It is also intended that the program be flexible enough to accommodate a broad range of educational interests. Sufficient electives have been provided so a student can emphasize areas such as chemistry, mathematics, material science, management, computer science, and bioengineering. The curriculum also is well suited as a pre-law or pre-medicine program.

The Chemical Engineering curriculum is best suited to highly motivated students with strong abilities in chemistry, physics, and mathematics. The first two years are devoted to a study of the pure sciences and the essential communication skills. In the last two years emphasis is placed upon the application of these sciences through the study of transport processes, separation techniques, thermodynamics, reaction engineering, process dynamics, and systems design.

### Dual Degree Program

The Department of Chemical Engineering also offers a five-year dual degree program in Chemistry-Chemical Engineering. The program may be pursued entirely at K-State, requiring a minimum of 150 credit hours, or a portion of the requirements may be completed at other colleges. In particular, a formal cooperative program exists between K-State and KSC of Pittsburg, in which the student spends the first three years at KSC and the last two at KSU. Graduates of this program are especially well suited for work in the chemical industries or for graduate study in either field. Other dual degree programs also are available.

### 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

##### 520 015. Engineering Assembly.

**520 314. 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. 214.

**520 316. 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. 314 and Math. 240.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**520 520. Ch.E. Thermodynamics I.** (2) I. A study of the first and second laws of thermodynamics, real gases, heat of solution and reaction. Two hours rec. a week. Pr.: Ch.E. 314, or conc. Ch.E. 314 and Chem. 585.

**520 521. Ch.E. Thermodynamics II.** (3) II. A continuation of the study of the second law, thermodynamic analysis of processes, phase equilibrium, chemical reaction equilibrium. Three hours rec. a week. Pr.: Ch.E. 520.

**520 522. 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. Five hours lab. a week. Pr.: Ch.E. 520; Pr. or conc.: Ch.E. 530.

**520 530. Transport Phenomena I.** (3) I. A unified treatment of the basic principles of momentum, energy and mass transport. Three hours rec. a week. Pr. or conc.: Ch.E. 314.

**520 531. Transport Phenomena II.** (3) II. Continuation of 520 530 with special emphasis on mass transfer. Three hours rec. a week. Pr.: Ch.E. 530.

**520 532. Chemical Engineering Laboratory II.** (2) I, II. Cont. of Chemical Engineering Laboratory I. Five hours lab. a week. Pr.: Ch.E. 522.

**520 542. Chemical Engineering Laboratory III.** (2) I, II. Cont. of Chemical Engineering Laboratory II. Five hours lab. a week. Pr.: Ch.E. 532.

**520 550. Chemical Reaction Engineering.** (3) I. Applied chemical kinetics and catalysis including the analysis and design of tubular, packed bed, stirred tank and fluidized bed

chemical reactors. Three hours rec. a week. Pr.: Ch.E. 521 and 531.

**520 560. Separational Process Design.** (2) I. Development of the basic theory and design of separational processes such as distillation, gas absorption, liquid extraction, adsorption and ion exchange. Two hours rec. a week. Pr.: Ch.E. 521 and 531.

**520 561. Chemical Process Dynamics & Control.** (3) II. A study of the unsteady state behavior of chemical processes, modeling and simulation of chemical processes, classical control theory and design. Two hours rec. and three hours lab. a week. Pr.: Ch.E. 550.

**520 570. Ch.E. Systems Design I.** (3) I. Basic concepts of optimization and process economics with application to the design of chemical processes. Two hours rec. and three hours lab. a week. Pr. or conc.: Ch.E. 550 and 560.

**520 571. Ch.E. Systems Design II.** (3) II. The synthesis and design of chemical processing systems. Emphasis will be placed on the solution of comprehensive systems design problems. One hour rec. and six hours lab. a week. Pr.: Ch.E. 570.

**520 580. Problems in Chemical Engineering.** Credit arranged. I, II, S. An introduction to chemical engineering research. Pr.: Approval of department head.

#### UNDERGRADUATE AND GRADUATE CREDIT

**520 715. 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. 550.

**520 725. 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. 530.

**520 735. 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. 530.

**520 745. 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. 550.

**520 795. Separation of Nuclear Fuels.** (4) II. A graduate level course investigating the chemical properties, the methods of separation, purification and reprocessing of uranium, Thorium and Plutonium. Three hours rec. and three hours lab. a week. Pr.: N.E. 590 or Ch.E. 560 (Cross-listed with Nuclear Engineering 580 795).

**520 805. 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. 715.

#### 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. 550.

**520 826. Advanced Unit Operations I.** (3) I, II, S. Advanced study of mass transfer operations. Three hours rec. a week. Pr.: Ch.E. 560.

**520 832. Advanced Unit Operations II.** (3) I, II, S. Advanced study of the operations involving mechanical separation of materials. Three hours rec. a week. Pr.: Ch.E. 560.

**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. 735.

**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. 3 hours rec. a week. Pr.: Ch.E. 735.

**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. 571, 735.

**520 875. Graduate Seminar in Chemical Engineering.** (1) I, II. Discussion of current advances and research in chemical engineering and related fields.

**520 898 Master's Report.** Credit Arranged. I, II, S. Topics selected with approval of department head and major professor.

**520 899. Master's Thesis.** Credit Arranged. I, II, S. Topics selected with approval of department head and major professor.

**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.

**520 999. Dissertation Research.** Credit Arranged. I, II, S. Topics selected with approval of department head and major professor.

## CIVIL ENGINEERING

Robert R. Snell,\* Head of Department

Professors Smith\* and Snell,\* Associate Professors Cooper,\* Rosebraugh,\* Schmid,\* Swartz,\* and Williams,\* Assistant Professors Wallace\* and Zovne,\* Instructor McCallum; 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 participation in, and ultimately to assume 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, and Transportation Planning. Laboratory facilities for advanced study and research are available in the areas of Structures, Soil Mechanics, Hydraulics, Sanitary Engineering and Transportation.

### Courses in Civil Engineering

#### UNDERGRADUATE CREDIT

**525 010. Freshman Engineering Assembly.** (0) II.

**525 015. Advanced 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.

**525 322. Soil and Foundation Construction.** (3) II. The origin, distribution and predictable variation of soil; soil testing and mechanics as applied to practical problems; soil investigations; foundation types, application and construction; ground water, drainage, and dewatering; earth moving including stable cuts in embankments. Not open to engineering students. Three hours rec. a week. Pr. or Conc.: Geol. 100.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**525 511. 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.

**525 522. Soil Mechanics I.** (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. 515.

**525 528. 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 3 hours lab. a week. Pr.: C.E. 522. Pr. or Conc.: C.E. 544.

**525 531. Analysis of Statically Determinate Structures.** (3) I, II. Analysis of statically determinate beams, frames, and trusses; calculation of influence lines and deflections. Three hours rec. a week. Pr.: Ap.M. 515.

**525 532. 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. Three hours rec. a week. Pr.: C.E. 531.

**525 542. 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. 531.

**525 544. 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. 532.

**525 551. 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. 571.

**525 552. 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. 551.

**525 563. 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.

**525 565. 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. 552 and 563.

**525 571. 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. 522.

**525 585. 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

**525 680. 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.

**525 718. Engineering Photo Interpretation.** (3) I. Photo interpretation techniques, types of aerial photographic film and their uses; application 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.

**525 722. 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. 522.

**525 724. 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. 522.

**525 728. 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. 544 and C. E. 528.

**525 732. 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. 532.

**525 741. 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. 518.

**525 743. 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. 544.

**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. 552.

**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. 563 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. 565 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. 565 or equiv.

**525 770. 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. 571.

**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. 571 or consent of instructor.

**525 773. 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. 571.

**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. 522.

**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. 571 or consent of instructor.

**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. 722.



**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. 722.

**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. 724.

**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. 732.

**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. 732, 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. 732, 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. 544.

**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. 542.

**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. 732, Ap.M. 701.

**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. 732, 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. 522, 552, 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. 732, Ap.M. 701.

**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.

**525 898 Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**525 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**525 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

## ELECTRICAL ENGINEERING

Wellington W. Koepsel,\* Head of Department

Professors Koepsel,\* Lucas,\* Ward, Jr.,\* Associate Professors Ahmed,\* Casey,\* Harris,\* Kaufman,\* Lenhart,\* Assistant Professors Calhoun,\* Cottom,\* Gallagher,\* Hummels,\* and Johnson,\* Instructors Alnema, Dollar, Hearn, 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

**530 241. 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. 200 or equivalent.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**530 501. 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. 511, 525, 557.

**530 502. Electrical Engineering Laboratory II.** (2) I, II, S. Cont. of Electrical Engineering Laboratory I. Three hours lab. a week. Pr.: E.E. 501; Pr. or conc.: E.E. 526, 581.

**530 503. Electrical Engineering Laboratory III.** (2) I, II. Cont. of Electrical Engineering Laboratory II. Three hours lab. a week. Pr.: E.E. 502, Pr. or conc.: 530.

**530 504. Electrical Engineering Laboratory IV.** (2) I, II, S. Cont. of Electrical Engineering Laboratory III. Three hours lab. a week. Pr.: E.E. 503.

**530 510. 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. 214.

**530 511. 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. 510.

**530 519. 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. 214.

**530 525. Electronics I.** (3) I, II, S. Fundamentals of electronic devices. Three hours rec. a week. Pr.: E.E. 510.

**530 526. Electronics II.** (3) I, II, S. Analysis and design of electronic circuits. Three hours rec. a week. Pr.: E.E. 511, 525.

**530 530. 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.

**530 557. Electromagnetic Theory I.** (3) I, II. Vector analysis, electrostatics, magnetostatics, Maxwell's equations, and applications. Three hours rec. a week. Pr.: Phys. 214, Math 240; Pr. or conc.: E.E. 510.

**530 581. 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. 511 and 557.

**530 590. 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.

#### UNDERGRADUATE AND GRADUATE CREDIT

**530 612. Circuit Theory III.** (3) I, II, S. One and two port network theory. Three hours rec. a week. Pr.: E.E. 511.

**530 625. 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.

**530 627. Electronics III.** (3) I, II. Continuation of 530 526. Three hours rec. a week. Pr.: E.E. 526.

**530 641. Design of Digital Systems I.** (3) II. Design considerations pertaining to computer organization, data representation, data flow circuits, storage organization, and input-output processes. Three hours rec. a week. Pr.: E.E. 241.

**530 642. Design of Digital Systems II.** (3) I. Hardware aspects pertaining to special purpose counters, computer input-output devices, A-D and D-A conversion, magnetic memory devices and systems, clocks, and interfacing. Three hours of rec. a week. Pr.: E.E. 645 and E.E. 641.

**530 643. Computer Logic Laboratory.** (1) II. Laboratory experience in the design, construction and debugging of simple digital systems and subsystems. Three hours of lab. a week. Pr. or conc.: E.E. 641.

**530 644. Digital Systems Design Laboratory.** (1) I. Practical aspects of digital system design including threshold voltage levels, propagation delay, clock requirements and interfacing problems associated with logic systems and analogic devices. Three hours of lab. Pr. or conc.: E.E. 642.

**530 645. Digital Electronics.** (3) I, II. The switching behavior of discrete electronic devices and integrated circuits, wave shaping circuits, sweep circuits, comparators, digital memories, and pulse generation. Three hours rec. a week. Pr.: E.E. 526.

**530 647. 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. 511 or permission of instructor.



**530 649. 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. 114 or 214, E.E. 526 or consent of instructor.

**530 658. Electromagnetic Theory II.** (3) I, II. Continuation of 530 557. Three hours rec. a week. Pr.: E.E. 447.

**530 659. 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. 658.

**530 661. 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. 526.

**530 682. Energy Conversion II.** (3) I, II, S. Continuation of 530 581. Three hours rec. a week. Pr.: E.E. 581.

**530 685. Electric Energy Systems Engineering I.** (3) I. A comprehensive study of the network aspects of existing electric-energy systems in the steady state. Vector-matrix descriptions and computer solutions are emphasized. Pr.: E.E. 581 or equivalent.

**530 686. Electric Energy Systems Engineering II.** (3) II. A comprehensive study of the systems control and operational aspects and the transient behavior of existing electric energy systems. Vector-matrix description and computer solutions are emphasized. Pr.: E.E. 530 and E.E. 670.

**530 688. Power System Stability.** (3) II. The analysis of power systems under transient and steady-state conditions. Three hours rec. a week. Pr.: E.E. 682.

**530 690. Problems in Electrical Engineering.** Credit arranged. I, II, S.

**530 695. 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. 658; Phys. 551 or N.E. 411 or 295.

**530 730. Control Systems Analysis and Design.** (3) II. Utilization of classical analysis techniques for control system compensation. State space control theory fundamentals are presented in addition to an introductory treatment of several major systems areas: Pr.: E.E. 510 or M.E. 612 or equivalent. (Cross-listed with 560 730)

**530 759. 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.: consent of instructor.

**530 771. 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. 530 or M.E. 712 or equivalent basic physiology and analog computer courses.

**530 772. 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 potential, 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. 771 or consent of instructor.

**530 791. 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. 612.

**530 792. 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. 511.

#### GRADUATE CREDIT

**530 816. 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. 612 or consent of instructor.

**530 817. 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. 816.

**530 830. 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. 730 or equiv.

**530 836. 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. 730 or equiv.

**530 838. 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. 730 or equiv.

**530 855. Advanced Electromagnetic Theory I.** (3) I. Mathematical development of electromagnetic wave theory. Three hours rec. a week. Pr.: E.E. 659.

**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.

**530 861. 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. 661.

**530 862. 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. 3 hours rec. a week. Pr.: E.E. 861.

**530 865. 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. 661.

**530 866. 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. 791 or equivalent and Stat. 770 or equivalent, or consent of instructor.

**530 890. Advanced Electrical Theory.** Credit arranged. I, II. Pr.: Consent of instructor.

**530 897. Research in Electrical Engineering.** Credit arranged. I, II, S. Special research problems in electrical engineering. Pr.: consent of instructor.

**530 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**530 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**530 957. 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.

**530 958. 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.

**530 960. 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. 861, 865.

**530 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

## GENERAL ENGINEERING

Ralph G. Nevins, Dean

### UNDERGRADUATE CREDIT

**500 010. 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.

**500 299. Honors Seminar in Engineering.** (1) I, II. Selected topics of general interest. Open to sophomores in the Engineering Honors Program for two semesters.

**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 Colloquium in Engineering.** (1) I, II. Selected topics of general interest. Open to juniors in the Engineering Honors Program for two semesters.

**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 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;\* Instructor Ebeling; 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 design to specify, predict and evaluate the results of any industrial system. In addition, strong consideration is given to the economic and human factors involved in industrial operations.

Industrial engineers find opportunities in all types of businesses and industries and in many different activities. Graduates may be engaged in staff positions in work study, work flow design, safety engineering, economic analysis, process design, process control, cost control, manufacturing management, ergonomics, production processes, 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 demand for Industrial Engineering graduates. The use of newly developed techniques and fresh interpretations of more traditional approaches to industry's problems helps to keep the course and curriculum 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.

The University Remote Computing Laboratory is located in the Industrial Engineering building. This adjunct facility contains a card reader and printer in addition to typewriter units connected directly to the university's IBM 360/50 computing system.

Undergraduate students from other scientific disciplines such as mathematics, chemistry, physics and computer science are encouraged to consider the possibility of a graduate degree in Industrial Engineering.

## Courses in Industrial Engineering

### UNDERGRADUATE CREDIT

**550 015. 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.

**550 050. 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.

**550 120. Introduction to Industrial Engineering.** (2) II. Basic functions in industrial organization and their interrelationships; management considerations involving product, process, plant and personnel. Two hours rec. a week.

**550 241. 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.

**550 271. Computer Applications in Engineering.** (1) I, II. Brief introduction to Fortran IV using the WATFIV Compiler. Examples using application programs such as APT, ECAP, ICES, and MPS/360. Three 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.: Physics 213.

**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. Pr.: I.E. 241.

**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

**550 501. 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.

**550 502. 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. 501.

**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. Pr. or Conc.: Stat. 510 or equivalent.

**550 531. Design Ergonomics I.** (2) I. Factors influencing the human use of architectural spaces especially work spaces. Design for health, safety, performance, comfort and pleasantness. Emphasis on evaluation, research and analysis. Two hours rec. a week. Pr.: Third year standing in College of Architecture and Design or the Department of Clothing, Textiles, and Interior Design, College of Home Economics.

**550 532. Design Ergonomics II.** (2) II. Factors influencing the human use of architectural spaces especially work spaces. Emphasis on effects of environmental conditions on health, safety, performance, comfort and pleasantness of users. Two hours rec. a week. Pr.: IE 531.

**550 541. 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.

**550 551. Work Design.** (3) I, II. Motion and time study; process analysis and charting; principles of motion economy and ergonomics; work stations and environments; biomechanics; micro-motion analysis and an introduction to standard data systems. Two hours rec. and three hours lab. a week. Pr.: I.E. 241.

**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. 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. 510.

**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. 510.

**550 575. Quantitative Techniques in Industrial Engineering.** (3) I, II. Problem formulation and conceptual models; ap-

plication 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. 501, 571, or consent of instructor.

**550 609. 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.

**550 625. 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 visual, auditory and thermal environments. Two hours rec. and two hours lab 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.

**550 655. Metal Casting.** (3) II. An advanced course in the materials and metals used in modern metal casting processes. Application of metallurgical principles in the study of cast metals. Two hours rec. and three hours lab. a week. Pr.: I.E. 241 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. 214, 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 fiber, solid-state solution and precipitation. Two hours rec. and three hours lab. a week. Pr.: I.E. 241, 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. 213.

**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.

**550 721. 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.

**550 762. 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.

#### GRADUATE CREDIT

**550 801. Problems in Industrial Engineering.** Credit Arranged. I, II, S. Pr.: Graduate standing.

**550 805. Engineering Administration.** (3) I. Engineering project administration; organization dynamics; quantitative factors in decision making; application of computerized and non-computerized games. Two hours rec. and three hours lab. a week. Pr.: I.E. 502 or consent of instructor.

**550 811. Advanced Production and Inventory Control.** (3) I. 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.

**550 830. 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.

**550 842. Engineering Reliability and Quality Assurance II.** (3) II. Design and management of reliability programs and quality assurance systems; mathematics of reliability, case studies of reliability evaluation programs. Three hours rec. a week. Pr.: I.E. 541 or consent of instructor.

**550 850. Human Engineering I.** (3) I. Focus on man: human factors affecting work, 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.

**550 865. Simulation of Industrial and Management Systems.** (3) II. 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. 770 or consent of instructor.

**550 872. Industrial Forecasting Techniques and Applications.** (3) I. 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.

**550 874. Operations Research I.** (3) I. A study of the methods of operations research including formulation of models and derivation of solutions by various optimization techniques. Introduction to deterministic models and techniques, including optimization techniques, sequencing and replacement, linear programming, geometric programming and dynamic programming. Three hours rec. a week. Pr. or conc.: I.E. 572 or equiv.

**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.

**550 892. 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.

**550 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**550 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**550 930. 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 or 865 and 830.

**550 950. 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.

**550 951. Applied Decision Theory.** (3) II. Bayes theorem, Bayesian estimators utility, loss function and risk, minimax strategies, elementary game theory and linear programming. Pr.: Stat. 511 or 770.

**550 971. Industrial Queueing Processes.** (3) I, 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. 770 or equivalent.

**550 973. 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.

**550 975. Operations Research II.** (3) II. 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. 770.

**550 976. 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.

**550 982. Nonlinear Programming.** (3) I, 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. 975.

**550 983. Dynamic Programming.** (3) I, 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. 770.

**550 985. 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.

**550 990. 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.

**550 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

## MECHANICAL ENGINEERING

J. Garth Thompson,\* Head of Department

Professors Appl,\* Azer,\* Crank,\* Duncan,\* Flinner,\* Miller,\* Nevins,\* Rohles,\* Tripp,\* and Wood; Associate Professors Gorton,\* Gowdy,\* Lindholm,\* Sprague,\* Swearingen,\* Thompson,\* Turnquist,\* and Walker;\* Assistant Professors Annis,\* Ball,\* and Pauli; Emeritus: Dean Durland; Professors Brainard, Helander, Hobson, Messenheimer, and Smutz.

Mechanical engineering graduates render professional services that vary from the development of machines to the management of industrial operations; from theoretical systems to the satisfaction of societal needs.

Mechanical engineering deals with the conversion, transfer and control of energy for the benefit of man. Mechanical engineers design, develop, create, supervise, manufacture and sell components and systems which are utilized in the processes involving energy. KSU graduates are contributing to the benefit of mankind by their work in pollution control, computers, food supply and processing, communication systems, power generation and distribution, petroleum location and production, aircraft, environmental control, transportation, construction, atomic energy, etc.

To provide a background for this wide range of activities the mechanical engineering curriculum is founded on a broad base of the basic sciences of mathematics, physics, chemistry and mechanics. The curriculum includes engineering science courses in the sophomore and junior years and engineering application courses in the junior and senior years. Laboratory courses and humanistic and social science electives are integrated through the curriculum. The entire curriculum serves as preparation for the senior design laboratory where a team of three to five students is assigned to work on an authentic engineering problem supplied by an industrial sponsor. Considerations of cost, social impact, economics, product life, and the like are usually involved, as well as the technical solution of the problem. At the end of the project a written report is prepared and a verbal presentation made to engineers and officials of the sponsoring company. Frequently a working model is fabricated and demonstrated. This brief internship gives the new mechanical engineering graduate the experience and confidence to move quickly into a productive and satisfying career.

Because of the broad and fundamental nature of the undergraduate curriculum, mechanical engineering provides an excellent background for careers in such fields as law, medicine, social services, urban design, and business management. Professionals with this type of interdisciplinary background are ideally prepared to contribute to the solutions of the most pressing social and technological problems of our day.

The electives in the curriculum provide the opportunity for students to develop their own special interests. Students with clear career objectives may be permitted to substitute appropriate courses for some of the "required" courses.

### Graduate Study

The Department of Mechanical Engineering offers course work leading to the Master of Science and Doctor of Philosophy degrees. 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 University's digital and analog computers, and the various engineering laboratories and shops.

Many research and teaching assistantships and free-grant fellowships are available to graduate students.

### Courses in Mechanical Engineering

#### UNDERGRADUATE CREDIT

**560 015. 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.

**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. 214; Math. 240.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**560 513. 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 213; Math. 222.

**560 523. Thermodynamics II.** (3) I, II. Continuation of Thermodynamics I. Gas mixtures, psychrometry, generalized thermodynamic relations and reactive systems. Three hours rec. a week. Pr.: M.E. 513.

**560 527. 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. 571, Math. 240 or equiv.

**560 533. 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. 512.

**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. 513, E.E. 510.

**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. 513.

**560 563. 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. 515, M.E. 533.

**560 575. 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. 527, 533.

**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.

#### UNDERGRADUATE AND GRADUATE CREDIT

**560 606. 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.

**560 613. Thermodynamics III.** (3) I, II. 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. 523.

**560 620. Internal Combustion Engines.** (3) II. Analysis of cycles, design and performance characteristics. Three hours rec. a week. Pr.: M.E. 523.

**560 622. Environmental Engineering I.** (3) I, II. Psychrometry; heating-cooling system design; air quality measurement and control; effect of air pollution. Three hours rec. a week. Pr.: M.E. 527.

**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 visual, auditory and thermal environments. Two hours rec. and two hours lab a week. (Cross listed with I.E. 625) Pr.: Senior standing in engineering.

**560 628. 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. 571, Math. 240 or equiv.

**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. 523, Ap.M. 571, Math. 240 or equiv.

**560 633. Thermodynamics of Modern Power Cycles.** (3) I. The first and second law analysis of modern steam cycles for both fossil-fuel and nuclear-fuel installations. Cycle efficiency and factors affecting performance, such as cycle design, load factor and auxiliaries. Thermal pollution resulting from steam cycles. Three hours rec. a week. Pr.: M.E. 513.

**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. 527, 563.

**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. 512, Math. 240 or equiv.

**560 671. 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.

**560 699. Problems in Mechanical Engineering.** Credit arranged I, II, S. Pr.: Approval of department head.

**560 712. 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. 510; Pr. or conc.: Ap.M. 571.

**560 713. 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. 523, Ap.M. 571, 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. 523, Ap.M. 571.

**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. 527.

**560 728. 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. 628.

**560 730. Control Systems Analysis and Design.** (3) II. Utilization of classical analysis techniques for control system compensation. State space control theory fundamentals are

presented in addition to an introductory treatment of several major systems areas. Pr.: E.E. 530 or M.E. 712 or equivalent. (Cross-listed with 530 730).

**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. 730.

**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. 712 or consent of instructor.

**560 742. 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. 571 and one course in statistics or consent of instructor.

**560 746. 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.

**560 756. 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. 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. 533.

**560 760. Engineering Analysis I.** (3) I, S. 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.

**560 766. Aeronautical Engineering Design.** (2) I. Design problems related to aircraft, missiles, and space vehicles. Six hours lab. a week. Pr.: M.E. 527, 631, 728.

**560 771. 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. 671, Math. 240 or equiv., Ap. M. 571.

## GRADUATE CREDIT

**560 813. 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. 523, 527 or consent of instructor.

**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. 527.

**560 850. Advanced Power Plant Engineering.** Credit arranged. II. 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.: Consent of instructor.

**560 857. 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. 533.

**560 860. Engineering Analysis II.** (3) II. Cont. of Engineering Analysis I. Emphasis placed on continuous systems. Three hours rec. a week. Pr.: M.E. 760 or consent of instructor.

**560 890. Laboratory Investigations in Mechanical Engineering.** Credit arranged. I, II, S. Pr.: Approval of department head.

**560 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**560 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**560 915. 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.

**560 916. 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.

**560 922. Advanced Air Conditioning.** (3) I. Advanced psychrometric analysis; physiological factors; biotechnology and heat transfer. Three hours rec. a week. Pr.: M.E. 622.

**560 925. 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.

**560 931. 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.

**560 935. 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. 527.

**560 942. 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. 527.

**560 943. 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. 527.

**560 965. 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.

**560 999. Dissertation Research in Mechanical Engineering.** Ph.D. level. Credit arranged. I, II, S. Pr.: Approval of dept. head and major professor.

## NUCLEAR ENGINEERING

Richard E. Faw,\* Head of Department

Professors Donnert,\* Faw,\* and Mingle;\* Associate Professors Eckhoff,\* and Merklin;\* Assistant Professors Clack, Hightower, Krick,\* and Shultis;\* Instructor Verser.

The curriculum leading to the B.S. degree in nuclear engineering is designed to prepare students for professional positions in industry, government and private practice. Through technical electives, the student may organize a program suited to his particular needs and interests. For example, the student may elect a program leading to engineering practice with various specialties or to postgraduate study in engineering, science, medicine, or law. Sample elective programs of study are listed in an accompanying section.

As a profession, nuclear engineering requires understanding and competence in many and diverse disciplines. Hence, undergraduate nuclear engineering students at Kansas State University take engineering science courses in chemical process analysis, thermodynamics, particle and continuum dynamics, electronics, circuit theory, and economics. With background established in these courses, able students will then be prepared for course work in the Department of Nuclear Engineering involving nuclear reactor design principles, neutron and charged particle interactions, radiation detection, radiation protection, radiation effects on materials, nuclear fuel processing, industrial isotope applications, nuclear power cycle thermodynamics and siting, regulation and environmental impact assessment of nuclear power plants.

### 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. Programs of study will be arranged 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, a radiation shielding facility located on a 180-acre remote site with experimental shielding structures, pumped sources 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 systems, neutron spectrometer systems, two multiparameter pulse-height analysis systems and four multi-channel analyzers (one with pulse-height, time-of-flight, pulsed-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, two thermoluminescence-



dosimeter systems, three digital logic training systems, and two desktop electronic calculators.

## Courses in Nuclear Engineering

### UNDERGRADUATE CREDIT

**580 110. Nuclear Engineering Concepts.** (2) I. This first course in the Nuclear Engineering curriculum acquaints freshmen students with the professional activities 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.

**580 290. Introduction to Nuclear Engineering Analysis.** (3) II. Introduction to analytical, statistical, and numerical analysis as applied to nuclear engineering, including computer programming. Three hours rec. a week.

**580 295. 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; 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.: N.E. 290.

**580 410. Introduction to Nuclear Engineering.** (3) I, II, S. 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 radioisotope applications engineering. Three hours rec. a week. Pr.: Junior standing in engineering or consent of instructor.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**580 500. Applied Nuclear Engineering Analysis.** (3) I. Methods and applications of analytical, statistical, and numerical analysis as applied to nuclear engineering including computer programming. Three hours rec. a week. Pr.: Junior standing in engineering.

**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.: Consent of instructor.

**580 511. Radioisotope Applications Engineering.** (2) I, II. A laboratory course designed to familiarize the student with experimental parameters of importance in the design of engineering systems which make use of radioisotopes. Six hours of lab. per week. Pr.: N.E. 295 or N.E. 410.

**580 515. 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. 295.

**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. 295. Pr. or conc.: Ap.M. 571, M.E. 513.

**580 590. Nuclear Fuel Cycle.** (3) I. A course to familiarize the student with uranium conversion procedures, enrichment

techniques, nuclear fuel burnup, spent fuel transport, reprocessing of spent fuel, fission product disposal methods, and economics of the nuclear fuel cycle. Three hours rec. per week. Pr.: N.E. 515.

**580 599. Neutron and Particle Interactions.** (3) II. Engineering approach to the mechanics of the interactions of neutrons and other radiation with matter; production and detection of neutrons and other types of radiation. Three hours rec. a week. Pr.: N.E. 295, 500.

### UNDERGRADUATE AND GRADUATE CREDIT

**580 615. Nuclear Materials Control and Safeguards.** (3) 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.

**580 630. Applied Reactor Theory.** (3) I. Diffusion and slowing down of neutrons. Theory of critical and sub-critical reactors. Reactor dynamics. Three hours rec. a week. Pr.: N.E. 599.

**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. 630.

**580 650. Environmental Radiation.** (3) I. Radionuclides and ionizing radiation in the environment of natural and artificial origin. Biological effects of radiation. Detection and measurement of environmental radiation. Licensing and regulation pertaining to environmental radiation. Pr.: NE 295 or NE 410 or consent of instructor.

**580 655. Radiation Protection Engineering.** (3) II. Principles of radiation protection. Radiation shielding, radiation dosimetry, and administrative aspects of radiation protection. Special applications in nuclear plant design, fuel transportation, and fuel reprocessing. Three hours rec. a week. Pr.: N.E. 295, 511 or consent of instructor.

**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, 630.

**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. Characteristics and effects of nuclear explosives; Plowshare tests; industrial uses of nuclear explosives; scientific applications of nuclear explosions. Pr.: N.E. 630, 599 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) I. 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.: N.E. 515.

**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. 630.

**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. 630.

**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.

**580 761. Radiation Detection and Measurement.** (4) 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. and three hours lab. per week. Pr.: N.E. 511 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. 511, 526, 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. 599.

**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. 599, Chem. 595, or consent of instructor.

**580 791. 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. 599 or consent of instructor.

**580 795. Separation of Nuclear Fuels.** (4) II. A graduate level course investigating the chemical properties, the methods of separation, purification and reprocessing of uranium, thorium and plutonium. Three hours rec. and three hours lab. a week. Pr.: N.E. 590 or Ch.E. 560 (Cross-listed with Chemical Engineering, Ch.E. 795).

#### GRADUATE CREDIT

**580 810. Research in Nuclear Engineering.** Credit arranged. I, II, S. Independent investigation of an advanced nuclear engineering problem. 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.

**580 851. Nuclear Engineering Laboratory.** (2) I. Reactor kinetics, reactor noise analysis determinations of  $\beta/\lambda$ , 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.

**580 860. Advanced Topics in Nuclear Engineering.** (Var.) I, II, S. A presentation of various special topics covering advanced nuclear engineering specialties. Pr.: Consent of instructor.

**580 865. 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. 740 or Math. 761 or consent of instructor.

**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.

**580 895. Nuclear Systems Design.** (3) I. 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.

**580 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

**580 920. 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.

**580 940. 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.

**580 945. 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, 705.

**580 955. 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, 940, 945.

**580 970. 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.: Consent of instructor.

**580 991. Controlled Thermonuclear Reactions II.** (3) II. Continuation of N.E. 791. Collisionless plasmas; plasma waves and instabilities; plasma diagnostics, experimental approaches. Other topics of current interest. Three hours rec. a week. Pr.: N.E. 791.

**580 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head.

#### 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 in 1910 by the Board of Regents for the purpose of undertaking research of engineering and manufacturing value to 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 on includes:

- Structural characteristics of concrete panels and of beams with web openings.

- Waste disposal problems in cattle feedlots.

- Food science and grain processing.

- Electromagnetic wave propagation.

- Evaluation of information concerning resources from earth satellites.

- The effect of shifting light-dark cycles on performance.

- 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.

- Application of integrated circuits to agricultural machinery.

- Air and water pollution control.

## **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 under the Dean of the College of 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 communication 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.

## **Center for Energy and Power Research and Training**

The goal of the Center is to conduct interdisciplinary research and to provide training in the planning,

design, and operation of fuel production processes; power generation, transportation, and utilization systems; and in the management of energy resources.

The Center carries out basic as well as mission-oriented interdisciplinary research on problems related to energy resources and power production, disseminates the results of this research through seminars and publication of reports, and provides training to students and personnel from government and industry to upgrade their professional competence.

The mission of the Center is fulfilled using systems analysis and synthesis techniques. Implicit in this fulfillment is the consideration of economics, safety, and environmental and aesthetic aspects of the systems.

### **Center for Transportation Research and Training**

The Center's goal is to conduct interdisciplinary research and training in the planning, design, and operation of rural and urban transportation systems.

The Center carries out interdisciplinary mission-oriented research concerning national, regional, state and local transportation problems; disseminates the results of research through publication of reports and seminars for university, industry and government representatives to assure that the results can and will be applied to the solution of practical transportation problems; and provides training to students and personnel from the transportation community to upgrade their professional competence.

In performing the stated missions of the Center, systems analysis and synthesis techniques will be emphasized, and the safety, aesthetic and environmental aspects of transportation systems will not be neglected.

### **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 use 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.

### **NUCLEAR ENGINEERING SHIELDING FACILITY**

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**

Richard E. Faw, 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 (th) and pulsed operation to 250,000 kilowatts (th) 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. Neutron 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.

### **DEFENSE CIVIL PREPAREDNESS AGENCY REGIONAL TECHNICAL SUPPORT CENTER**

F. A. Verser, Director

Kansas State University maintains a Regional Technical Support Center which administers and operates the Direct-Mail Shelter Development System of the Defense Civil Preparedness Agency.

The Center is operated by the Department of Nuclear Engineering and consists of a full-time adviser and several part-time assistants. These individuals are highly qualified fallout 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. The Center also provides guidance to architects and engineers in the States of Nebraska, Kansas, Missouri, Iowa, Colorado, Wyoming, North Dakota, and South Dakota on the development of shelters to provide protection against nuclear weapon blast, fire effects, severe windstorms, tornadoes, earthquakes, noise pollution, etc. The director of the Center also is available to state and local officials to conduct seminars, workshops, and lectures on civil defense planning including fallout shelter analysis and design. The Center does not actually design 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 works closely with the Cooperative Extension Service and the Office of Business Management Services at Kansas State University 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, 150 Seaton Hall, Kansas State University, Manhattan, Kansas 66506.





## THE COLLEGE OF

# Home Economics

Doretta Hoffman,\* Dean  
 Ruth Hoeflin,\* Associate Dean  
 Jean Reehling, Assistant Dean  
 Jean Sego, Assistant to the Dean

In 1873, K-State offered the first home economics course in the U.S. for college credit. This great heritage has served as a basis for dynamic and innovative home economics programs in higher education. Today, the College of Home Economics at Kansas State University is recognized as one of the largest and most progressive institutions for the education of professional home economists.

Home Economics at Kansas State University is an exciting and challenging educational experience. Students learn to solve everyday problems and to become involved in the future needs of all people. The uniqueness of home economics involves the integration of knowledge gained from the basic liberal arts as applied in courses that focus on the home, family, and quality of living for each individual.

### AN UNDERGRADUATE DEGREE IN HOME ECONOMICS

Programs of study leading to the Bachelor of Science degree are offered within the five curriculums in the College of Home Economics. These curriculums are designed to interest students with varying academic and professional objectives. The curriculums and options are listed and described on the following pages.

#### 1. Curriculum in Home Economics with Options

- Clothing Retailing
- Textile Research
- Fashion Design
- Interior Design
- Community Services
- Extension
- Early Childhood Education
- Consumer Interest

- Housing and Equipment
- Foods and Nutrition in Business
- Foods and Nutrition Science
- Dietetics and Institutional Management
- Home Economics Education - Vocational Teaching
- Radio and Television

#### 2. Curriculum in Home Economics and Journalism

#### 3. Curriculum in Home Economics with Liberal Arts

#### 4. Curriculum in Restaurant Management

#### 5. Curriculum in Food Science and Industry (offered jointly with College of Agriculture)

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.

### HONORS PROGRAM AND MASTER'S DEGREE PROJECT

Students with outstanding academic records are invited to participate in the Home Economics Honors Program. High School students are selected according to their rank in the upper percent of their class and scores on the American College Test. Transfer students and upperclassmen with a 3.5 cumulative grade point average who are recommended by faculty members also are eligible. Special advisers help honor students plan their individual programs of study which include honors courses, seminars, and independent study.

The Home Economics Master's Degree Project is for outstanding students with demonstrated ability for advanced study. Starting with second semester freshmen, students with a "B" average or better are invited to join the project. Selected members of the graduate faculty advise those who choose to participate. Together they plan educational experiences that can lead to a graduate program in a specialized area of the student's choice.

## GRADUATE STUDY OPPORTUNITIES

The College of Home Economics offers excellent opportunities for graduate study for the student who wishes to continue beyond the Bachelor of Science Degree. All departments in the College of Home Economics, including General Home Economics and Home Economics Education, offer the Master of Science degree. In addition to the M.S. degree, the Department of Foods and Nutrition offers the Doctor of Philosophy degree. Graduate research and teaching assistantships are available to qualified students.

Application forms and additional information can be obtained from the Dean's Office, College of Home Economics, Justin Hall, Kansas State University, Manhattan, Kansas 66506.

## TRANSFER STUDENTS

Careful planning enables a student to transfer to the College of Home Economics at Kansas State University without loss of credit. 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.

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.

### TWO-YEAR PROGRAM WITH HOME ECONOMICS COURSES

Freshman Year		Credit Hours*
Courses		
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		Credit Hours*
Courses		
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.

## COOPERATIVE EXTENSION SERVICE

The Cooperative Extension Service with educational programs designed to improve the quality of life of individuals and families and to improve communities is an integral part of the Land-Grant Institution. The Extension Service provides professional opportunities for Home Economics graduates in home economics-family living programs and 4-H youth programs.

State Extension services need personnel with different kinds of competencies. Some positions in Extension Home Economics require that the individual have a broad background in all subject-matter areas of home economics. Some require that the individual be specialized in one or more closely related Home Economics subject-matter areas. Course work in educational program development and teaching-learning methods and procedures is desirable.

A student interested in a position with the Cooperative Extension Service may wish to confer with a county, area, or state extension worker to find out about job responsibilities.

## 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.

\*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.



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, 13-14 Hours

I. Des.	611 101	Design for Contemp. Living	3
F.C.D.	620 210	The Preschool Child	3
		OR	
F.C.D.	620 230	Intro. Human Development	3
		OR	
F.C.D.	620 272	The Helping Relationship	3
		OR	
F.C.D.	620 350	Family Relationships	2
F. Ec.	630 300	Family Economics	3
F. & N.	640 132	Basic Nutrition	3
		OR	
F. & N.	640 133	Food for Man	3
		OR	
F. & N.	640 301	Trends in Food Products	3
Gen. H.E.	650 110	Intro. to H. Ec.	1
Gen. H.E.	650 400	H. Ec. Seminar	1

#### Professional and Supporting Courses, 52 to 87 Hours

(See specific option)

#### Unrestricted Electives, 4 to 26 Hours

#### Other

Physical Education (2semesters)	0
Total for Graduation	124

\*Not required in Home Economics Education

## OPTION IN CLOTHING AND RETAILING

### Department of Clothing, Textiles, and Interior Design

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.	305 260	Fund. of Accounting	4
Bus. Ad.	305 420	Management Concepts	3
Bus. Ad.	305 440	Marketing	3
Bus. Ad.	305 540	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.	610 600	Fashion Store Ser. Lab.	5
C.&T.	610 635	Fashion Merchandising II	3
C.&T.	610 645	Textile and Apparel Industry	3
C.&T.	610 670	Textiles for Merchandising	3
C.&T.	610 730	History of Costume	3
I. Des.	611 215	Intro. Int. Des.	2
		OR	
C.&T.	610 220	Costume Des. I	2

Option Requirements	52
Unrestricted Electives	24-25
Curriculum Requirements*	47-48

124

\*Under Liberal-General Education Additional Requirements, take Hist. 101, Math. 100, and Chem. 110 and 190 or Physics 101-104.

## OPTION IN TEXTILE RESEARCH

### Department of Clothing, Textiles, and Interior Design

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	020 521	Gen. Biochemistry	3
Mathematics	245 100	College Algebra	3
Physics	265 115	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
		OR	
C.&T.	610 220	Costume Design I	2
		OR	
I. Des.	611 215	Intro. Interior Design	2
C.&T.	610 260	Textiles	3
C.&T.	610 645	Textile and Apparel Ind.	3
C.&T.	610 670	Textiles for Merchandising	3
C.&T.	610 755	Advanced Textiles	3
F. Ec.	630 420	The House OR	3
F. Ec.	630 605	Consumer and the Mkt.	3
F.&N.	640 601	Food Science	4

Option Requirements	57-58
Unrestricted Electives	18-20
Curriculum Requirements*	47-48

124

\*Under Liberal-General Education Additional Requirements, take two Modern Language courses in sequence.

## OPTION IN FASHION DESIGN

### Department of Clothing, Textiles, and Interior Design

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	209 220	Water Color I	2
Art	209 225	Fig. Drawing I	2
Modern Lang.	253 111	French I	4
C.&T.	610 131	Socio-Econ. of Clothing	3
C.&T.	610 210	Pattern Study and Garment Construction	3
		OR	
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.	610 395	Window Display	3
C.&T.	610 500	Costume Design II	3
C.&T.	610 610	Pattern Dev. Theory I	3
C.&T.	610 720	Design by Draping	3
C.&T.	610 740	Costume Design III	3
C.&T.	610 730	History of Costume	3
I. Des.	611 740	History of Fabric Design	3

Option Requirements	59
Unrestricted Electives	17-18
Curriculum Requirements*	47-48

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 INTERIOR DESIGN

Department of Clothing, Textiles, and Interior Design

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.	611 540	Interior Design II	3
I. Des.	611 545	Interior Design Practicum	3
I. Des.	611 550	Contemporary Homes	3
I. Des.	611 730	Interior Design III	3
I. Des.	611 745	Historic Furn. Design	3
I. Des.	611 740	Historic Fabric Design	3

### CHOOSE ONE AREA OF SPECIALIZATION

#### Area I — Designing Living Environments

Architecture		*Architecture courses	4
Art	209 210	Drawing II	2
		OR	
Art	209 220	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.	610 565	Design by Weaving	2

Under Liberal-General Education take two Modern Languages courses in sequence and a minimum of four hours in Physical Science.

#### Area II — Retailing

Art	209 230	Sculpture I	2
		OR	
Art	209 265	Ceramics I	2
Bus. Ad.	305 260	Fund. of Accounting	4
Bus. Ad.	305 340	Sales Communication	3
Bus. Ad.	305 420	Managements Concepts	3
Bus. Ad.	305 440	Marketing	3
Bus. Ad.	305 540	Consumer Behavior	3
I. Des.	611 600	Int. 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	13-21
Curriculum Requirements**	47-48

124

\*Selected in consultation with advisor.

\*\*See Area of Specialization for Additional Requirements.

## OPTION IN EARLY CHILDHOOD EDUCATION

Department of Family and Child Development

This option is for students who wish to work in pre-kindergarten education programs in administrative or teaching positions. Such positions require work with parents and community resources as well as with young children.

### Professional and Supporting Courses

Pol. Sci.	269 110	Prin. Pol. Science	3
Sociology	277 211	Intro. to Sociology	3
		Social Science electives at 300 level or above**	9
		Communications elective*	3
		Family-Community Health elective	3
Speech	281 440	Language Development	3
C.&T.	610 131	Socio.-economics of clothing	3
		OR	
C.&T.	610 440	Social Psych. Aspects of Clothing	3
F.C. Dev.	620 210	The Preschool Child*	3
F.C. Dev.	620 211	The Preschool Child Lab.	1
F.C. Dev.	620 230	Intro. to Human Development*	3
F.C. Dev.	620 350	Family Relationships*	2
F.C. Dev.	620 330	Middle Childhood	2
F.C. Dev.	620 331	Middle Childhood Lab.	1
F.C. Dev.	620 610	Creative Experiences	2
F.C. Dev.	620 611	Creative Experiences Lab.	1
F.C. Dev.	620 620	Advanced Study of Children	3
F.C. Dev.	620 650	The Family	3
F.C. Dev.	620 625	Directed Experiences in Early Childhood Education	8
F.C. Dev.	620 670	Parent Education	3
F.C. Dev.	620 626	Child Developmental Center Programming	3
F.&N.	640 132	Basic Nutrition*	3
F.&N.	640 603	Child Nutrition	3
		Professional Elective*	3

Option Requirements ..... 68-71

Unrestricted Electives ..... 6-9

Curriculum Requirements\*\* ..... 47-48

\*If not taken in Home Economics Core.

\*\*Selected in consultation with faculty adviser.

\*\*\*Under Liberal-General Education take six hours of literature or language; eight hours Biological Science and four hours Physical Science.

## OPTION IN COMMUNITY SERVICES

Department of Family and Child Development

This option is for students interested in the **social work sequence, family life education, and youth programs.**

### Professional and Supporting Courses

Pol. Sci.	269 110	Prin. Pol. Science	3
Sociology	277 211	Intro. to Sociology	3
		Social Science electives at 300 level or above**	9
		Communications elective*	3
		Socio.-Economics of Clothing	3
		OR	
C.&T.	610 131	Social Psych. Aspects of Clothing	3
C.&T.	610 440	The Preschool Child*	3
F.C. Dev.	620 210	The Preschool Child Lab.	1
F.C. Dev.	620 211	Intro. to Human Development*	3
F.C. Dev.	620 230	Middle Childhood	2
F.C. Dev.	620 330	Middle Childhood Lab.	1
F.C. Dev.	620 331	Family Relationships*	2
F.C. Dev.	620 350	The Adolescent	2
F.C. Dev.	620 630	The Adolescent Lab.	1
F.C. Dev.	620 631	The Family	3
F.C. Dev.	620 650	Parent Education	3
F.C. Dev.	620 670	Basic Nutrition*	3
F.&N.	640 132		

### CHOOSE ONE AREA

#### Social Work Sequence

F.C. Dev.	620 260	Introduction to Social Work	3
Soc.	277 510	Social Welfare as Social Institution	3
F.C. Dev.	620 560	Skills & Tech. in Pract. of Social Work	3
F.C. Dev.	620 465	Field Experience	6
		OR	
F.C. Dev.	620 580	Directed Field Experience	8
		Additional hours chosen in consultation with faculty advisor	3-6

\*If not taken in core

\*\*Selected in consultation with faculty advisor



**Youth Work**

F.C. Dev.	620 260	Introduction to Social Work ..	3
F.C. Dev.	620 400	Field Study .....	8
		Additional hours chosen in consultation with faculty advisor .....	7-10

**Family Life Education**

F.C. Dev.	620 260	Introduction to Social Work ..	3
F.C. Dev.	620 400	Field Study .....	8
		Additional hours chosen in consultation with faculty advisor .....	7-10

Option Requirements .....	60-66
Unrestricted Electives .....	10-17
Curriculum Requirements .....	47-48

**OPTION IN EXTENSION****Department of Family and Child Development**

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. Science .....	3
Soc.	277 211	Intro. to Sociology .....	3
		Social Science electives at 300 level or above** .....	9
A.&O.	410 605	Communications elective** ..	3
A.&O.	410 752	Ext. Organization and Program .....	3
C.&T.	610 131	Principles of Teaching Adults in Educ. ....	3
C.&T.	610 440	Socio-Economics of Clothing OR Social Psych. Aspects of Clothing .....	3
F.C. Dev.	620 210	The Preschool Child*	3
F.C. Dev.	620 211	The Preschool Child Lab. ....	1
F.C. Dev.	620 230	Intro. to Human Development*	3
F.C. Dev.	620 330	Middle Childhood .....	2
F.C. Dev.	620 331	Middle Childhood Lab. ....	1
F.C. Dev.	620 350	Family Relationships*	2
F.C. Dev.	620 630	The Adolescent .....	2
F.C. Dev.	620 631	The Adolescent Lab. ....	1
F.C. Dev.	620 650	The Family .....	3
F.&N.	640 132	F.C. Dev. Elective .....	3
		Basic Nutrition*	3
		Professional Electives** .....	12

Option Requirements .....	60-63
Unrestricted Electives .....	13-17
Curriculum Requirements** ..	47-48

\*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 CONSUMER INTEREST****Department of Family Economics**

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.	620 210	Preschool Child .....	3
		OR	
F.C. Dev.	620 650	The Family .....	3
F. Ec.	630 405	Family Finance .....	3
F. Ec.	630 420	The House .....	3
F. Ec.	630 440	Household Equipment .....	3
F. Ec.	630 460	Home Management .....	2
F. Ec.	630 465	Home Management Lab. ....	2
F. Ec.	630 700	Fam. in Amer. Econ. ....	3
F. Ec.	630 605	Consumer and the Mkt. ....	3
F.&N.	640 132	Basic Nutrition .....	3
		Prof. Electives* .....	15

Option Requirements .....	61
Unrestricted Electives (if F.C. Dev. 650 is elected, take F.C. Dev. 350) .....	15-16
Curriculum Requirements** ..	47-48

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\*Selected in consultation with faculty advisor.

\*\*Under Liberal-General Education Additional Requirements take Math. 100 and Stat. 320.

**OPTION IN HOUSING AND EQUIPMENT****Department of Family Economics**

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	221 120	Intro. Org. & Biochem. ....	5
Mathematics	245 100	College Algebra .....	3
Mathematics	245 150	Plane Trigonometry .....	3
		OR	
Statistics	285 320	Elem. of Statistics .....	3
Physics	265 115	Descriptive Physics .....	4
C.&T.	610 260	Textiles .....	3
F.C. Dev.	620 650	The Family .....	3
		OR	
Sociology	277 640	Sociology of the Family .....	3
F. Ec.	630 405	Family Finance .....	3
F. Ec.	630 420	The House .....	3
F. Ec.	630 440	Household Equipment .....	3
F. Ec.	630 460	Home Management .....	2
F. Ec.	630 465	Home Management Lab. ....	2
F. Ec.	630 605	Consumer and the Mkt. ....	3
F. Ec.	630 720	Housing Requirements of Families .....	2
F. Ec.	630 740	Adv. Household Equip. ....	3
F.&N.	640 601	Food Science .....	4
		Prof. Electives* .....	16

Option Requirements .....	67
Unrestricted Electives (if F.C. Dev. 650 is elected, take F.C. Dev. 350) .....	9-10
Curriculum Requirements .....	47-48

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\*Selected in consultation with faculty advisor.

\*\*Under Liberal-General Education Additional Requirements, take Biol. 198 and 450; Soc. 211.

**OPTION IN FOODS AND NUTRITION SCIENCE**

Department of Foods and Nutrition

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**

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	211 120	Intro. Org. & Biochem.	5
		Physics Course	4

**CHOOSE ONE OF THE PROFESSIONAL AREAS I, II, III****Area I — Business Organization**

F.&N.	640 300	Meal Management	3
F.&N.	640 301	Trends in Food Products*	3
F.&N.	640 599	Principles of Food	
		Demonstration	2
F.&N.	640 601	Food Science	4
F.&N.	640 602	Principles of Nutrition	3
F.&N.	640 612	Prin. Fd. Prod. Dev. &	
		Control	3
F.&N.	640 680	Seminar in Foods and	
		Nutrition	2
F.&N.	640 790	Food Research Techniques	3
IM	660 440	Quantity Foods	4
		Business Electives	6
		Professional Electives	2-5

**Area II — Extension Service**

A.&O.	410 605	Org. & Prog. in Adult	
		Education	3
A.&O.	410 752	Methods of Adult Teaching	3
F. Ec.	630 405	Family Finance	3
F. & N.	640 300	Meal Management	3
F. & N.	640 301	Trends in Food Products*	3
F.&N.	640 599	Principles of Food	
		Demonstration	2
F.&N.	640 601	Food Science	4
F.&N.	640 602	Principles of Nutrition	3
F.&N.	640 680	Seminar in Foods & Nutrition	2
IM	660 440	Quantity Foods	4
		Professional Electives	8-11

**Area III — Communication Services**

Journalism	289 275	Reporting I and Lab.	3
Journalism	289 320	Principles of Advertising	3
		OR	
Journalism	289 630	Public Relations	3
Journalism	289 335	Editing I	3
Journalism	289 525	Family Page	3
F.&N.	640 300	Meal Management	3
F.&N.	640 301	Trends in Food Products*	3
F.&N.	640 599	Principles of Food	
		Demonstration	2
F.&N.	640 601	Food Science	4
F.&N.	640 602	Principles of Nutrition	3
F.&N.	640 680	Seminar in Foods & Nutrition	2
IM	660 440	Quantity Foods	4
		Professional Electives	5-8

Option Requirements	57-63
Unrestricted Electives	13-20
Curriculum Requirements**	47-48

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\*Option requirement, unless taken as part of Home Economics Core.

\*\*Under Liberal-General Education Additional Requirements, take Journ. 260; and an additional six hours social science including Sociology 211; five hours communication electives; six hours humanities.

**OPTION IN FOODS AND NUTRITION IN BUSINESS**

Department of Foods and Nutrition

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**

Biochemistry	211 200	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	256 115	Descriptive Physics	4

**CHOOSE ONE OF THE PROFESSIONAL AREAS I, II****Area I — Community Nutrition**

F.&N.	640 133	Food for Man*	3
		OR	
F.&N.	640 301	Trends in Food Products*	3
F.&N.	640 300	Meal Management	3
F.&N.	640 601	Food Science	4
F.&N.	640 602	Prin. of Nutrition	3
F.&N.	640 613	Applied Nutrition	3
F.&N.	640 614	Nutr. in Med. Science	6
F.&N.	640 615	Ntr. Care Patients	6

**Area II — Foods and Nutrition Science**

F.&N.	640 133	Food for Man	3
		OR	
F.&N.	640 301	Trends in Food Products	3
F.&N.	640 300	Meal Management	3
F.&N.	640 601	Food Science	4
F.&N.	640 602	Prin. of Nutrition	3
F.&N.	640 680	Seminar in Foods and	
		Nutrition	2
F.&N.	640 710	Nutr. Throughout Life	
		Cycle	3
F.&N.	640 790	Food Research Tech.	3
		Home Economics Elective	3
		Foods and Nutr. Elective	6

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Option Requirements	59-61
Unrestricted Electives	15-18
Curriculum Requirements*	47-48

\*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**

Department of Institutional Management

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

Biochem.	211 120	Intro. Organic Biochem. ....	5
Biology	215 198	Prin. of Biology .....	3
Biology	215 425	Human Physiology .....	4
Biology	215 450	Microbiology .....	4
Chemistry	221 110	General Chemistry .....	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.	305 260	Fund. of Accounting .....	4
Bus. Ad.	305 270	Managerial Accounting .....	3
Bus. Ad.	305 420	Management Concepts .....	3
		OR	
Bus. Ad.	305 520	Personnel Administration ....	3
F.&N.	640 601	Food Science .....	4
F.&N.	640 602	Principles of Nutrition .....	3
F.&N.	640 790	Food Research Tech. ....	3
Ins. M.	660 440	Quantity Foods .....	4
Ins. M.	660 635	Food Serv. Equip. & Layout ..	2
Ins. M.	660 640	Org. & Mgmt. of Food Serv. ....	3
		Food Service Systems .....	6
Ins. M.	660 650	Additional Business Courses ..	6

##### Area II — Hospital Dietetics

To meet academic requirements for application to American Dietetic Association Approved Internship.

ASI	005 280	Meat Utiliz., HE .....	2
Bus. Ad.	305 420	Management Concepts .....	3
		OR	
Bus. Ad.	305 520	Personnel Administration ....	3
A.&O.	410 560	Meth. of Tchg. for Diet. Stu. ..	3
F.&N.	640 601	Food Science .....	3
F.&N.	640 602	Principles of Nutrition .....	3
F.&N.	640 710	Nutr. Life Cycle .....	3
F.&N.	640 712	Diet. Therapy .....	3
F.&N.	640 790	Food Research Tech. ....	3
Ins. M.	660 440	Quantity Foods .....	4
Ins. M.	660 635	Food Serv. Equip. & Layout ..	2
Ins. M.	660 640	Org. & Mgmt. of Food Ser. ....	3
Ins. M.	660 650	Food Serv. Systems .....	6

##### 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.	305 420	Management Concepts .....	3
		OR	
Bus. Ad.	305 520	Personnel Administration ....	3
A.&O.	410 560	Meth. of Tchg. for Diet. Stu. ..	3
F.&N.	640 601	Food Science .....	4
F.&N.	640 602	Principles of Nutrition .....	3
F.&N.	640 710	Nutr. Life Cycle .....	3
Ins. M.	660 430	Intro. Dietetics .....	1
Ins. M.	660 440	Quantity Foods .....	4
Ins. M.	660 650	Food Serv. Systems .....	6
Ins. M.	660 660	Mgmt. in Dietetics .....	9

##### Clinical Experience in Wichita

F.&N.	640 613	Applied Normal Nutr. ....	3
F.&N.	640 614	Nutr. in Medical Science .....	6
F.&N.	640 615	Nutritional Care of Patients ..	6
Ins. M.	660 670	Seminar in Dietetics .....	1

#### 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 .....	13-24
Curriculum Requirements .....	39-40

\*Under Liberal-General Education take Sociology 211 and 9 hours elective in Soc. Sci. and Humanities.

## 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 168-172 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	211 120	Intro. Org. & Biochem. ....	5
A.&F.	405 202	Educ. Psych. I. ....	3
A.&F.	405 302	Educ. Psych. II. ....	3
A.&O.	410 550	Methods of Teaching Home Ec. ....	2
A.&O.	410 620	Principles and Philosophy of Vocational Education ....	3
A.&O.	410 621	Program Planning in Vocational Education .....	3
A.&O.	410 637	Practical Home Economics Related Occupations .....	1-3
A.&O.	410 760	Coordination of Cooperative Vocational Education ....	3
C.&I.	415 316	Intro. to Instructional Tech. ....	1
A.&O.	410 477	Teaching Part. Sec. School ..	8
C.&T.	610 210	Pattern Study and Garment Construction .....	3
C.&T.	610 260	Textiles .....	3
I. Des.	611 215	Intr. Int. Design .....	2
F.C. Dev.	620 210	Preschool Child .....	3
F.C. Dev.	620 211	Preschool Child Lab. ....	1
F.C. Dev.	620 230	Intro. Human Development ..	3
		OR	
F.C. Dev.	620 350	Family Relations .....	2
F.C. Dev.	620 630	The Adolescent .....	2
F.C. Dev.	620 631	The Adolescent Lab. ....	1
F. Ec.	630 400	Family Economics .....	3
F. Ec.	630 420	The House .....	3
F. Ec.	630 440	Household Equipment .....	3
		OR	
F. Ec.	630 630	Household Equipment Theory ..	3
F. Ec.	630 460	Home Management .....	2
F. Ec.	630 465	Home Management Lab. ....	2
		OR	
F. Ec.	630 405	Family Finance .....	3
		OR	
F. Ec.	630 700	Families in Amer. Economy ..	3
		OR	
F. Ec.	630 605	Consumer and the Mkt. ....	3
F.&N.	640 300	Meal Management .....	3
F.&N.	640 400	Food Preparation .....	3
		OR	
F.&N.	640 601	Food Science .....	4
F.&N.	640 602	Principles of Nutrition .....	3

Option Requirements .....	82-87
Unrestricted Electives .....	4-8
Curriculum Requirements* .....	33-34

\*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 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.	290 250	Radio-TV Speech Procedures	3
R. TV.	290 260	Radio-TV Continuity	3
R. TV.	290 320	Intro. to Television	2
R. TV.	290 520	TV Production	3
R. TV.	290 610	History of Broadcasting	3
R. TV.	290 630	Radio-TV Prog.	3
		OR	
R. TV.	290 510	Radio-TV Writing	3

### 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	10-18
Curriculum Requirements	47-48

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## 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 Composition I	3
English	229 120	English Composition II	3
Speech	281 105	Oral Communication	2
Social Science			6
Economics	225 110	Economics I	3
Psychology	273 110	General Psychology	3

Additional Requirements\* 20  
Four disciplines of Humanities, Social, Biological, and Physical Sciences shall be represented in Liberal-General Education and/or Supporting Courses. (One discipline, not represented in Supporting Courses, shall include 8-12 credit hours, with two courses in sequence plus one additional course.)

### Home Economics Core (13-14 Hours)

I. Des.	611 101	Design for Contemp. Living	3
F.C. Dev.	620 210	The Preschool Child	3
		OR	
F.C. Dev.	620 230	Intro. Human Develop.	3
		OR	
F.C. Dev.	620 272	The Helping Relationship	3
		OR	
F.C. Dev.	620 350	Family Relationships	2
F.Ec.	630 400	Family Economics	3
F.&N.	640 132	Basic Nutrition	3
		OR	
F.&N.	640 133	Food for Man	3
		OR	
F.&N.	640 301	Trends in Food Products	3
General H.E.	650 110	Intro. to Home Ec.	1
General H.E.	650 400	Home Ec. Seminar	1

### Professional and Supporting Courses, 61-67 Hours

Journalism	289 275	Reporting I	3
Journalism	289 285	Reporting II	3
Journalism	289 330	Editing I	3
Journalism	289 525	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

18-19 Hours in Journalism may be selected from, but not limited to, the following courses:

Journalism	289 235	Survey of Mass Media	3
		OR	
Journalism	289 685	Journalist in a Free Society	3
Journalism	289 310	Photojournalism I	3
Journalism	289 320	Prin. of Advertising	3
Journalism	289 610	Interpret. of Cont. Affairs	3
		OR	
Journalism	289 615	Magazine Article Writing	3
Journalism	289 335	Editing II	3
		OR	
Journalism	289 555	Ad. Copy and Layout	3
		OR	
Journalism	289 620	Magazine Production	3
		OR	
Journalism	289 630	Public Relations	3
Journalism	289 625	Formation of Pub. Opinion	3
		OR	
Journalism	289 660	History of Journalism	3
		OR	
Journalism	289 665	Law of Mass Communications	3
Journalism	289 360	Publications Practice	1
		OR	
Journalism	289 680	Readings in Journalism	1-3
		OR	
Journalism	289 690	Problem in Journalism	1-3
R. TV.	290 250	Radio-TV. Speech and Procedures	3
		OR	
R. TV.	290 260	Radio-TV. Continuity	3

### Unrestricted Electives, 9-16 Hours

### Other

Physical Education (twosemesters)	0
Total for Graduation	124

\*Under Liberal-General Education Additional Requirements, take Soc. 211 and Pol. Sci. 110 or 301.

\*\*Selected in consultation with Home Economics faculty advisor.

## 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, 33-34 Hours**

I. Des.	611 101	Design for Contemp. Living ..	3
F.C. Dev.	620 210	The Preschool Child .....	3
		OR	
F.C. Dev.	620 230	Intro. Human Development ..	3
		OR	
F.C. Dev.	620 272	The Helping Relationship ....	3
		OR	
F.C. Dev.	620 350	Family Relationships .....	2
F. Ec.	630 400	Family Economics .....	3
F.&N.	640 132	Basic Nutrition .....	3
		OR	
F.&N.	640 133	Food for Man .....	3
		OR	
F.&N.	640 301	Trends in Food Products .....	3
General H.E.	650 110	Intro. to Home Economics ...	1
General H.E.	650 400	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. 210 (3), F.C. Dev. 350 (2), F.C. Dev. 650 (3), courses in Family and Child Development and related areas in home economics (12).

c. Family Economics: F.Ec. 405 (3), F. Ec. 460 (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. 460 (2), F.C. Dev. 210 (3) and selected home economics courses (12).

**Unrestricted Electives, 22-26 Hours****Other**

Physical Education (two semesters) ..... 0

Total for Graduation ..... 124

**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.

**Liberal-General Education Courses, 47 Hours**

Communications	.....	11		
English	229 100	English Composition I	.....	3
English	229 120	English Composition II	.....	3
Speech	281 105	Oral Communication I	.....	2

Humanities Electives ..... Minimum 3

Social Science ..... 12

Economics	225 110	Economics I .....	3
Economics	225 120	Economics II .....	3
Psychology	265 110	General Psychology .....	3
Sociology	277 211	Intro. to Sociology .....	3

Biological Science ..... 4

Biology 215 198 Principles of Biology ..... 4

Physical Science ..... 10

Chemistry 221 110 General Chemistry ..... 5

Biochemistry 211 120 Intro. Org. & Bio. Chem. .... 5

**Professional and Supporting Courses, 60-61 Hours**

ASI	005 280	Meat. Sel. and Util., HE .....	2
Biology	215 450	Microbiology .....	4
Bus. Ad.	305 260	Fund. of Accounting .....	4
Bus. Ad.	305 270	Managerial Accounting .....	3
Bus. Ad.	305 420	Management Concepts .....	3
Bus. Ad.	305 425	Business Law I .....	3
Bus. Ad.	305 520	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.	640 400	Food Prep. ....	3
		OR	
F.&N.	640 601	Food Science .....	4
Ins. M.	660 440	Quantity Foods .....	4
Ins. M.	660 650	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, 15-16 Hours****Other**

Physical Education (two semesters) ..... 0

Total for Graduation ..... 124

**CURRICULUM IN FOOD SCIENCE AND INDUSTRY**

Science Option - Joint Program with Colleges of Agriculture and Home Economics

**B.S. in Food Science and Industry**

Students wishing to fulfill the requirements for Institute of Food Technology may choose this option. Food scientists are concerned with the theoretical and practical aspects of the food industry from production of the raw material through acceptance of the finished product. The curriculum, designed to educate individuals in the discipline of food science, balances fundamental principles and applications of food theory within a flexible program that permits each student to tailor his or her education to fit personal career goals.

**Liberal-General Education Courses, 23 Hours**

Engl.	229 100	English Comp. I .....	3
Engl.	229 120	English Comp. II .....	3
Speech	281 105	Oral Communications I .....	2
Math.	245 100	College Algebra .....	3
Econ.	225 110	Economics I .....	3
		Electives in Social Science or	
		Humanities .....	9

**Biological Science, 8 Hours**

Biol.	215 198	Prin. of Biology .....	4
Biol.	215 450	Microbiology .....	4

**Physical Science, 37 Hours**

Biochem.	211 521	Gen. Biochem. ....	3
Biochem.	211 522	Gen. Biochem. Lab. ....	2
Chem.	221 210	Chemistry I .....	5
Chem.	211 230	Chemistry II .....	3
Chem.	211 271	Chem. Analysis .....	4
Chem.	221 350	Gen. Org. Chem. ....	3
Chem.	221 351	Gen. Org. Chem. Lab. ....	2
Math.	245 150	Plane Trig. ....	3
Math.	245 220	Anal. Geom. & Cal. I .....	4
Physics	265 113	Gen. Physics I .....	4
Physics	265 114	Gen. Physics II .....	4

**Home Economics Core  
Choose 5-7 Hours**

I. Des.	611 101	Design for Contemp. Living ..	3
F.C. Dev.	620 210	The Preschool Child .....	3
		OR	
F.C. Dev.	620 230	Intro. Human Development ..	3
		OR	
F.C. Dev.	620 272	The Helping Relationship ....	3
		OR	
F.C. Dev.	620 350	Family Relationships .....	2
F. Ec.	630 400	Family Economics .....	3
F.&N.	640 132	Basic Nutrition .....	3
		OR	
F.&N.	640 133	Food for Man .....	3
		OR	
F.&N.	640 301	Trends in Food Products .....	3
General H.E.	650 110	Intro. to Home Econ. ....	1
General H.E.	650 400	Home Ec. Seminar .....	1

**Professional Courses, 23-24 Hours**

ASI	005 305	Fund. of Food Processing ....	3
Dy. Sc.	025 305	Fund. of Food Processing ....	3
Horf.	040 305	Fund. of Food Processing ....	3
Gr. Sc.	045 305	Fund. of Food Processing ....	3
Dy. Sc.	025 311	Intr. Food Chemistry .....	3
Gn. Ag.	035 105	Intro. to Food Sc. & Tech. ....	3
Gr. Sc.	045 625	Food and Feed Plant	
		Sanitation .....	4
		OR	
Dy. Sc.	025 690	Practical Quality Control of	
		Dairy and Food Products ...	3
Biol.	215 520	Microbiology of Foods .....	4
F.&N.	640 601	Food Science .....	4
F.&N.	640 602	Prin. of Nutrition .....	3

**Professional Electives, 14-17 Hours**

Choose 5-8 Hours of the following:

ASI	005 250	Elements of Meat Processing .....	2
ASI	005 260	AND Meat Processing (conc. assign.) .....	1
ASI	005 720	Meat-Packing Plant Oper. ....	2
ASI	005 776	Meat Technology .....	3
Dy. Sc.	025 401	Fund. of Milk Proc. & Sant. ....	3
Dy. Sc.	025 501	Prin. of Dy. Foods Proc. ....	3
Dy. Sc.	025 505	Prin. of Dy. Foods Proc. Lab. ....	1-3
Poul. Sc.	026 700	Poultry Prod. Tech. ....	3
Hort.	040 692	Harvesting, Handling, and Processing of Fruits and Vegetables .....	3
Gr. Sc.	045 120	Intr. Bakery Tech. ....	2
Gr. Sc.	045 610	Baking Science I .....	2
Gr. Sc.	045 611	Baking Science I Lab. ....	2

and a minimum of 9 hours of the following:

Ag. Ec.	010 514	Econ. of Food Marketing .....	3
Dy. Sc.	025 350	Dairy Bacteriology .....	4
Dy. Sc.	025 715	Chem. of Foods .....	3
Gr. Sc.	045 300	Cereal and Feed Analysis .....	3
Gr. Sc.	045 630	Cereal Science .....	3
Gr. Sc.	045 635	Qualities of Fd & Feed Ingredients .....	3
Gr. Sc.	045 700	Adv. Cereal Chemistry .....	3
Gr. Sc.	045 730	Prin. of Food Analysis .....	3
Biol.	215 201	Organismic Biology .....	4
Biol.	215 425	Human Physiology .....	4
Stat.	285 340	Biometrics I .....	3
C. Sci.	286 200	Fund. of Computer Progr. ....	3
Ag. E.	506 655	Dairy Mechanics .....	3
F.&N.	640 301	Trends in Food Products .....	3
F.&N.	640 710	Nutr. Needs Throughout Life Cycle .....	3
F.&N.	640 760	Fund. of Food Flavor Analysis .....	3
F.&N.	640 790	Food Res. Techniques .....	3
Ph. Sc.	740 530	Anat. & Physiology .....	4

**Unrestricted Electives, 13 to 16 Hours****Other**

Physical Education (two semesters) .....	0
Total for Graduation .....	126

## Departments and Course Offerings

**CLOTHING, TEXTILES, AND INTERIOR DESIGN**

Jessie A. Warden,\* Head of Department

Professors Brockman, Kilbourne, and Warden;\* Associate Professors Cormany,\* and St. John;\* Assistant Professors Craigie,\* and Newby; Instructors Belleau, Coleman, Munson, Dollar, Peterson, and Sukiennik; 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 225, C. & T. 220, or consent of instructor.

**610 395. Window Display.** (3) II. Designing and executing displays for windows and interior cases. Experience through cooperation of local stores. Pr.: Art 100.

**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.

**UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD**

**610 500. 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.

**610 565. Design by Weaving.** (2) I, II. Color, texture, and design are integrated within the experience of fabric and rug construction. Pr.: I. Des. 240 or consent of instructor.

**UNDERGRADUATE AND GRADUATE CREDIT**

**610 600. 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.A. 540. Senior in option, 2.00 GPA.

**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.

**610 635. Fashion Merchandising II.** (3) I. The processes involved in planning and controlling the operation of fashion departments. Pr.: C. & T. 230 and B. A. 540 or consent of instructor.

**610 645. Textile and Apparel Industry.** (3) I. The textile industry from fiber production to the ultimate consumer. Pr.: Econ. 110; C. & T. 260.

**610 670. Textiles for Merchandising.** (3) I. Fiber characteristics, performance specifications, and standards of fabrics,



furnishings, and apparel. Pr.: C. & T. 260, Chem. 190 or Phys. 104. Senior in 610 or 613 option.

**610 705. 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.

**610 710. 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 720 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. 500 recommended.

**610 720. 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.

**610 725. Pattern Development Theory III.** (3) I, alt. S. A critical analysis of pattern syling for women's fashions with emphasis on the development of original designs. Pr.: C. & T. 500 and C. & T. 715.

**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.

**610 735. 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. 541.

**610 740. Costume Design III.** (3) alt. years. Design orientation for market size range. Pr.: C. & T. 500 or consent of instructor.

**610 745. 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.

**610 750. Experimental Textiles.** Credit arranged. Offered on sufficient demand. Individual investigation into textile research. Pr.: C. & T. 755.

**610 755. 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.

**610 760. 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.

**610 780. 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. 500 or consent of instructor.

## GRADUATE CREDIT

**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.

**610 835. Fashion Industries in the Economy.** (3) I, alt. S. Issues in the production and distribution in textiles, clothing, and home furnishings. Pr.: Econ. 110; 6 hours in C. & T.

**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 advisory 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. 541, C. & T. 645 or consent of instructor.

**610 898. Master's Report.** (1 or 2), I, II, S. Written report required of student 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.

**610 899. 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.

## Courses in Interior Design

### 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, S. 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).

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**611 540. Interior Design II.** (3) I, II, S. The analysis and design of interior space. Emphasis on design and awareness of human ecological requirements. Pr.: I. Des. 240.

**611 545. Interior Design Practicum.** (3) I, II, S. Sources and professional practice; materials and constructions used in home furnishings. Pr.: I. Des. 540. Required of seniors in interior design option.

**611 550. Contemporary Home.** (3) I. Living environments explored in three dimensional studies. 2 hours lec.; 2 hours lab. Pr.: I. Des. 240.

#### UNDERGRADUATE AND GRADUATE CREDIT

**611 600. 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. 540, B.A. 540.

**611 730. Interior Design III.** (3) II, alt. S. Creative design of furnishings; introduction to markets and selling; designer client relationships; qualifications of the professional designer. Pr.: I. Des. 540.

**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.

**611 745. 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.

**611 750. 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.

**611 780. 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.

**611 782. Problems in Interior Design.** Credit arranged. I, II, S. Problems planned with the student to meet particular needs. Pr.: I. Des. 730 or consent of instructor.

#### GRADUATE CREDIT

**611 820. Readings in Interior Design.** (2) I, II, S. Directed study in current problems of interior design. Pr.: I. Des. 540 or consent of instructor.

**611 899. 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 Professors Bollman,\* and Vincent;\* Assistant Professors Bergen,\* Jurich, Pelletier, Poresky;\* Instructors Branscum, Fretwell, Glasscock, Sistrunk; Emeritus Professors Kell\* and Williams;\* Associate Professor Aldous;\* Assistant Professor Raffington.

Family and Child Development offers unique opportunities for study of children and their families, with enriching experiences in the Child Development Laboratory, the Infant and Child Care Center, and the community. Courses are planned to create an awareness of the dynamics of family relationships through the study of children, families, and one's self.

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 work sequence, 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.

The Child Development Laboratory and the Infant and Child Care Center provide opportunities for students to observe and participate in child care programs. Both facilities have morning and afternoon sessions and are located near Justin Hall, the main home economics building. A research room with one-way vision glass and an inter-communication system provides further opportunities for students to observe individuals or groups in an experimental setting. Field experiences, involving direct contact with children, are available through the Friendship Tutoring Program, Fort Riley Child Care Center, Larned Semester, and additional programs in Manhattan and other Kansas communities. During one semester a field placement is arranged.

The Department offers work toward the Master of Science degree for students interested in professional opportunities such as child development programs, child guidance clinics, family life education through community agencies and 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 relations. Some students elect to pursue the doctorate degree at other institutions after completing the M.S. program in Family and Child Development at Kansas State.

#### Social Work Sequence

Kansas State University offers a Social Work Sequence jointly sponsored by the Department of Sociology and Anthropology and by the Department of Family and Child Development. Based on a broad foundation in liberal arts, the program's primary objective is to prepare the student for social work practice positions immediately upon graduation. This is accomplished by an integrated professional program of study and field experience through a generalized model approach, through which the student learns and uses the knowledge, skills, and values of social work applicable in various social work settings.

Secondarily, the program attempts to develop a wide perspective on human need through an understanding of social welfare programs and issues. The program also intends to offer a beginning preparation for graduate education in Social Work.

Although hosted by the two departments, each with specific requirements for degree work, the **social work sequence** has an identity of its own and requires that certain criteria be met for entry into the program. The criteria by which a student may be admitted into the program are: (1) 3.0 average in the two introductory



- courses F.C. Dev. 260 or Soc. 260 and Soc. 510, (2) Significant previous volunteer work in a social agency on a college level, through which the student's capability for social work will be judged, and (3) Adequate foundation courses by which the student's readiness for field placement will be judged.

In conjunction with the course material, a field experience curriculum is offered, affording the student the opportunity of placement in a social service agency. The student is expected to spend one day a week in such an agency for two semesters. The objectives of this field experience are as follows: (1) to gain knowledge on how social agencies function within the community, (2) to gain experience in direct service to clients: individuals, groups, and communities, through which the student will have the opportunity of developing practice skills and techniques of social work, and the opportunity of applying knowledge and theory learned in the classroom, and (3) to encourage self-awareness in the student relative to understanding his own value orientation so he may determine his suitability for a career in social work. In addition to meeting the degree requirements of the department, the student in the **social work sequence** in either Family and Child Development or the Sociology Department must satisfy the following requirements:

#### F.C. Dev. or Soc.

620 260	277 260	Introduction to Social Work (3).
	277 510	Social Welfare as a Social Institution (3).
620 560	277 560	Skills and Techniques in the Practice of Social Work (3).
620 465	277 465	Field Experience (taken two semesters for a total of 6 credits.)

### Courses in Family and Child Development

#### UNDERGRADUATE CREDIT

**620 210. The Preschool Child.** (3) I, II, S. Principles of development and growth of children from conception to five years of age in homes and in groups. Pr.: Psych. 110 and sophomore standing.

**620 211. 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. Conc. with F.C. Dev. 210.

**620 212. Observation of the Preschool Child.** (1) I, II, S. Observation and recording of behavior of children from birth to five years of age. Conc. or following F.C. Dev. 210.

**620 230. Introduction to Human Development.** (3) I, II, S. A study of human development through an individual's awareness and understanding of his own physical, social and psychological growth and relationships with his family, peers, and others. One hour lecture and two hours recitation a week.

**620 260. 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. (Same as Soc. 260)

**620 272. 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. 230.

**620 300. Problem in Family and Child Development.** Credit arranged. I, II, S. Independent or small group study. Pr.: Consent of instructor.

**620 315. Community Resources for Children.** (3) I. Study of legislation, community agencies and programs pertaining to children. Field trips arranged. Pr.: F.C. Dev. 210 and Soc. 211.

**620 320. Interaction Techniques with Young Children.** (3) I, II. A developmental approach to the acquisition of interaction techniques conducive to healthy emotional and self-concept growth in the child from birth to five years. Pr.: F.C. Dev. 210 or consent of instructor. Two hours lecture and one hour lab.

**620 330. 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. 331. Pr.: Psych. 110 and one of the following: F. C. Dev. 210, Educ. 215, or Psych. 280.

**620 331. 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. 330.

**620 332. Concepts of Family Health.** (3) I, II. Current health issues in various developmental stages of the family. Factors conducive to maintaining health for family members from the prenatal period through old age. Pr.: Sophomore standing.

**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.

**620 400. Field Study in Family and Child Development** (1-8) I, II, S. Directed study of processes of human development and participation in a field setting. Pr.: Consent of department head.

**620 465. Field Experience** (3) Supervised field experience in community agencies and programs as a practical application of social work knowledge and skills gained from introductory courses. Emphasis on direct work with clients, whether individuals, groups, or communities. Weekly seminar makes use of students' experience to analyze social work theory and practice. Pr.: F.C. Dev. 260, Soc. 510, F.C. Dev. 560, and consent of instructor. (May be taken in two consecutive semesters for 6 hours credit.) (Same as Soc. 465.)

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**620 560. Skills and Techniques in Practice of Social Work.** (3) Fundamental skills and techniques for social workers, emphasizing the use of helping, engagement, observation, communication, and action skills, such as interviewing, diagnosis, etc. Course will develop problem solving process and roles for social workers. Taken previous to or concurrent with F.C. Dev. 580 or 465. Pr.: F.C. Dev. 260, Soc. 510, and consent of instructor. (Same as Soc. 560)

**620 580. Directed Field Experience.** (6-8) A block field placement for eight weeks in agencies outside of Manhattan. Faculty supervised experience in direct service to clients: individuals, groups, and communities. Weekly seminar previous to placement emphasizes social work theory and practice. Pr.: F.C. Dev. 260, Soc. 510, F.C. Dev. 560, and consent of instructor.

#### UNDERGRADUATE AND GRADUATE CREDIT

**620 610. Creative Experiences for Preschool Children.** (2) I, II. Principles and techniques of curriculum building to meet

the needs of preschool children through their experience with stories, music, play activities, and creative media. Take F.C. Dev. 611 concurrently. Pr.: F.C. Dev. 210, F.C. Dev. major, or consent of instructor.

**620 611. Creative Experiences for Preschool Children Lab.** (1) I, II. Application of principles and techniques covered in F.C. Dev. 610 in a preschool program. To be taken concurrently with F.C. Dev. 610.

**620 620. Advanced Study of Children.** (3) I, 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. 210 or Psych. 415 or consent of instructor.

**620 625. Directed Experiences in Early Childhood Education** (with children 2-5). (8) I, S. Participation in a preschool program; planning, instruction, evaluation. Pre-arrangement and consent of instructor required. Two hours lecture and eight weeks preschool participation. Pr.: F.C. Dev. 610 and 611 or equiv.

**620 626. 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.

**620 630. 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 FCD 631 concurrently. Pr.: 5 hours of F.C. Dev. or 5 hours of a combination of Psych. and Educ. Psych. and junior standing.

**620 631. 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. Take F.C. Dev. 630 concurrently.

**620 640. Characteristics and Developmental Processes of College Students** (3) I, 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. Supervised lab. Pr.: F.C. Dev. 230 plus nine additional hours in F.C. Dev., Psych., Soc., or Educ. and consent of instructor. Two hours lecture and two hours lab. a week.

**620 650. 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.

**620 652. 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. 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. 210, 650, six hours psychology, or consent of instructor.

**620 700. 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.

**620 704. 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 department head. Pr.: F.C. Dev. 650 or consent of instructor.

**620 708. Topics in Family and Child Development.** (2-3) I, II, S. Review of recent research and theory related to family and child development, individual growth, family and interpersonal processes. Pr.: Consent of instructor. May be taken more than one semester.

**620 710. Child Care: Components and Issues** (2-3) Alt. II, S. Resources and facilities of quality child care; exploration of methods and philosophies of such programs; designed for those working with paraprofessional child care personnel. Pr.: 15 hours of either social science and/or F.C. Dev. or combination.

**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. 210, 332, and Biol. 425 or equiv.

**620 750. Low-Income Families.** (2-3) II, S. Factors affecting family life in disadvantaged families; life styles of subcultures; proposed programs; implications for persons working with low-income children and families. Pr.: F.C. Dev. 650 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, and 650, consent of instructor.

**620 765. Human Sexuality** (3) I, II, S. Focus on implications of personal and familial aspects of human sexuality throughout the life cycle. Pr.: F.C. Dev. 350 or consent of instructor.

#### GRADUATE CREDIT

**620 820. 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. 620 or equivalent.

**620 840. 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.

**620 842. 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.

**620 843. 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.

**620 860. 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. 650 and consent of instructor.

**620 870. 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. 860; Educ. 823; F.C. Dev. 840, 842, or 843 or consent of instructor.

**Practicums in Family and Child Development.** Credit arranged. I, II, S. Supervised experience in providing help and/or instruction in the several areas of family and child development represented in terms of the special interests of the students. Pr.: F.C. Dev. 840, 842, 843 or equiv.; 3-6 additional graduate hours in F.C. Dev.; and consent of practicum supervisor. Additional specific prerequisites are listed by individual practicums.

**620 880. Practicum in Counseling.** (Same as Psych. 860 and Educ. 863.) Pr.: Educ. 823.



**620 881. Practicum in Family and Community Services.** Pr.: 9 hours Social Science.  
**620 882. Practicum in Study of Student Development.** Pr.: F.C. Dev. 640, Psych. 856, Educ. 826 or equiv.

**620 883. Practicum in Early Childhood Education.** Pr.: F.C. Dev. 620.

**620 884. Practicum in Parent Education.** Pr.: F.C. Dev. 670

**620 888. Conjoint and Group Techniques in Family Counseling.** (3) II, S. Advanced theory in marriage and family counseling with emphasis on group techniques. Pr.: F.C. Dev. 870, 880, and consent of instructor.

**620 890. 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.

**620 892. Practicum in Human Development Research.** Credit arranged. I, II, S. Observation, modification, and reporting of behavior. Pr.: F.C. Dev. 840, 842, or 843; course in methods of research; six other graduate hours in Family and Child Development; consent of department head.

**620 894. 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. 210 or equiv. and F.C. Dev. 650 or equiv. and six hours in social science or consent of department head. May be taken more than once.

**620 899. 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;\* Associate Professor Morris;\* Assistant Professors Annis\* and Rasmussen; Instructor 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 are 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

**630 400. Family Economics.** (3) I, II, S. Economics forces affecting families, and management by families of their economic resources. Pr.: Econ. 110 or equiv.

**630 405. Family Finance.** (3) I, II, S. Financial problems involved in the effective management of the family's resources.

**630 420. The House.** (3) I, II, S. A consideration of dwellings, their environment, plans, and space requirements, which promote effective utilization of family resources. Two hours lecture, two hours lab a week. Pr.: Sophomore standing.

**630 440. 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.

**630 450. Consumer Product Safety.** (3) I, II, S. Evaluation of measures that assure consuming public of safe products, consumer recourse, business protection and responsibility, methods of surveillance, investigation, and reporting. Pr.: Consent of instructor.

**630 460. Home Management.** (2) I, II, S. Study of the use of family's resources toward maximum achievement of family's goals. Pr.: Junior standing.

**630 465. 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. 460 or conc. enrollment.

### UNDERGRADUATE AND GRADUATE CREDIT

**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.

**630 615. The Elderly Consumer** (2-3) I, S. An analysis of consumer problems of the elderly, emphasizing the relationship to national, state, and local public policy. Pr.: F. Ec. 400.

**630 620. Social Effects of the Housing Environment** (2-3) I, S. A critical analysis of the literature on the social influences on the family and the individual attributable to the nature of the housing and neighborhood environment. Alternative physical determinist and socio-cultural interpretations are developed. Pr.: F. Ec. 420 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. 440. Six hours rec. and lab. a week. Pr.: 4 hours lab. science course.

**630 670. 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. 400, 460, or consent of department head.

**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.

**630 700. 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.

**630 705. 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. 405 or consent of instructor.

**630 710. 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.

**630 712. Family Financial Counseling** (2) II. Analyses of specific problems of financially troubled families seeking counsel from cooperating agencies. Pr.: F. Ec. 705 or conc. enrollment.

**630 720. Housing Requirements of Families.** (1-4) II, S. Housing needs and requirements of families as influenced by social norms, societal values, family activities and preferences, and economic and political constraints. Field trips to gather data for course projects required. Pr.: F. Ec. 420, 620, or consent of instructor.

**630 740. 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. 440, Phys. 115; senior or graduate standing.

**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

**630 810. 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. 450, A. & O. 752, or degree in social science.

**630 811. Consumer Education** (2 or 3) S. Evaluate syllabi and approaches to teaching consumer economics and consumer affairs. Pr.: C. & I. 450 or A. & O. 752 and F. Ec. 400 or consent of instructor. (See A. & O. 811)

**630 815. 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. 605, 700, or equiv.

**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. 460, 700, 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. 740 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. 465 or consent of department head.

**630 899. 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 Professors McCarty and Newell; Emeritus: Associate Professors Browning\* and McMillan,\* Assistant Professor Mullen.\*

The Department of Foods and Nutrition provides, through its two options and interdepartmental program, specialized instruction for students who wish to become nutritionists, research workers in food and nutrition, dietitians, extension specialists, food editors, food scientists, 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.

Students wishing to fulfill requirements of Institute Food Technology may choose the science option of the curriculum in Food Science and Industry (with a B.S. in Food Science and Industry). This is an interdepartmental program involving the Departments of Foods and Nutrition, Animal Science and Industry, Dairy and Poultry Science, Grain Science and Industry, and Horticulture and Forestry.

M.S. and Ph.D. programs are offered by the department. Research and teaching laboratories provide students with excellent equipment. 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 M.S. and Ph.D. degrees.

## Courses in Foods and Nutrition

### UNDERGRADUATE CREDIT

**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. Fundamentals of food purchasing and preparation, and meal service with emphasis on nutritional adequacy, aesthetics, and management of money, facilities and human resources. One hour rec. and six hours lab a week.



**640 301. Trends in Food Products** (3) I or II. Current trends in utilization, consumption, preservation, and market forms of various foods. Food laws, regulation, additives, labeling, and packaging.

**640 400. Food Preparation** (3) I, II. Effect of preparation, conditions, and ingredients on physical characteristics of standard food products. One hour rec. and four hours lab a week. Pr.: Biochem. 120 or Chem. 190 and 191.

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**640 500. 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, 599, and/or consent of instructor.

**640 599. 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, 300, or 400.

#### 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.** (2-3) 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.

**640 612. Principles of Food Product Development** (3) I, II, or S. Food product concept, feasibility and evaluation. Pr.: F. & N. 601 or consent of instructor.

**640 613. 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 521, Biol. 425, consent of instructor.

**640 614. 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 521, Biol. 425, consent of instructor.

**640 615. 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 521, Biol. 425, consent of instructor.

**640 680. Seminar in Foods and Nutrition** (2) I, II, S. Individual reports and discussion of current topics in foods and nutrition. Pr.: F. & N. 601 and 602 or consent of instructor.

**640 700. 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.

**640 710. 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 521, Biol. 425, F. & N. 602.

**640 712. Diet Therapy.** (3) II. Dietary modifications for pathological conditions. Pr.: F. & N. 602, Biochem. 200 or 521, 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 550; F. & N. 601; 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. 601 or 602.

**640 790. Food Research Techniques.** (3) I, II, S. Fundamental principles of food quality evaluation and development of an independent research problem. Pr.: F. & N. 601.

#### GRADUATE CREDIT

**640 809. Research Methods of Foods and Nutrition** (3) I or II, on demand. Chemical, biological, and histological methods applicable to research in foods and nutrition. Pr.: F. & N. 710 and 601, or consent of instructor.

**640 811. Advances in Foods** (1-3) S. Recent developments and concerns related to foods. Pr.: F. & N. 601 or equiv. and consent of instructor.

**640 813. Advances in Nutrition** (1-3) S. Recent developments and concerns related to nutrition. Pr.: F. & N. 602 or equiv. and consent of instructor.

**640 814. World Nutrition** (1-3) I, II, S. alt. years. Analysis of factors that contribute to malnutrition, effects of under-nutrition and of malnutrition, methods for assessing nutritional status and measures for improvement. Pr.: F. & N. 602 or consent of instructor.

**640 815. Practicum in Community Nutrition.** (3) I, II, S. Supervised experience in community nutrition agencies. Pr.: F. & N. 700.

**640 816. 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.

**640 817. Nutrition and Aging.** (2-3) II, S. Nature of aging process, nutritional requirements, food habits, and effect of nutrition on the rate of biological aging. Pr.: 9 hr. of nutrition, Biol. 425 and Biochem. 521 or consent of instructor.

**640 818. Fundamentals of Meat Processing and Preparation.** (1-2) S. on demand. Inspection, grading, processing, and preparation in relation to chemical and physical characteristics, costs, safety, quality, and palatability of red meat. Pr.: F. & N. 400 or equiv. and conc. enrollment in ASI 660.

**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. 790 and 710 or 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.

**640 898. Master's Report.** (2) I, II, S. Survey in depth of the literature.

**640 899. Master's Thesis.** (6-8) I, II, S. Research in area of specialization.

**640 900. Bionutrition.** (3) I, S. Evaluation of nutrient needs of the whole man by integration of knowledge of biochemistry, physiology, and nutrition. Pr.: Biochem. 521, Biol. 425 and F. & N. 602 or equiv.

**640 901. Advanced Nutrition.** (3) II, S. Current knowledge of metabolic functions of food in the human organism. Pr.: Biochem. 200 or 521, Biol. 425, F. & N. 602.

**640 902. Food Systems.** (3) I, S. Basic scientific principles associated with colloidal systems as applied to food gels and emulsions and to protein food systems. Pr.: Biochem. 521, F. & N. 601, or consent of instructor.

**640 903. 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 521, and F. & N. 601, or consent of instructor.

**640 904. 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.

**640 905. Lipids in Food Systems.** (2) I or II, alt. year. Physical and chemical characteristics of lipids with emphasis on their behavior and function in food systems. Pr.: Biochem. 521 and F. & N. 903 or consent of instructor.

**640 906. Proteins in Food Systems.** (3) I or II, alt. year. Behavior and function of proteins in food systems. Pr.: Biochem. 521 and F. & N. 902, consent of instructor.

**640 981. 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 a M.S. degree or four hours toward a Ph.D. degree. Pr.: consent of instructor.

**640 999. 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.

**650 308. Home Economics Colloquium.** Credit arranged. I, II, S. Special topics for home economics majors.

**650 385. Problem in General Home Economics.** Credit arranged. I, II, S. Independent study. 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.

**650 400. Home Economics Seminar.** (1) I, II. Current issues, professionalism and place of research in home economics. Pr.: Senior standing or consent of instructor.

#### 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

**650 800. Methods of Research in Home Economics.** (2) I, S. Fundamental procedures for research; meaning and organization of research from conception through publication.

**650 850. Home Economists in Rehabilitation.** (1-6) I, II, S. Current status, literature, and research on rehabilitation

programs for the handicapped. Pr.: 15 credit hours in 400-700 level home economics courses.

**650 851. Field Study in Rehabilitation.** (6-12) I, II, S. Supervised professional experience in a rehabilitation agency or community program as a member of the rehabilitation team. Pr.: General H.E. 850.

**650 860. Contemporary Topics in Home Economics.** (1-4) I, II, S. Selected topics in home economics. May be taken more than once with consent of graduate committee. Pr.: 8 hours graduate level home economics courses.

**650 865. Field Study in Home Economics.** (1-6) II. Supervised professional home economics experiences. May be taken more than one semester. Pr.: General H.E. 860 or consent of instructor.

**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.

**650 899. 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 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 180-182. 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;\* 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 coordinated 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

**660 400. School Lunch Management I.** (2) S. Basic principles of nutrition, menu planning and quantity food production as related to school food services.

**660 410. 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. 400.

**660 430. Introduction to Professional Dietetic Practice.** (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. Consent of instructor.

**660 440. 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.

**660 445. School Food Service Management.** (2-3) II, S. Managerial functions in the school food service system. Pr.: Ins. M. 440 or equiv.

**660 450. Field Experience in Dietetics and Institutional Management.** (1-5) I, II, S. Supervised professional experience in dietetics and institutional food service. May be taken more than once.

#### UNDERGRADUATE AND GRADUATE CREDIT

**660 635. Food Service Equipment and Layout.** (2) I. Factors affecting the selection and arrangement of equipment in food service systems. Pr.: Ins. M. 440.

**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. 650 or consent of instructor.

**660 650. Food Service Systems.** (6) I, II. Institutional food service as a system; menu planning, forecasting; food ordering, production and service; employee training; supervisory experience in campus food services. 2 cr. recitation, 4 cr. lab. Pr.: Ins. M. 440 and consent of instructor.

**660 660. 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 cr. rec., 6 cr. lab. Pr.: Ins. M. 650 and consent of instructor.

**660 670. Seminar in Dietetics.** (1) I, II. Investigation of trends and current research in dietetics. Pr.: Ins. M. 650 and consent of instructor. May be taken more than once.

**660 710. Readings in Institutional Management.** (1-3) I, II, S. Directed study of current literature in Institutional Management and related areas.

**660 755. Food Service in Community Institutions.** Credit arranged. I, S. Management of the food service in small hospitals, nursing homes, and schools. Pr.: Ins. M. 440 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

**660 805. Food Production Management.** (3) II. Production planning and controls in food service systems. Decision optimization and application of computer-assisted management and systems analysis in food service organizations. Pr.: Ins. M. 650 or consent of instructor.

**660 880. Resource Procurement and Food Service System Planning.** (3) II. Principles and methods of planning, selection, and purchasing resources for the food service system. Consideration of automation and convenience food systems. Pr.: Ins. M. 650 and 635 or consent of instructor.

**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. 640 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.

**660 899. 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  
 Dan W. Upson,\* 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 October 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 October 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 qualified, bona fide Kansas residents. Non-residents from states with a College of Veterinary Medicine are advised to seek admission in their home states. 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 applications to the professional curriculum will be approved after January.

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* .....	1-3
Total Semester Hours .....	64

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.

## VETERINARY MEDICAL LIBRARY

As a result of generous contributions from alumni and friends plus a federal grant, the College of

\*Number depending on selection of other courses.

\*\*Those receiving the BS degree in Agriculture must use Agriculture in Our Society (2 hours) for 2 hours of their electives.

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 .....	\$255.00	\$675.00
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	16.25
6. Stadium Bonds .....	4.25	4.25
Total for Veterinary .....	\$313.00	\$733.00
Medical Students		

## DOCTOR OF VETERINARY MEDICINE CURRICULUM

The Curriculum in Veterinary Medicine at Kansas State University was established to give 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 must 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, third 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
Biochemistry 211 521	General Biochemistry .....	3
Physiological Sci. 740 700	Gross Anatomy I .....	7
Physiological Sci. 740 710	Microscopic Anatomy I .....	5
Physiological Sci. 740 730	Physiological Chemistry .....	2
Physiological Sci. 740 740	Veterinary Orientation .....	1
		18
Spring Semester	Course	Semester Hours
Infectious Diseases 720 710	Vet. Microbiology I .....	5
Physiological Sci. 740 705	Gross Anatomy II .....	5
Physiological Sci. 740 715	Microscopic Anatomy II .....	3
Physiological Sci. 740 735	Physiology I .....	5
		18

### SECOND PROFESSIONAL YEAR

Fall Semester	Course	Semester Hours
Animal Sci. & Ind. 005 601	Livestock Feeding .....	3
Infect. Diseases 720 720	Vet. Microbiology II .....	5
Pathology 730 703	General Pathology .....	5
Physiological Sci. 740 745	Physiology II .....	5
		18
Spring Semester	Course	Semester Hours
Infectious Diseases 720 775	Clinical Pathology .....	3
Infectious Diseases 720 795	Vet. Parasitology I .....	3
Pathology 730 710	Systemic Pathology .....	5
Physiological Sci. 740 770	Pharmacology .....	6
Surgery 750 810	Propaedeutic Medicine .....	2
		19

### THIRD PROFESSIONAL YEAR

Fall Semester	Course	Semester Hours
Infectious Diseases 720 797	Vet. Parasitology II .....	3
Surgery 750 800	Clinic I .....	2
Surgery 750 805	Surgery I .....	3
Surgery 750 830	Medicine I .....	5
Surgery 750 840	Radiology I .....	2
Surgery 750 895	Toxicology .....	4
		19
Spring Semester	Course	Semester Hours
Physiological Sci. 740 720	Anatomy III .....	2
Surgery 750 803	Clinic II .....	2
Surgery 750 815	Surgery II .....	8
Surgery 750 850	Medicine II .....	7
		19

### FOURTH PROFESSIONAL YEAR

Fall Semester	Course	Semester Hours
Business Admin. 305 300	Fundamentals of Business for Professional People .....	2
Infectious Diseases 720 751	Public Health I .....	4
Pathology 730 847	Avian Medicine .....	3
Surgery 750 823	Clinical Medicine I .....	4
Surgery 750 870	Medicine III .....	6
		19
Spring Semester	Course	Semester Hours
Infectious Diseases 720 753	Public Health II .....	3
Surgery 750 825	Clinical Medicine II .....	4
Surgery 750 865	Lab. An. Medicine .....	3
Surgery 750 885	Therapeutic Nutrition .....	3
Surgery 750 890	Medicine IV .....	6
		19

## DEPARTMENTS AND COURSE OFFERINGS

### INFECTIOUS DISEASES

E. H. Coles, Jr., Head of Department

Professors Coles,\* Kelley,\* Leland,\* and Lindquist;\* Associate Professors Burroughs,\* and Minocha;\* Assistant Professors Bailie, Moore,\* and Ridley; Emeritus: Professors Leasure and Kitselman; Instructor Kimball.

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

**720 645. Veterinary Mycology.** (3) I in odd years. Detailed study of etiology of cutaneous, subcutaneous and systemic fungus infections of animals, using histopathologic examinations and culture studies. Two hours rec. and three hours lab. a week. Pr.: Biol. 198, Path. 710.

**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. 198 and consent of staff.

**720 710. 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. 730 or consent of instructor.

**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.

**720 720. 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. 710 or consent of instructor.

**720 751. Public Health I.** (4) 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. 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.

**720 790. Veterinary Hematology.** (3) II in odd years. 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.: Inf. Dis. 775 or consent of instructor.

**720 795. 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.

**720 797. 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.: Inf. Dis. 795.

### GRADUATE CREDIT

**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) II in even years. Further studies and application of the more detailed laboratory procedures and tests in hematologic, serologic, bacteriologic, chemic and pathologic diagnosis. Pr.: Path. 849 and consent of staff.

**720 825. Pathology of Body Fluids.** (3) I. 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 in even years. The scope and objectives of epidemiologic principles relative to infectious and noninfectious diseases transmissible from animals to man, and application of these principles by use of case investigations. Two hours lec. a week. Pr.: Inf. Dis. 753, Med. 870.

**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.

**720 875. 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 seafood, poultry, animal meat, and dairy products. Two hours lec. and three hours lab. a week. Pr.: Inf. Dis. 753.

**720 880. Principles and Techniques of Research in Medical Investigations.** (4) I in even years. A study of the procedures in planning and evaluating medical experiments and the use of special research instruments in medical research. Three hours rec. and three hours lab. a week. Pr.: Path. 703, Physi. 745.

**720 899. 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.

## PATHOLOGY

J. E. Cook,\* Acting Head of Department

Professors Dennis,\* Cook,\* Adjunct Professor Huston;\* Associate Professors Leipold,\* McGavin,\* Smith,\* and Strauss.\*

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

**730 703. 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.

**730 710. Systemic Pathology.** (5) II. Pathology of the organ systems of domestic animals including gross and microscopic study of lesions. Three hours lec. and six hours lab a week. Pr.: Path. 703.

## GRADUATE CREDIT

**730 845. Advanced Diagnostic Pathology.** (3) I. Study of pathologic alterations of disease with emphasis on diagnostic characteristics. Pr.: Path. 710 and consent of instructor.

**730 847. Avian Medicine.** (3) I. The prevention, diagnosis and treatment of avian diseases. Three hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

**730 848. Avian Pathology.** (2) II. Study of etiology, pathogenesis, gross and microscopic characteristics of avian diseases. Pr.: Path. 847 or consent of instructor.

**730 849. Pathological Technique and Diagnosis.** (3) I, II. Practical experience in mammalian necropsy, avian necropsy, clinical pathology, histologic techniques, and diagnostic laboratory procedures. Pr.: Path. 710 and consent of staff.

**730 851. 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. 710 and consent of instructor.

**730 855. Oncology.** (4) II in odd years. Etiology, behavior, gross, microscopic characteristics, identification and prognosis of tumors. Pr.: Path. 845 and consent of staff.

**730 857. Developmental Pathology.** (2) I in even years. A bridging course between embryology and pathology with emphasis on congenital defects in domestic animals. Pr.: Path. 710 and consent of instructor.

**730 860. 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. 845 and consent of instructor.

**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 845 or consent of staff.

**730 947. 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. 845 and consent of staff.

**730 950. 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. 947 and consent of staff.

**730 965. 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.

**730 966. Cellular and Molecular Pathology Lab.** (1) I, II, S. Basic techniques used in the study of cellular and molecular pathology. Pr.: Path. 965 or concurrent enrollment and consent of instructor.

**730 970. Pathology Seminar.** (1) I, II, S. Pr.: Consult department head.

**730 980. 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. 710 and consent of instructor.

**730 985. 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. 845 or consent of staff.

**730 999. Research in Pathology.** (1-6) I, II, S. Individual research in the pathology of animal disease. Pr.: Path. 710, 849. This work may form the basis for the Master's thesis and the Ph.D. dissertation.

## PHYSIOLOGICAL SCIENCES

Emerson L. Besch,\* Head of Department

Professors Besch,\* Trotter,\* Associate Professors Cardinet,\* Clarenburg,\* Erickson,\* Fedde,\* Frey,\* Gronwall,\* Klemm,\* Oehme,\* Upson,\* and Westfall,\* Assistant Professors Chapman,\* Chen,\* Purinton and St. Omer; Instructors Eichen, Hartke and Shaw. Emeritus: Professor Underbjerg.

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 AND GRADUATE CREDIT IN MINOR FIELD

**740 530. 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 530 or equivalent.

### UNDERGRADUATE AND GRADUATE CREDIT

**740 700. 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.

**740 705. 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. 700.

**740 710. 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.



**740 715. Microscopic Anatomy II.** (3) 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. 710.

**740 720. 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.

**740 730. 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 521 lecture or equivalent to be taken concurrently or previously. First-year standing in College of Veterinary Medicine or consent of instructor.

**740 735. 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. 700, 710, Physiol. Chem. 730 or consent of instructor.

**740 740. Veterinary Orientation.** (1) I. Lectures on introduction to veterinary medicine. One hour lec. a week. Pr.: First-year standing in College of Veterinary Medicine.

**740 745. Physiology II.** (5) I. Cont. of Physi. 735 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. 735.

**740 770. 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. 745 and Biochem. 521 or equiv.

## GRADUATE CREDIT

**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.

**740 812. Canine Anatomy.** (2 to 4) I, II, S. Pr.: Consent of staff.

**740 825. 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. 700, 705 or equiv.

**740 850. Anatomical Techniques.** (1 to 2) I of odd-numbered years and each S. Pr.: Consent of staff.

**740 855. Comparative Physiology.** (3) II. Comparisons of physiological functions in the animal kingdom; including respiration, circulation, digestion; excretion, locomotion and control. Pr.: Biol. 201, Physi. 530 or equivalent.

**740 865. 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. 745 and consent of staff.

**740 885. Environmental Toxicology.** (2) II in odd-numbered years. An advanced toxicology course concerned with the occurrence, biological effect, detection, and control of foreign chemicals in the environment. Pr.: Consent of staff.

**740 899. Research in Anatomy.** (1 to 4) I, II, S. For graduate students in the field of anatomy.

**740 900. 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. 745 and consent of staff.

**740 915. 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.

**740 925. 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. 735, 745 and consent of staff.

**740 995. 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.

**740 999. 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.

## SURGERY AND MEDICINE

J. E. Mosier,\* Head of Department

Professors Mosier,\* Butler,\* and Noordsy,\* Associate Professors Anderson,\* Carnahan, Frey,\* Guffy,\* Martin,\* Oehme,\* and Schneider; Assistant Professors Blauch, Brandt, Harris,\* Jernigan, Kruckenberg, Olson, Schoneweis and Taussig; Instructors Hulse, Vestweber and Wilson. Emeritus: Professors Frank and Frick.

The Dykstra Veterinary Hospital is equipped for diagnosis and treatment of animal disease and for instruction of students in the science and art of veterinary medicine.

The Hospital has a capacity of 35 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, where 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

### GRADUATE CREDIT

**750 802. 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. 700, 705, 720; Surg. 805, 815. Offered especially for graduates in veterinary medicine.

**750 805. 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.

**750 815. 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.

**750 832. 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.

**750 847. 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. 852.

**750 867. 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.

**750 872. 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.

**750 877. 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 or consent of instructor.

**750 887. 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

**750 235. 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. 530 and sophomore standing.

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**750 500. Diseases of Wildlife.** (3) II. Infectious and noninfectious diseases of birds, fur-bearing animals, zoological animals, and fish, with reference to methods of prevention and control. Pr.: Biol. 198 or 205 or Biol. 430 or 450 and consent of instructor.

### GRADUATE CREDIT

**750 800, 750 803. 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.

**750 810. Propaedeutic Medicine.** (2) II. Introduction to the principles of animal hospitalization, diagnostic procedures

and techniques, care of the hospitalized patient and an introduction to the psychology of veterinary medical practice. Two hours lec. a week. Pr.: Second-year standing in College of Veterinary Medicine.

**750 812. 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.

**750 822. 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.

**750 823, 750 825. 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 conference. Twenty-two hours lab. a week. Pr.: Fourth-year standing in College of Veterinary Medicine.

**750 826. Systemic Medicine I.** (3) I, II, S. Advanced 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. Advanced study of the medical aspects of diseases of the musculoskeletal, cardiovascular, endocrine and hemic lymphatic systems. Pr.: D.V.M. or consent of staff.

**750 830. 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.

**750 831. 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.

**750 833. 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.

**750 837. 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. 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.

**750 842. 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. 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.

**750 852. 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 electroretinography. 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 the gastrointestinal disorders, utilizing clinical and experimental subjects. Pr.: 750 842, D.V.M. degree and consent of instructor.

**750 865. 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.

**750 870. 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.

**750 882. 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. 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.

**750 887. 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. 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.

**750 892. 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.

**750 895. 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.

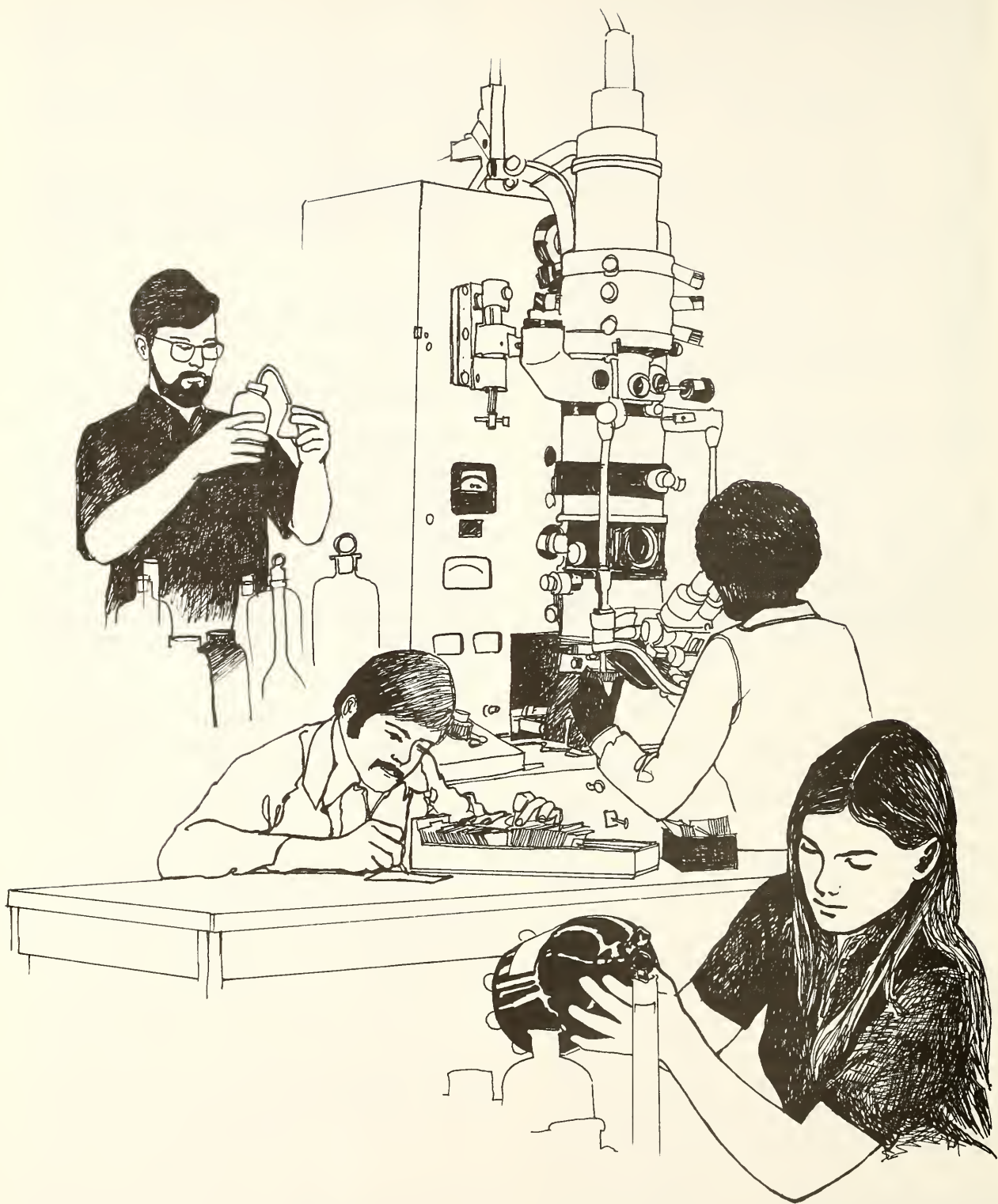
## VETERINARY DIAGNOSTIC LABORATORY

H. D. Anthony, Director

Professor Anthony;\* Associate Professors Gray,\* and Robl; Assistant Professors Milleret, and Munger.\*

The Diagnostic Laboratory serves the livestock industry in the state in solving animal disease problems. The staff of the laboratory also contributes to the teaching, service and research programs of the College. The laboratory is the official rabies diagnostic service to the state and serves as consultant about many animal disease problems for all species.

Special laboratories with appropriate personnel and equipment can perform a variety of diagnostic tests not available or accessible to practitioners in the state.





## THE Graduate School

R. F. Kruh, Dean  
John P. Noonan, Associate Dean  
John P. Murry, Assistant 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, and 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 only 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.** An application for 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 at 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 nine 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 in 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.

**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. 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. 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.

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 or twelve 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 ten hours for half-time and twelve 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. Several departments also have federally supported traineeships available under the programs of the National Institutes of Health and other agencies.

## 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  
Agronomy  
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  
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  
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  
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: Architecture, Architectural Structures, Interior Architecture, Environmental Technology, and Urban 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  
 Biology  
 Chemical Engineering  
 Chemistry  
 Computer Science  
 Economics (Agricultural)  
 Economics (Arts and Sciences)  
 Education  
 Electrical Engineering  
 English  
 Entomology  
 Food Science  
 Foods and Nutrition  
 Genetics  
 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

(Continued next column)



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.

### **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, Ames and Bolsen.

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 hours 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 Professor Clarenburg, B. Cunningham, Hedgcoth, Klopfenstein, Lineback, and Seig; Assistant Professors Center, 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 or 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 Departments of Biochemistry, Physiological Sciences, Grain Science and Industry, and the Division of Biology.

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 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, Erickson, Fan, Farrell, Finkelstein, Greig, Harrison, Hoover, J. Johnson, Kropf, Kyle, H. L. Mitcheil, P. Nordin, Parrish, Pfost, Ruliffson, Schruben, Shugart, Tinklin, Tsen, Wakefield, and Ward; Associate Professors Allen, Bassette, Bowers, Brent, Chung, Cunningham, B. Fryer, Hosenev, Klopfenstein, Lineback, Mickelsen, Robinson, Seib, and Tuma; Assistant Professors Dikeman, Iandolo, Miller and Mugler.

\*Members of the Animal Nutrition Coordinating Committee

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, 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, and (5) a course in botany, zoology or biology. When the student's committee believes it 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.

Following are selected 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**

- Fundamentals of Milk Processing
- Poultry Products Technology
- Chemistry of Foods

(Continued next column)

- Principles of Dairy Foods Processing
- Food Plant Management
- Dairy Fermentations
- Processing and Chemical Analysis of Fats and Oils

#### **Division of Biology**

- Microbiology of Foods

#### **Foods and Nutrition**

- Food Science
- Principles of Nutrition
- Advances in Foods
- Food Research Techniques
- World Nutrition
- Fundamentals of Food Flavor Analysis
- Bionutrition
- Advanced Nutrition
- Food Systems
- Advanced Foods
- Research Methods in Foods and Nutrition
- Food Science Colloquium
- Principles of Food Product Development

#### **Grain Science and Industry**

- Milling Technology I
- Flour and Dough Testing
- Baking Science I
- Baking Science II
- Bakery Technology
- Cereal Science
- Food and Feed Plant Sanitation
- Milling Technology II
- Fundamentals of Grain Storage
- Principles of Food Analysis
- Qualities of Feed and Food Ingredients
- Enzyme Applications
- Fundamentals of Processing Grains into Foods
- Advanced Cereal Chemistry

#### **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\*, Sorenson and Wheat\*; Associate Professors Barnett, Liang, Nassar\*, Nickell, Smith, Schalles and Wassom; Assistant Professors Rodkey and 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 one or more 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.

\*Members of the Genetics Coordinating Committee



In addition to the general entrance requirement set up by the Graduate School, students in genetics should have 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:

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

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

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 Breeding
- Plant Genetics

#### **Animal Science and Industry**

- Population Genetics

#### **Biology**

- Genetic Analysis of Eukaryotic Organisms
- Genetics of Microorganisms
- Molecular and Cellular Biology
- Regulation of Gene Expression

#### **Dairy and Poultry Science**

- Dairy Cattle Genetics
- Quantitative Genetics and Poultry Improvement

#### **Horticulture**

- Plant Breeding
- Plant Genetics

#### **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, 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**

Stanley E. Leland, Chairman

Professors Anthony, Coles, Cook, Dennis, Kelley, Leland, and Lindquist; Associate Professors Burroughs, Leipold, McGavin, Minocha, Smith, and Straffuss; Assistant Professor Moore.

Graduate programs are offered by the Department of Pathology and Infectious Diseases in the College of Veterinary Medicine leading to the degree of Master of Science and Doctor of Philosophy.

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.

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

There are no requirements for a reading knowledge of a foreign language.

## **PHYSIOLOGY**

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, Upson, Westfall\*, and Wilson; Assistant Professors Ames\*, Chapman\*, and Chen.

\*Members of the Steering Committee, Graduate Group in Physiology

Graduate work leading to the degree Doctor of Philosophy in Physiology is supervised by members of the Graduate Group in Physiology. The program is designed to provide in-depth training in the various areas of physiology to students located in many departments of the University. Departments cooperating in the program are Animal Science and Industry, Dairy and Poultry Science, Entomology, Foods and Nutrition, 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 anatomy (Physiological Sciences 825 or the equivalent); systemic physiology (Physiological Sciences 735 and 745 or the equivalent); 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 Animal Reproduction  
Analytical Techniques in Animal Science and Industry  
Environmental Physiology of Farm Animals  
Animal Nutrition

#### **Biochemistry**

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

#### **Biology**

Comparative Anatomy of Vertebrates  
Embryology  
Human Physiology  
Zoological Microtechniques  
Principles of Zoophysiology  
Comparative Embryology  
Endocrinology  
Advanced Endocrinology  
Developmental Biology  
Environmental Biology  
Cytology  
Cell Biology  
Use of Models in Biology  
Molecular Genetics

#### **Dairy and Poultry Science**

Milk Secretion  
Avian Metabolism  
Rumen Metabolism  
Mammalian Reproduction  
Artificial Breeding of Farm Animals  
Behavior of Domestic Animals

#### **Entomology**

Insect Physiology  
Advanced Physiology of Insects  
Insect Behavior

#### **Infectious Diseases**

Principles and Techniques of Research in Medical Investigations

#### **Physiological Sciences**

Special Anatomy  
Canine Anatomy  
Anatomical Techniques  
Special Microscopic Anatomy  
Research in Anatomy  
Physiologic Constituents of Body Fluids  
Pharmacology  
Physiology and Pharmacology of Hormones  
Histophysiology of Nutritional Deficiencies  
Advanced Physiology  
Comparative Physiology  
Environmental Toxicology

#### **Psychology**

Introduction to Physiological Psychology  
Vision  
Seminar in Physiological Psychology  
Psychobiology  
Comparative Psychology  
Advanced 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 Barton-Dobenin, Deines\*, Douglas, Ealy\*, Emerson, Friedmann\*, Kelley\*, Morse\*, Pine, Secher\*, Smith\*; Associate Professors Edmonds, Erickson, Ernst, McGraw, Morris, Rosebraugh, Siddall\*, Weisenburger; Assistant Professors Althoff, Bollman, Day, C. Flora, J. Flora, Kromm, Olson, Page, Reid, Selfridge, and Willis.

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, Business Administration, Economics, Education, Family Economics, 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

\*Members of Regional and Community Interdepartmental Coordinating Committee



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
- National Resources Economics
- Seminar in Land Economics
- Rural Human Resource Development

#### **Business Administration**

- Management Concepts
- Business and Society
- Real Estate
- Organization Behavior and Administration
- Advanced Management

#### **Architecture**

- Environmental Seminar
- Theory of Design
- Environmental Aesthetics
- Inspection Trip

#### **Civil Engineering**

- Economics of Design and Construction
- Regional Planning Engineering
- Urban Transportation Analysis I & II
- Air Photo Interpretation
- Traffic Engineering I & II

#### **Computer Science**

- Computer Organization & Programming I & II
- Information Organization and Retrieval

#### **Construction Science**

- Sanitation Systems
- Construction Management I & II
- Construction Estimating

#### **Economics**

- Public Finance
- Economics of State and Local Government
- Urban and Regional Economics
- Location of Economic Activities
- Development Economics
- Introduction to Econometrics
- Regional Economic Analysis

#### **Education**

- General School Administration
- The School Plant
- School Business and Finance
- Public School Law
- 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**

- Earth Science
- Applied Geology

#### **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**

- Design Ergonomics
- Introduction to Operations Research I & II

#### **Journalism**

- Public Affairs Reporting
- Formation of Public Opinion
- The Black Press in America
- Public Relations
- Communication Theory

#### **Landscape Architecture**

- Site Planning and Analysis
- Community Site 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  
International Organizations  
Seminar in Public Policy and Decision Making  
Seminar in Public Administration

**Statistics**

Statistical Methods I & II  
Introductory Probability and Statistics I & II  
Theory of Statistics I & II  
Sample Survey Methods

**Psychology**

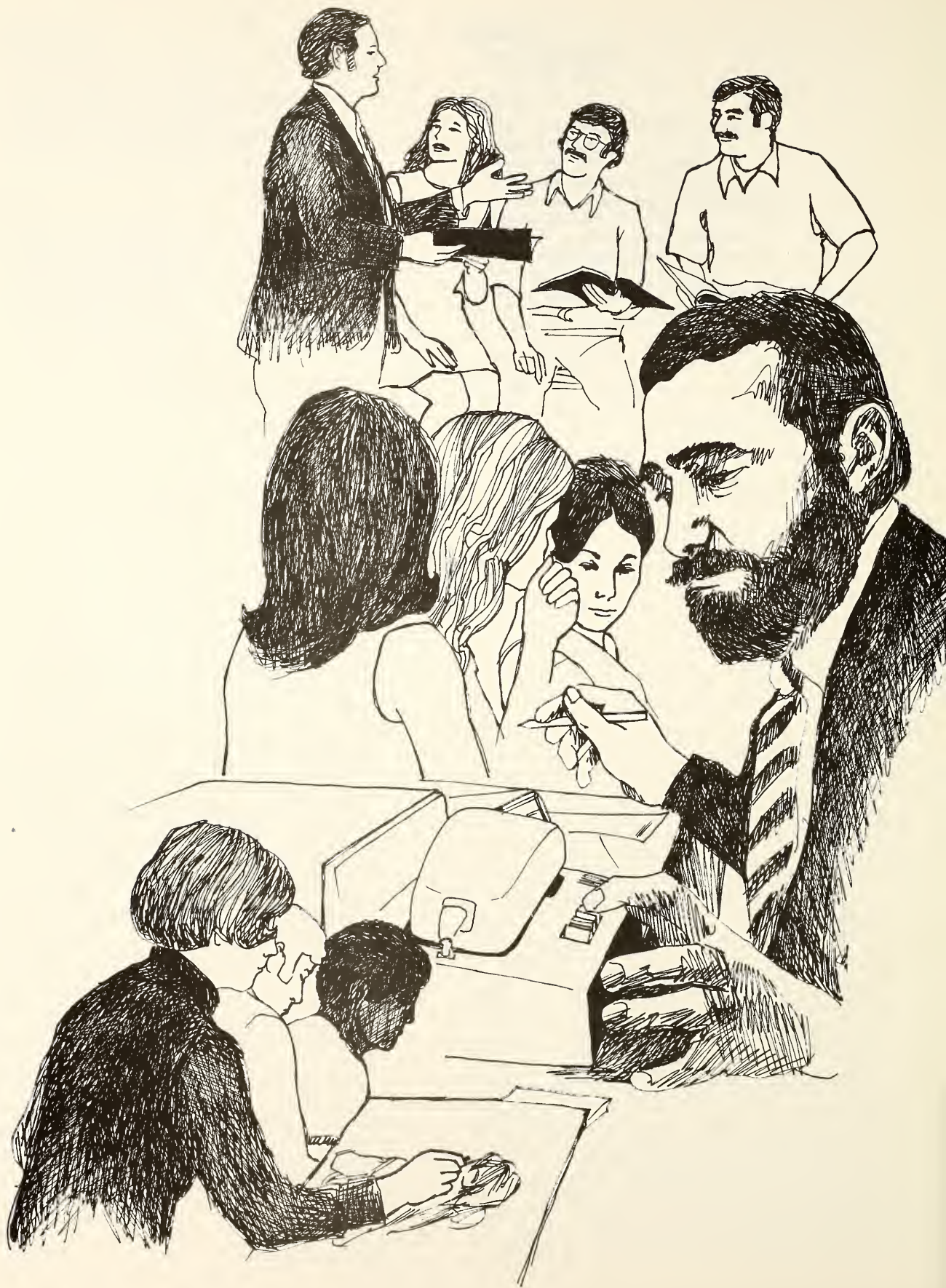
Social Psychology  
Group Dynamics

**Sociology**

Methods of Social Research I & II  
Urban Sociology  
Racial and Cultural Minorities  
Population and Human Ecology  
Community Organization and Leadership  
Advanced Rural Sociology  
Methods of Demographic Analysis  
The Social Organization of the Future  
Seminar in Community Analysis  
Seminar in Demographic Analysis









## THE DIVISION OF Continuing Education

E. Norman Harold, Director

Michael Williamson, Assistant Director, Operations

Assistant Professors Miller, Noble, and Williamson; Instructors Biles, Dieckhoff, Foncannon, Harold, Hoover, Lockhart, Michael, Midcap, Reichow, Schulthess, Stamey, and Sumner.

The Division of Continuing Education brings to the residents of Kansas educational services on whatever level and in whatever area of interest the 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.

### STATEWIDE CONTINUING EDUCATION NETWORK

The Statewide Continuing Education Network is a system whereby classroom instruction is conducted via telephone lines linking classrooms in more than 20 Kansas communities. Voices are amplified for ease of communication, and instruction is supplemented by handout materials and audio-visual aids. Courses for non-credit and extension credit (at each institution) originate from the six state colleges and universities.

Conferences and meetings also can be conducted via the network, thus allowing for the participation of widely-separated individuals.

### 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 Painting 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.

**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 education in or near their home communities is provided through the Statewide Continuing Education Network.

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.

**LAW ENFORCEMENT TRANSITION PROGRAM**

Law enforcement training is offered to approximately 25 selected qualified pre-release military personnel per quarter. Trainees attend classes eight hours a day for 12 weeks. The curriculum is designed by the International Association of Chiefs of Police to provide 240 hours of instruction approved by those states which recognize legally authorized out-of-state training of police officers.

**CIVIL DEFENSE TRAINING**

This program is responsible for the technical Civil Defense training throughout Kansas. Instruction in radiological monitoring, shelter management, and emergency preparedness for business and industry and public officials are among the training courses available.









## THE DIVISION OF

# Cooperative Extension

Glenn H. Beck, Vice President for Agriculture  
Robert A. Bohannon, Director  
Paul W. Griffith, Associate Director  
E. J. Peterson, Administrative Assistant

The Division of Cooperative Extension conducts educational programs for Kansans 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 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, marketing, home economics, 4-H club and youth work, community resource development and related subjects.

Modern conditions continually enlarge the span of subjects related to the above areas of work so that 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 programs in agriculture, home economics, and 4-H Club work were 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, 4-H agents and horticultural 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 in-

structions 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 and home magazines, radio, television, bulletins and circulars.

### **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.

## **STUDIES AND STAFF DEVELOPMENT**

Professors Johnson and Prawl; Assistant Professors Blankenhagen and 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 endeavors 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.

Training programs also make it possible for the Extension Service to modify and retool for meeting new challenges. Education provided by colleges and universities establishes 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 available fellowships and scholarships.

## 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 also is the director of the Division of University Information. This department head coordinates and directs information activities of the Division of Cooperative Extension with all other informational activities of Kansas State University. The Department of Extension Information is divided into four sections: Office of Extension Radio-Television-Film, Office of Extension News, Office of Extension Publications, and Office of Extension Special Projects.

### OFFICES OF EXTENSION RADIO-TELEVISION-FILM, EXTENSION NEWS, EXTENSION PUBLICATIONS, AND EXTENSION SPECIAL PROJECTS

Jack M. Burke, Associate State Leader and Manager, Radio Station KSAC

Fred M. Parris, Associate State Leader and Extension Editor, News

Chester R. Unruh, Associate State Leader and Extension Editor, Publications

Ralf O. Graham, Associate State Leader and Extension Editor, Special Projects

Associate Professors Burke, Graham, Parris, Springer, Titus, and Unruh; Assistant Professors DeWeese, Medlin, Peck, Stockard, Tennant, and Wright; Instructors Brewer, Crawford, Dierking, Kingsley, Kuehn, and Nagel; Extension Assistants Jones and Sullins. Emeritus: Professor Warner and Associate Professor Shankland.

It is the objective of these offices 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. This includes the responsibility of reporting to all the people of Kansas new developments and recommendations in agriculture, quality of living, youth work, public affairs, and community and rural development. All means of communication are utilized in the dissemination of information for the benefit of all Kansas residents.

Scientific information, as written or produced in popular version by the departmental staff, is channeled through all appropriate 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, trade and consumer 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 and the specialized staff in five area offices, as well as central office staff workers, in planning and executing information programs.

Radio is divided into two phases: broadcasting programs over KSAC, an institution-owned, non-commercial, educational station; and broadcasting recorded services and live programs over more than 80 cooperating commercial radio stations in Kansas and adjacent states.

Station KSAC, the University radio station, is used exclusively for the dissemination of informative and cultural programs. 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 stations when the personnel are in the field.

Television programs showing results of research work and demonstrations are prepared, directed and presented on several cooperating television stations in the state. Special television training is provided for Extension and other University staff members who appear on educational television programs.

Motion pictures for the University and off-campus groups with educational objectives are produced on a fee basis.

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 government.

Providing visual aids materials represents an important phase of work in the department.

Each year nearly four million copies of timely, popular Extension Service, Experiment Station and USDA publications, and other materials are printed and distributed.

## AGRICULTURAL PRODUCTION, MANAGEMENT, AND NATURAL RESOURCE USE

Wilber E. Ringler, Assistant Director, Professor

Specialists in several departments of the Colleges of Agriculture, Engineering, and Veterinary Medicine, offer direct educational and technical assistance to Kansas citizens throughout the state.

Each department listed below has Extension faculty who plan, conduct and evaluate off-campus programs in their respective subject matter areas. These specialists organize the educational information, prepare support materials, and make presentations in counties, upon request.

In addition, Extension offers interdisciplinary programs in five areas:

**Food, Feed and Forage Production.** Stresses continued application of physical, biological, and economical factors to food, feed, and forage production which influence sound crop production practices, good business management, efficient use of labor, and rapid adoption of new technology.

**Animal Production and Utilization.** Provides a more concentrated effort for effective production and utilization of meat, dairy, and poultry products, based on such economic factors as comparative advantage in animal and feed resources, climate, producer competence, market location, and consumer demand.

**Resource Use and Conservation.** Focuses attention on increasing need for pollution-free soil, water, and air in rural and urban settings; zoning; and public affairs education. Also, emphasizes the proper management and conservation of fields and forests — as related to commercial production and recreation — to gain clientele and legislative approval and support.

**Management on Commercial Farms.** Helps producers effectively manage their farm, forest or range enterprises to increase the proper utilization of the marketing system. Farmers need more information about enterprise organization, total business structure, and procurement of supplies, labor, credit, and equipment.

**Service to Agri-Business.** Suggests more effort in presenting in-depth short courses and action programs aimed at making appropriate use of Extension-type materials and techniques, organizational development, management skills, basic sales and service skills, public relations, business record analysis, and plant operation studies.

## EXTENSION AGRICULTURAL ECONOMICS

Paul L. Kelley, Head of Department

Norman V. Whitehair, Assistant Head of Department

### Farm Management

Associate Professors Langemeier, Schlender and Thomas; Assistant Professors Figurski, McReynolds, Overley, Pretzer, and Treat; Instructors Appleby, Collins, Dickson, Faidley, Frederick, Germann, Greene, Guy, Hackler, Herod, Kepley, McMinimy, Mullen, Nelson, Olson, Parker, Reimer, Stielow, Trayer and Urban. Emeritus: Professor Coolidge; Instructors Bartlett, Hageman, McClelland and Means.

The Extension educational program in farm management is divided into two sections: Kansas Farm Management Programs and Area Farm Management Programs.

In the Kansas Farm Management Program, the 20 extension economists, farm management (fieldmen) conduct an intensive educational program with 3,500 Kansas farm families via the County Extension Council in the six Farm Management Associations. Each fieldman conducts a person-to-person educational program in farm management with 150-160 farm units. This program involves at least two fieldmen visits to the farms for counseling, a visit in November and December for tax management purposes, county summary and analysis meetings, county fall crops and livestock forward planning meetings, individual summary and analysis of the farm and household record, special field days or tours, public tax management schools and estate planning.

The program provides Kansas State University with a field laboratory and representative sample of farms for obtaining information important in conducting research, training, and Extension educational programs.

This sample of Kansas farms provides the foundation for development of publications and educational materials for the entire Kansas agricultural industry. In addition, each association farm family leads in the dissemination of useful information in agriculture, home economics, and related subject matter areas.

The Area Farm Management Program encompasses the public educational program in farm management. This is conducted by state specialists and area extension economists. It is done with in-depth educational schools, individual programs, and through publications, radio, and television. State specialists and area extension economists conduct county in-depth educational programs in cooperation with the county extension agents. The area 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.

An important and successful tool is the Farm Management Handbook. This contains material on many of the specific management topics of concern to agents, farm people, and agri-business interests.

Special interest topics include farm financial management, land economics, machinery investment analysis, farm business arrangements, farm records, and farm leases. In-depth workshops are conducted in



cooperation with the production specialists and county agents. Cost return analysis of the various livestock and crop programs is an important part of this public educational program. Publications and educational materials are prepared for distribution via county Extension offices for the agricultural industry.

Special educational efforts are designed to meet the educational needs of agri-related businesses and persons, such as bankers, Production Credit Association managers, machinery dealers, and 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, Kilgore, Nuttelman, and Stiegler. Emeritus: Professors 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 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, Armbruster, Schafer and Westmeyer; Extension Associate Olson. 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 with 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  
Leuthold, McDaniel and Marr.

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 Atchison, Gaylor, Lindsey, Loucks, Moyer, Naughton, Nighswonger, Pinkerton, and Rowland; Instructors Baughman, Biles, Bratton, Geisler, Gould and Shreve.

This department 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 department 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 contracts with the Corps of Engineers and the Bureau of Reclamation, the department develops vegetative management plans for public use areas around reservoirs. The section also is responsible for implementing these plans through tree planting, grass seeding and recreational timber stand improvement.

Through a Community Forestry Program, assistance is given to Kansas towns with the development of management programs for street, park and other public trees.

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

Earl E. Hansing, Acting Head of Department

Professors Hansing and King; 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 disease 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 people 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.

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 Hays, Jepsen, Murphy 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, sorting, 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**

### **EXTENSION AGRICULTURAL ECONOMICS**

Paul L. Kelley, Head of Department  
Norman V. Whitehair, Assistant Head

Professors 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; Assistant Professor 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, assists 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 Jean Brannan, Assistant Director

Professor Brannan; Associate Professors Anderson, Elithorpe, and Johnson; 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, ex-

pansion and improvement of cultural opportunities for women and development of leadership abilities.

Each county designs its home economics program according to needs of individuals, families and communities in the county.

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.

## **EXTENSION EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM**

Betty Jean Brannan, Assistant Director

Professor Brannan; Associate Professor Wells

An educational program in nutrition education for adults and youth from families with limited resources. The program with individual family members and youth is conducted through para-professionals who work under the supervision and administration of an Extension home economist. The program is being conducted in 20 counties throughout Kansas.

## **4-H AND OTHER YOUTH PROGRAMS**

Glenn M. Busset, Head of Department

Professors Apel and Busset; Associate Professors Bates, Eyestone, Hanna, Honstead, and Neely; Assistant Professor Area. Emeritus: Professors Johnson and Regnier.

4-H work is the out-of-school youth educational program of the University, conducted in cooperation with County Extension Councils and the United States Department of Agriculture. In 4-H work young people take part in agriculture, 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 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 7 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 32,000 boys and girls enrolled in 1,050 4-H Clubs, another 18,000 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 opportunities 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.

## EXTENSION RURAL DEVELOPMENT

Oscar W. Norby, Assistant Director, Professor.  
Assistant Professors Frazier and Baker.

The rural development program has two basic 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 Borst, Hoss, King, and Mann; Assistant Professors Blankenhagen, Crist, Deutsch, Finley, Neufeld, Schroeder, and Whipps; Instructors Albright and Blackwood. Emeritus: Professor Blecha; Associate Professor Hagans; Assistant Professor Meyer.

**Area Extension Offices.** Five Area Extension Offices are located in different parts of the state so as to place Extension staff, including specialists, closer to the counties in which they work. These area offices are located in Garden City, Colby, Hutchinson, Manhattan, and Chanute. The area Extension specialists work directly with the county Extension agents and local leaders in conducting educational programs specifically fitted to the particular area.

**County Extension Offices.** 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 in these offices may include any or all of the following: 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.

# Administration and Faculty

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 January, 1973. 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 their names.

## Officers of Administration

**ALLOWAY, JAY E.**, Instr., Computing Center (1970). BS 1970, Kan. St. Univ.  
**AYRES, JANET SPRANG**, Alumni Field Rep. (1970). BS 1970, Kan. St. Univ.  
**BEATTY, DANIEL D.**, Vice Pres. for Business Affairs, Prof. of Business Administration (1956, 1959). AB 1947, Hope Col.; MBA 1949, Univ. of Mich.  
**BECK, GLENN H.**, Vice Pres. for Agriculture (1936, 1965). BS 1936, Univ. of Idaho; MS 1938, Kan. St. Univ.; PhD 1950, Cornell Univ. (GF)  
**BONEBRAKE, CASE A.**, Dir. of Physical Plant (1947, 1967). BS 1947, BS 1955, Kan. St. Univ.  
**BROWN, WILBUR E.**, Dir., Student Publications, Asst. Prof. (1970). BS 1949, Kan. St. Univ.  
**CHALMERS, JOHN**, Vice Pres. 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 Pres. for Planning (1957, 1967). BS 1951, Kan. St. Univ.; Registered Architect, 1952.  
**DALLAM, JERALD**, Asst. Dir. of Records, Instr. (1968). BS 1959, Northwest Mo. St. Col.; MS 1964, Okla. St. Univ.  
**DODGE, THEODORE O.**, Dir., Budget Office, Asst. Prof. (1946, 1957). BS 1940, Kan. St. Univ.; CPA 1954, Kansas.  
**ELKINS, RICHARD NELSON**, Assoc. Dir. of Admissions, Instr. (1966, 1968). BS 1956, MS 1963, Kan. St. Univ.  
**FORD, KENNEY LEE**, Alumni Secretary Emeritus (1928). BS 1924, MS 1932, Kan. St. Univ.  
**FOSTER, DONALD E.**, Dir. of Records, Instr. (1965, 1968). BS 1960, MS 1961, Kan. St. Univ.  
**GALLAGHER, TOM L.**, Dir. of Computing Center (1970); Assoc. Prof. of Computer Science (1970). BA 1953, and MS 1954, North Tex. St. Col.; DSc 1967, Wash. Univ. (GF)  
**GARVIN, RICK L.**, Office of Educational Resources, Instr. (1972). BA 1970, San Jose St. Col.  
**GERRITZ, ELLSWORTH M.**, Dean of Admissions and Records; Prof. (1954, 1962). BE 1938, St. Cloud St. Teach. Col.; MS 1948, PhD 1951, Univ. of Minn. (GF)  
**HAINES, RICHARD D.**, Dir., Office of Univ. Publications, Asst. Prof. (1967). BS 1958, Kan. St. Univ.  
**HAJDA, JOSEPH**, Dir. 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, Ind. Univ. (GF)  
**HESS, H. DEAN**, Dir. of Alumni Relations (1961). BS 1950, Kan. St. Univ.  
**HEYWOOD, KENNETH M.**, Dir., Endowment and Development (1956). BS 1938, Kan. St. Univ.; MA 1949, Univ. of Wyo.  
**HOYT, DONALD P.**, Dir., Office of Educational Resources, Prof. (1968). BS 1948, Univ. of Ill.; MA 1950, PhD 1954, Univ. of Minn. (GF)  
**KEPPLE, MELVIN T.**, Dir., Data Processing Center (1967). BS 1950, Washburn Univ.  
**KRUH, ROBERT F.**, Dean of the Graduate School, Prof. of Chemistry (1967). AB 1948, PhD 1951, Wash. Univ. (St. Louis). (GF)  
**LAMBERT, JOHN P.**, Instr., Radiation Safety Officer (1964). BS 1959, Lebanon Valley Col.; MPH 1963, Univ. of Mich.

**LEWIS, JAMES J.**, Dir. of Admissions, Asst. Prof. (1963). BS 1953, MS 1954, Kan. St. Univ.; EdD 1961, Univ. of Kan.  
**MCCAIN, JAMES ALLEN**, President (1950). AB 1926, LLD 1951, Wofford Col.; MA 1929, Duke Univ.; EdD 1948, Stanford Univ.; LLD 1964, Mont. St. Univ.; DSc, Andhra Pradesh St. Univ. (India), 1967; LLD 1965, Colo. St. Univ.  
**MILBOURN, MAX W.**, Asst. to the Pres., Assoc. Prof. of Journalism (1949, 1957). AB 1938, Univ. of Wichita.  
**MILLER, MICHAEL H.**, Asst. Dir. of Computing Center (1964-1966), and Asst. Prof. of Computer Science (1960-1965). BS 1958, and MS 1960, Iowa St. Univ.  
**MURRY, JOHN P.**, Asst. to the Vice Pres. for Academic Affairs, Asst. Prof. (1957, 1972). BS 1955, Rockhurst Col.; MS 1960, PhD 1971, Kan. St. Univ.  
**NELSON, DE VERE V.**, Dir., Office of Sports Information, Asst. Prof. (1966). BS 1949, Kan. St. Univ.  
**NOONAN, JOHN P.**, Assoc. Dean of Graduate School (1947, 1966); Prof. of English (1968). BS 1947, Rockhurst Col.; MS 1950, Kan. St. Univ.; PhD 1955, Denver Univ. (GF)  
**OWENS, RICHARD E.**, Office of Educational Resources, Assoc. Prof. (1964, 1969). AB, BS 1949, Northwest Mo. St. Col.; MS 1953, EdD 1964, Colo. St. Col. (GF)  
**PERRINE, LARRY G.**, Univ. Publications Editor, Instr. (1970). BS 1967, Okla. St. Univ.  
**PERRY, RALPH H.**, Comptroller, Asst. Prof. (1946, 1953, 1962). BS 1946, Kan. St. Univ.  
**ROCHAT, CARL ROBERT**, Dir., Office of Univ. News, Assoc. Prof. of Journalism (1953, 1963). BS 1940, Kan. St. Univ.; MS 1948, Univ. of Ill.  
**SCHWAB, MERLE E.**, Instr., Vice Pres. for Univ. Development (1970). BS 1949, Kan. St. Univ.; Registered Professional Engineer; Licensed Surveyor.  
**SEATON, RICHARD H.**, University Attorney (1971). AB 1959, Harvard Col.; LLB 1963, Harvard Law School.  
**SMITH, RONALD G.**, Instr., Manager of Programming Services, Computing Center (1969-71). BS 1968; MS 1971, Kan. St. Univ.  
**STEHRLEY, DONALD R.**, Assoc. Dir. of Alumni Relations (1961, 1966). BS 1950, Kan. St. Univ.  
**SWANSON, TREVOR J.**, Instr. and Mgr. of Information Services, Computing Center (1972). BA 1963 and MA 1969, Calif. St. Col. at Long Beach.  
**TADTMAN, EMERSON L.**, Dir., Personnel Services (1964, 1969).  
**TARRANT, DONALD H.**, Office of Educational Resources, Instr. (1970). BS 1948, Morningside Col.; MS 1959, Iowa St. Univ. (GF)  
**THOMAS, KENNETH EUGENE**, Dir., Division of Univ. Information, Prof. (1951, 1962). BA 1951, Southwestern Col.; MS 1952, Kan. St. Univ.; PhD 1961, Univ. of Wis. (GF)  
**UNGER, ELIZABETH A.**, Assoc. Dir., Computing Center, Asst. Prof. of Computer Science (1966, 1969). BS 1961, MS 1963, Mich. St. Univ.  
**WEBER, ARTHUR D.**, Vice Pres. Emeritus (1924, 1963). BS 1922, MS 1926, Kan. St. Univ.; PhD 1940, DSc 1950, Purdue Univ.  
**YOUNG, PAUL M.**, Prof., Vice Pres., Univ. Development (1970). AB 1937, Miami Univ.; MA 1939, PhD 1941, Ohio St. Univ. (GF)



## Library Faculty

**AMEEL, HENRIETTA R.**, Asst. Prof. Emeritus, University Library (1960, 1972). AB 1930, Coe Col.; ABL 1935, Univ. of Mich.

**BAXTER, MABEL GERTRUDE**, Instr. Emeritus, University Library (1916-47), 1957.

**BLANDING, SYLVIA J.**, Instr., University Library (1972). BA 1970, Kan. St. Univ.; MLS 1971, Kan. St. Teach. Col.

**CAMP, MILDRED**, Assoc. Prof. Emeritus, University Library (1927, 1955). AR 1912, Eureka Col.; BLS 1924, Univ. of Ill.

**DOBBYN, MARGARET L.**, Instr., University Library (1970). BS 1942, Okla. St. Univ.; MSL 1969, Univ. of Okla.

**ELDER, NELDA J.**, Instr., University Library (1972). BA 1963, Wichita St. Univ.; MLS 1970, Kan. St. Teach. Col.

**FERGUSON, JANNA M.**, Instr., University Library (1969). BA 1964, Tulane Univ.; MLS 1966, Univ. of Mich.

**FINNERAN, DIANA M.**, Instr., University Library (1972). BA 1971, Kan. St. Teach. Col.; MLS 1972, Kan. St. Teach. Col.

**FRANCO, CAROLE A.**, Instr., University Library (1971). AB 1968, Baker Univ.; MSL 1969, Kan. St. Teach. Col.

**FRIESNER, VIRGINIA G.**, Instr., University Library (1972). BA 1971, Kan. Wesleyan; MLS 1972, Univ. of Ill.

**GREENWOOD, L. LARRY**, Instr., University Library (1972). BA 1967, Kan. Wesleyan Univ.; MSL 1969, Kan. St. Teach. Col.

**HEYDWEILLER, PATRICIA B.**, Instr., University Library (1972). BA 1969, St. Univ. of N.Y. at Buffalo; MSL 1971, Univ. of Md.

**JOHNSON, JOHN L.**, Instr., University Library (1969). BA 1967, Kan. St. Univ.

**LEVINSON, MARILYN I.**, Instr., University Library (1972). BA 1971, Ind. Univ.; MA 1972, Univ. of Wis.

**LITCHFIELD, MEREDITH C.**, Asst. Prof., University Library (1967, 1970). BS 1950, MS 1967, Kan. St. Teach. Col.

**LITZ, LAURA HEINRICH**, Instr., University Library (1972). AB 1959, Kalamazoo College; MSL 1968, Univ. of Mich.; AM 1969, Univ. of Mich.; PhD 1972, Univ. of Mich.

**LU, JAMES Y.**, Instr., University Library (1969). BA 1960, Tamkang Col.; MS 1965, MS 1970, Kan. St. Teach. Col.

**MASTER, SEVAKAL M.**, Instr., University Library (1968). BA 1950, Wilson Col.; MSL 1965, Rutgers Univ.

**MORELAND, RACHEL S.**, Instr., University Library (1971). BS 1955, Univ. of Ariz.; MS 1970, Kan. St. Univ.

**OWSLEY, CAROL L.**, Instr., University Library (1942, 1947). BS 1932; MS 1947, Kan. St. Univ.

**PEARCE, MARGARET T.**, Instr., University Library (1969). BS 1968, Univ. of Kan.; MSL 1969, Kan. St. Teach. Col.

**QUIRING, VIRGINIA M.**, Instr., University Library (1971). BA 1943, Ottawa Univ.; MSL 1971, Kan. St. Teach. Col.

**RAUSCH, G. JAY**, Prof.-Head, University Library (1973). BA 1955, North Central College; MA 1958, Univ. of Ill.; PhD 1960, Univ. of Ill.; MSL 1961, Univ. of Ill.

**RICHARDS, ARNE H.**, Asst. Prof., University Library (1965). BA 1954, Yankton Col.; MSL 1960, Univ. of Ill.

**ROBERTS, MARY E.**, Asst. Prof. Emeritus, University Library (1938, 1970). BS 1930, Kan. St. Univ.; BLS 1938 Univ. of Ill.; AM 1949, Univ. of Mich.

**ROHRER, RICHARD L.**, Instr., University Library (1968). BS 1960; MSL 1968, Kan. St. Teach. Col.

**SODERHOLM, DOROTHY J.**, Asst. Prof., University Library (1966, 1972). BA 1946, Kearney St. Teach. Col.; MA 1956, Wheaton Col.; MS 1959, Univ. of Ill.

**TAYLOR, ELLYN M.**, Instr., University Library (1957, 1958). BS 1938, Kan. St. Teach. Col.

**VANDER VELDE, JOHN J.**, Instr., University Library (1968). BA 1967, MSL 1968, Kan. St. Teach. Col.

**WANCURA, ELDON N.**, Assoc. Prof., Univ. Library (1962, 1970), B.S., 1957, Kan. St. Univ.; MA 1961, Denver Univ.

**WHITE, NEVA L.**, Assoc. Prof., Univ. Library (1966, 1970). AB 1944, Goshen Col.; AB in LS 1946, Univ. of Mich.

**WILDE, LUCY M.**, Instr., University Library (1967). BA 1965, Avila Col.; MSL 1967, Rosary Col.

**WILLIAMS, EVAN W.**, Assoc. Prof., University Library (1964, 1971). AB 1955, Washington Univ.; MSL 1956, Univ. of Ill.

**WILLIS, CECILIA A.**, Instr., University Library (1972). BA 1971, Kan. St. Univ.

**WINTER, DOROTHY M.**, Instr., University Library (1970). BS 1946, Kan. St. Univ.; MSL 1971, Kan. St. Teach. Col.

## Student Personnel Services Faculty

**AKIN, JAMES N.**, Assoc. Dir., Career Planning and Placement Center (1966). BS 1960, MS 1964, Kan. St. Univ.

**ALLEN, COY C.**, Admin. Assist., Instr., Housing and Food Service (1967, 1972). BS 1960, MS 1971, Kan. St. Univ.

**BERGEN, GERALD R.**, Dir., Aids, Awards and Veterans Service (1965, 1969). BS 1958, MS 1967, Kan. St. Univ.

**BODDIE, JULIA A.**, Instr., Center for Student Development (1971). BS 1969, MS 1970, Kan. St. Univ.

**BOUCHER, ANN L.**, Dietitian, Instr., Housing and Food Service (1971). BS 1970, Oregon St. Univ.

**BRADSHAW, MICHAEL H.**, Asst. Dir., Health Education Section, Student Health Center, Instr. (1971). BS 1968, MEd 1971, Brigham Young Univ.

**BRETELL, J. ALLAN**, Foreign Student Adviser, Asst. Prof., Center for Student Development (1966). BA 1949, MS 1951, Westminster Col.

**BROWN, ELVIN E.**, Instr., Center for Student Development (1969). BS 1951, McPherson Col.; MS 1954, Fort Hays St. Col.

**BROWN, ROBERT M.**, Assoc. Prof., Student Health Center (1972). BS 1954, Kan. St. Univ.; BA 1959, Univ. of Kan.; MD 1963, Univ. of Kan.

**BUTLER, NORVILLE L.**, Assoc. Prof., Student Health Center (1964). BA 1931, Neb. Wesleyan Univ.; MD 1940, Univ. of Neb.

**CARNEY, CLARKE G.**, Asst. Prof., Center for Student Development (1971). BA 1967, San Francisco St. 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 St. Univ. (GF)

**EDWARDS, A. THORNTON**, Dir., Housing and Food Service, Assoc. Prof. of Psychology (1945, 1949). BS 1941, MS 1946, Kan. St. Univ.

**FRITH, THOMAS J.**, Residence Halls Program Dir., Asst. Prof. (1965). BA 1960, MA 1963, EdS 1965, Univ. of Iowa.

**GEISSLER, VERNON V.**, Asst. Dir., Career Planning and Placement Center (1966). BS 1942, MS 1966, Kan. St. Univ.

**HILL, CYNTHIA J.**, Dietitian, Instr., Housing and Food Service (1968, 1971). BS 1965, Ohio Univ.

**KASPER, EUGENE C.**, Dir., Center for Student Development, Dean of Students, Assoc. Prof. of Education (1968). BS 1956, MS 1956, Kan. St. Teach. Col.; EdD 1963, Univ. of N.D. (GF)

**KAUP, BEVERLY JANE**, Instr., Center for Student Development (1967). BS 1964, Fort Hays St. Col.; MS 1967, Kan. St. Univ.

**KERR, WENDELL ROBERT**, Asst. Dir., Housing and Food Service, Asst. Prof. of Education (1947, 1957). BS 1947, MS 1951, Kan. St. Univ.

**KOENIGSBERG, STEVEN M.**, Asst. Prof., Student Health Center (1971). BA 1964, Rutgers Univ.; MA 1966, Temple Univ.; PhD 1971, Univ. of S. C.

**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**, Dir. Emeritus, Student Health Center (1946, 1948, 1962). BS 1923, Mich. St. Univ.; MD 1931, Western Reserve Univ.

**LAUGHLIN, J. BRUCE**, Dir., Career Planning and Placement Center, Asst. Prof. (1962, 1966). BS 1950, Univ. of Kan.; MS 1961, Kan. St. Univ.; JD 1967, Washburn Univ.

**LILLY, JERRY A.**, Administrative Asst., Vice Pres. for Student Affairs, Instr. (1967). BS, Ed, 1964, Concord Col.

**LYNCH, MICHAEL L.**, Asst. Prof., Center for Student Development (1972). BS 1967; MS 1968; EdD 1972, Ind. Univ.

**MCCOY, DONALD E.**, Associate Prof., Student Health Center (1970). BS 1937, MD 1945, Univ. of Kan.

**McKNIGHT, DAVID E.**, Radiologist, Student Health Center (1972). DVM 1954, Kan. St. Univ.; MD 1962, Univ. of Kan.

**McMANIS, HELEN L.**, Dietitian, Instr., Housing and Food Service (1966, 1971). BS 1941, Kan. St. Univ.

**MITCHELL, SHARLENE K.**, Residence Hall Dir., Instr. (1969). BS 1968, Kan. St. Univ.

**MORRISON, DAVID R.**, Assoc. Prof., Student Health Center (1972). BS 1947, Monmouth Col.; MD 1951, Loyola Univ.

**NORDIN, MARGARET N.**, Assoc. Dir., Center for Student Development, Dean of Women, Assoc. Prof. (1957). BS 1941, MA 1953, PhD 1962, Univ. of Minn. (GF)

**OGG, WILLIAM D.**, Instr., Center for Student Development (1964). BS 1956, MS 1964, Kan. St. Univ.

**PEINE, CAROLINE F.**, Instr., Center for Student Development (1961). AB 1947, Carleton Col.; MS 1951, Kan. St. Univ.

**PENCE, JOHN T.**, Dietitian, Instr., Housing and Food Service (1963, 1971). BS 1963, Purdue Univ.; MS 1970, Kan. St. Univ.

**PETERS, CHESTER E.**, Vice Pres. for Student Affairs, Prof. (1947, 1953, 1962, 1967). BS 1947, MS 1950, Kan. St. Univ.; PhD 1953, Univ. of Wis.

**PETERSON, JACK T.**, Consulting Pathologist, Student Health Center (1965). AB, MD, 1950, Univ. of Kan.

**PHILLIPS, STEPHEN B.**, Chief, Clinical Medicine, Student Health Center, Assoc. Prof. (1967). AB 1942, MD 1945, Univ. of Kan.

**RIGGS, JEAN M.**, Assoc. Dir., Housing and Food Service, Assoc. Prof. of Institutional Management (1960). BS 1939, MS 1956, Iowa St. Univ.

**ROBEL, RAYDON H.**, Asst. Dir., Dept. of Intramurals and Recreation (1970). BS 1965, MS 1970, Kansas State University.

**ROOF, DONALD B.**, Residence Hall Dir., Instr. (1964). BS 1964, Kan. St. Univ.

**ROSE, DONALD L.**, Dir., Dept. of Intramurals and Recreation (1968). BS 1953, Kan. St. Univ.

**SEGO, WILBURN**, Residence Hall Director, Instr. (1967). AB 1951, Western Ky. Univ.

**SINCLAIR, ROBERT E.**, Dir., Student Health Center, Prof. (1970). BA 1948, MD 1952, Ohio St. Univ.

**SINNETT, E. ROBERT**, Asst. Dir., Mental Health Section, Student Health Center, Prof. of Psychology (1962). AB 1948, Univ. of Iowa; MA 1950, PhD 1953, Univ. of Mich.

**SMITH, ROBERT W.**, Residence Hall Director, Instr. (1968). BS 1964, Kan. St. Univ.

**SMITH, WALTER D.**, Dir., K-State Union (1957, 1973). BA 1950, Kan. Wesleyan Univ.

**STEFFEN, JOHN D.**, Asst. Prof. of Education, Center for Student Development (1967). BA 1956, Hamline Univ.; PhD 1968, Univ. of Minn.

**STRONG, MABEL B.**, Residence Hall Director, Instr. (1961, 1964). BS 1961, Kan. St. Univ.

**SWITZER, VERYL A.**, Asst. to Vice Pres. for Student Affairs for Univ. Human Relations, Instr. (1969). BS 1954, Kan. St. Univ.

**TROTTER, MARILYN B.**, Instr., Center for Student Development (1967). BS 1965, MS 1967, Kan. St. Univ.

**UPHAM, JAMES A.**, Assoc. Dir., Aids, Awards and Veterans Service (1967, 1969). BS 1943, MS 1969, Kan. St. Univ.

**ZEIGLER, MERNA MILLER**, Dir. of Food Service, K-State Union, Assoc. Prof. of Institutional Management (1940, 1957). BS 1932, MS 1941, Kan. St. Univ. (GF)

**ZIELKE, DONALD D.**, Asst. Dir., Aids, Awards and Veterans Service (1971). BS 1955, Wichita St. Univ.; MS 1970, Kan. St. Univ.



## College of Agriculture

- ABLE, BILLY V.**, Asst. Prof. of Animal Science and Industry (1970). BS 1962, Okla. St. Univ.; MS 1964, Miss. St.; PhD 1970, Univ. of Ky. (GF)
- ABMEYER, ERWIN**, Asst. Prof. of Horticulture and Forestry; Research Horticulturist in charge Northeast Kan. Experiment Field (PO Wathena) Agr. Exp. Sta. (1934, 1935). BS 1933, Kan. St. Univ.
- ADAMS, ALBERT W.**, Assoc. Prof. of Dairy and Poultry Science; Research Poultry Scientist, Agr. Exp. Sta. (1962, 1968). BS 1951, MS 1955, Kan. St. Univ.; PhD 1964, S.D. St. Univ. (GF)
- AICHER, LOUIS CORNELIUS**, Prof. of Animal Science and Industry Emeritus (1921, 1957). BS 1910, Kan. St. Univ.
- ALLEE, GARY L.**, Asst. Prof. of Animal Science and Industry; Research Swine Nutritionist, Agr. Exp. Sta. (1970). BS 1966, MS 1967, Univ. of Mo.; PhD 1970, Univ. of Ill. (GF)
- ALLEN, DELORAN M.**, Assoc. Prof. of Animal Science and Industry; Meat Animal Research Scientist, Agr. Exp. Sta. (1966, 1970). BS 1961, Kan. St. Univ.; MS 1963, Univ. of Idaho; PhD 1966, Mich. St. Univ. (GF)
- AMES, DAVID R.**, Asst. Prof. of Animal Science and Industry; Research Environmental Physiologist and Sheep Husbandry Research, Agr. Exp. Sta. (1969). BS 1964, MS 1966, Ohio St. Univ.; PhD 1968, Mich. St. Univ. (GF)
- ANDERSON, KLING L.**, Prof. of Agronomy Emeritus (1936, 1967). BS 1936, Univ. of Calif.; MS 1938, Kan. St. Univ.; PhD 1951, Univ. of Neb.
- AREHART, JR., LAURENCE A.**, Asst. Prof.; Meat Animal Research Scientist, Colby Branch Agr. Exp. Sta. (1970). BS 1965, Va. Polytechnic Institute; MS 1970, Kan. St. Univ.
- ARMBRUST, DEAN V.**, Assoc. Prof. of Agronomy; Research Soil Scientist, Wind Erosion Laboratory, U.S.D.A., Agricultural Research Service (1968). BS 1960, MS 1961, Kan. St. Univ. (Courtesy Appointment)
- ATKINSON, C. HARRY**, Assoc. Prof. of Agronomy; Soil Scientist, Soil Conservation Service, U.S.D.A., Agr. Exp. Sta. (1949). BS 1931, MS 1933, Pa. St. Univ.
- AUBEL, CLIFF E.**, Prof. of Animal Science and Industry Emeritus (1915, 1961). BS 1915, Pa. St. Univ.; MS 1917, Kan. St. Univ.; PhD 1931, Univ. of Minn.
- AXELTON, MILBURNE C.**, Asst. Prof. of Agronomy Emeritus (1929, 1970). BS 1928, Kan. St. Univ.
- BANBURY, EVANS E.**, Assoc. Prof.; Superintendent in charge, Colby Branch Agr. Exp. Sta. (1946, 1955). BS 1940, Kan. St. Univ.
- BARNETT, FRANCIS L.**, Assoc. Prof. of Agronomy; Forage Research Geneticist, Agr. Exp. Sta. (1956, 1959). BS 1952, McGill Univ. (Canada); MS 1954, PhD 1956, Pa. St. Univ. (GF)
- BARTLEY, ERLE E.**, Prof. of Dairy and Poultry Science; Dairy Cattle Research 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; Dairy Foods Research Chemist, Agr. Exp. Sta. (1958, 1964). BS 1952, MS 1955, PhD 1958, Univ. of Md. (GF)
- BATES, LYNN S.**, Asst. Prof. of Grain Science and Industry; Research Biochemist, Agr. Exp. Sta. (1972). BS 1962, Heidelberg Col.; MS 1966, Purdue Univ.; PhD 1972, Kan. St. Univ. (GF)
- BAXTER, WILLIAM M.**, Asst. Prof. and Asst. to the Superintendent, Fort Hays Branch Agr. Exp. Sta. (1949, 1967). BS 1949, Kan. St. Univ.
- BEAT, LARRY J.**, Instr. of Dairy and Poultry Science; Kansas Artificial Breeding Service Unit (KABSU) Agr. Exp. Sta. (1970). BS 1967, Kan. St. Univ.
- BIDWELL, ORVILLE W.**, Prof. of Agronomy; Soil Survey Research Scientist, Agr. Exp. Sta. (1950, 1960). AB 1940, Oberlin Col.; BS 1942, PhD 1949, Ohio St. Univ. (GF)
- BIERE, ARLO WILLIAM**, Asst. Prof. of Agricultural Economics; Research Agr. Econ. Natural Resources; Regional and Community Dev., Agr. Exp. Sta. (1968). BS 1963, Univ. of Neb.; MA 1964, PhD 1967, Univ. of Calif. (GF)
- BLOCKER, H. DERRICK**, Assoc. Prof. of Entomology; Research Entomologist Taxonomy of Leafhoppers and Grassland Insects, Agr. Exp. Sta. (1965, 1971). BS 1954, MS 1958, Clemson Univ.; PhD 1965, N.C. St. Univ. (GF)
- BOLSEN, KEITH K.**, Asst. Prof. of Animal Science and Industry; Beef Cattle Research Nutritionist, Agr. Exp. Sta. (1971). BS 1966, MS 1967, Univ. of Ill.; PhD 1971, Univ. of Neb. (GF)
- BONNE, DONALD J.**, Instr. of Agronomy; Research Agronomist in Charge, Southwest Kan. Experimental Field (P. O. Minneola). Agr. Exp. Sta. (1969). BS 1967, MS 1969, Univ. of Neb.
- BORDOVSKY, DAVID G.**, Asst. Prof.; Irrigation Research Scientist, Colby Branch Agr. Exp. Sta. (1971). BS 1970, MS 1972, Tex. A and M Univ.
- BOREN, FRED W.**, Prof.; Superintendent and Meat Animal Research Scientist, Southeast Kan. Branch Agr. Exp. Sta. (1957, 1968). BS 1946, A & M Col. of Tex.; MS 1950, Kan. St. Univ.; PhD 1965, Utah St. Univ.
- BRANDNER, LOWELL**, Prof.; Agricultural Editor (1947, 1961). AB 1937, BS 1937, Emporia St. Teach. Col.; MS 1951, Kan. St. Univ.; PhD 1960, Univ. of Wis. (GF)
- BRATCHER, BOBBY G.**, Instr. of Agronomy; Crop Scientist, Kansas Crop Improvement Association, Agr. Exp. Sta. (1971). BS 1969, MS 1971, Okla. St. Univ.
- BRENT, BENNY E.**, Assoc. Prof. of Animal Science and Industry; Meat Animal Research Nutritionist, Agr. Exp. Sta. (1966, 1969). BS 1959, MS 1960, Kan. St. Univ.; PhD 1966, Mich. St. Univ. (GF)
- BRETHOUR, JOHN R.**, Assoc. Prof.; Beef Research Scientist, Fort Hays Branch Agr. Exp. Sta. (1957, 1968). BS 1955, Kan. St. Univ.; MS 1956, Oklahoma St. Univ.
- BRINKMAN, GEORGE L.**, Asst. Prof. of Agricultural Economics; Research Agr. Econ. Regional and Community Dev., Agr. Exp. Sta. (1969). BS 1964, MS 1965 Wash. St. Univ.; PhD 1969, Mich. St. Univ.
- BROWDER, LEWIS E.**, Asst. Prof. of Plant Pathology; Research Cereal Rust Plant Pathologist, U.S.D.A., Agricultural Research Service (1958). AS 1952, Cameron St. Agricultural Col.; BS 1954, MS 1956, Okla. St. Univ.; PhD 1965, Kan. St. Univ. (GF) (Courtesy Appointment)
- BULLER, ORLAN H.**, Assoc. Prof. of Agricultural Economics; Research Agr. Econ. Farm Management; Production Economics, Agr. Exp. Sta. (1963, 1969). BS 1958, Kan. St. Univ.; MS 1959, PhD 1965, Mich. St. Univ. (GF)
- BURCHETT, LOWELL A.**, Asst. Prof. of Agronomy; Research Agronomist in charge, North Central Kan. Experimental Field (P. O. Belleville) Agr. Exp. Sta. (1965, 1972). BS 1956, Okla. St. Univ.; MS 1969, Kan. St. Univ.
- CALL, EDWARD P.**, Assoc. Prof. of Dairy and Poultry Science; Dairy Cattle Research Physiologist, Agr. Exp. Sta. (1963, 1968). BS 1951, Ohio St. Univ.; PhD 1967, Kan. St. Univ. (GF)
- CAMPBELL, RONALD W.**, Prof.; Head, Department of Horticulture and Forestry; Research Horticulturist, Agr. Exp. Sta. (1946, 1966). BS 1943, MS 1946, Kan. St. Univ.; PhD 1955, Mich. St. Univ. (GF)
- CARPENTER, FRANK R.**, Asst. Dean, Col. of Agriculture; Assoc. Prof. (1961, 1969). BS 1948, MS 1951, Kan. St. Univ.; PhD 1967, Univ. of Mo. (GF)
- CASADY, ALFRED J.**, Prof. of Agronomy; Research Sorghum Geneticist, U.S.D.A., Agricultural Research Service (1949, 1970). BS 1948, MS 1950, PhD 1962, Kan. St. Univ. (GF) (Courtesy Appointment)
- CHYBA, LESLIE J.**, Instr.; Meat Animal Research Scientist, Southeast Kansas Branch Agr. Exp. Sta. (1972). BS 1969, MS 1972, Kan. St. Univ.
- CLAPP, ALFRED L.**, Prof. of Agronomy Emeritus (1915, 1961). BS 1914, MS 1934, Kan. St. Univ.
- CLAYDON, THOMAS J.**, Prof. of Dairy and Poultry Science; Dairy Foods Research Microbiologist, Agr. Exp. Sta. (1946, 1965). BSA 1934, Univ. of Saskatchewan (Canada); MS 1936, PhD 1939, Iowa St. Univ. (GF)
- CONDRAV, JERRY L.**, Asst. Prof.; Research Agronomist Weeds, Garden City Branch Agr. Exp. Sta. (1968). BS 1966, MS 1968, Kan. St. Univ.
- COX, RUFUS F.**, Prof. of Animal Science and Industry Emeritus (1930, 1971). BS 1923, Oklahoma State Univ.; MS 1925, Iowa St. Univ.; PhD 1941, Cornell Univ.
- CRAIG, JAMES V.**, Prof. of Dairy and Poultry Science; Poultry Research Geneticist, Agr. Exp. Sta. (1955, 1960). BS 1948, MS 1949, Univ. of Ill.; PhD 1952, Univ. of Wis. (GF)
- CUNNINGHAM, FRANKLIN E.**, Assoc. Prof. of Dairy and Poultry Science; Poultry Foods Research Scientist, Agr. Exp. Sta. (1969). BS 1957, Kan. St. Univ.; MS 1959, PhD 1963, Univ. of Mo. (GF)
- DAINELLO, FRANK J.**, Asst. Prof. of Horticulture and Forestry; Research Horticulturist, Food Crops, Sedgwick Co. Experimental Field (PO Wichita) Agr. Exp. Sta. (1969). BS 1964, Southeastern La. Col.; MS 1966, PhD 1969, La. St. Univ.
- DALLON, JR., JOSEPH**, Asst. Prof. of Horticulture and Forestry; Research Horticulturist, Ornamentals, Agr. Exp. Sta. (1972). BS 1960, Southern Univ.; MS 1962, Univ. of Ill.; PhD 1972, Rutgers Univ.
- DAVIS, JR., GEORGE V.**, Assoc. Prof.; Animal Research Scientist, Garden City Branch Agr. Exp. Sta. (1972). BS 1960, MS 1964, PhD 1972, Univ. of Ark.
- DePEW, LESTER J.**, Asst. Prof. of Entomology; Research Entomologist, Insects of Southwestern Kansas (PO Garden City) Agr. Exp. Sta. (1954, 1959). BS 1949, Colo. A & M; MS 1954, Univ. of Minn.
- DEYOE, CHARLES W.**, Prof. of Grain Science and Industry; Feed Technology Research Scientist, Agr. Exp. Sta. (1962, 1968). BS 1955, Kansas State Univ.; MS 1957, PhD 1959, Tex. A & M Col. (GF)
- DICKERSON, JERRY D.**, Instr. of Agronomy; Research Agricultural Engineer, Wind Erosion Laboratory, U.S.D.A., Agricultural Research Service (1970). BS 1957, MS 1964, Kan. St. Univ. (Courtesy Appointment)
- DICKERSON, OTTIE J.**, Prof. of Plant Pathology; Research Plant Nematologist, Agr. Exp. Sta. (1961, 1972). AS 1953, Ark. Polytechnic Col.; BSA 1955, MS 1956, Univ. of Ark.; PhD 1961, Univ. of Wis. (GF)
- DIKEMAN, MICHAEL E.**, Asst. Prof. of Animal Science and Industry; Meats Research Scientist, Agr. Exp. Sta. (1970). BS 1966, Kan. St. Univ.; MS 1968, Mich. St. Univ.; PhD 1970, Kan. St. Univ. (GF)
- DILLON, MERLIN A.**, Instr.; Crops Research Agronomist, Tribune Branch Agr. Exp. Sta. (1971). BS 1967, Panhandle State Col.; MS 1970, Colo. St. Univ.
- DISRUDE, LOWELL A.**, Instr. of Agronomy; Research Agricultural Engineer, Wind Erosion Laboratory, U.S.D.A., Agricultural Research Service (1968). BS 1963, N.D. St. Univ.; MS 1969, Kan. St. Univ. (Courtesy Appointment)
- DODGE, GILBERT R.**, Asst. Prof. and Administrative Asst., Agr. Exp. Sta. (1958). BS 1950, Kan. St. Univ.; CPA 1957, Kansas.
- DUITSMAN, W.W.**, Prof. and Supt. in charge, Fort Hays Branch Agr. Exp. Sta. (1941, 1970). BS 1940, Kan. St. Univ.
- EDMUNDS, LEON K.**, Assoc. Prof. of Plant Pathology; Research Sorghum Plant Pathologist, U.S.D.A., Agricultural Research Service (1960, 1968). BS 1953, PhD 1958, Univ. of Wis. (GF) (Courtesy Appointment)
- EHLER, STANLEY W.**, Asst. Prof. of Agronomy; Weed Control Research Scientist, Agr. Exp. Sta. (1972). BS 1962, MS 1964, Univ. of Southern Ill.; PhD 1972, Univ. of Missouri.
- ELLIS, JR., ROSCOE**, Prof. of Agronomy; Research Soil Chemist, Agr. Exp. Sta. (1948, 1960). BS 1948, MS 1950, Kan. St. Univ.; PhD 1952, Univ. of Wis. (GF)
- ELMER, OTTO HERMAN**, Prof. of Plant Pathology Emeritus (1927, 1961). BS 1911, MS 1921, Ore. St. Col.; PhD 1924, Iowa State Univ.
- ELZINGA, RICHARD J.**, Assoc. Prof. of Entomology; Research Entomologist, Medical Insects and Mites, Agr. Exp. Sta. (1961, 1966). BS 1955, MS 1956, PhD 1960, Univ. of Utah. (GF)
- ERICKSON, DONALD B.**, Assoc. Prof. of Agricultural Economics; Research Agr. Econ. Regional and Community Dev., Agr. Exp. Sta. (1966). BS 1955, MS 1960, Univ. of Wyoming; PhD 1964, Purdue Univ. (GF)
- ERHART, ANDREW B.**, Prof. and Supt. in charge, Garden City Branch Agr. Exp. Sta. (1931, 1952). BS 1933, Kan. St. Univ.
- ESHAUGH, ELBERT L.**, Asst. Prof. of Entomology; Research Entomologist, Alfalfa Weevil; Crop Pests, Agr. Exp. Sta. (1945, 1952). BS 1936, MS 1951, Kan. St. Univ.
- FARMER, EARL L.**, Prof. of Dairy and Poultry Science; Dairy Cattle Research Physiologist, Agr. Exp. Sta. (1949, 1968). BS 1948, Univ. of Missouri; MS 1957, Kan. St. Univ.; PhD 1963, Univ. of Wis. (GF)
- FARRELL, EUGENE PATRICK**, Prof. of Grain Science and Industry; Milling Technology Research Scientist, Agr. Exp. Sta. (1949, 1967). BS 1935, MS 1952, Kan. St. Univ. (GF)
- FILINGER, GEORGE A.**, Prof. of Horticulture and Forestry, Emeritus (1931, 1966). BS 1924, MS 1925, Kan. St. Univ.; PhD 1931, Ohio St. Univ.
- FINNEY, KARL FREDERICK**, Prof. of Grain Science and Industry; Research Chemist, USDA Regional Hard Winter Wheat Laboratory (1938, 1948). AB 1935, Kan. Wesleyan Univ.; BS 1936, MS 1937, Kan. St. Univ. (GF) (Courtesy Appointment)



- FULLER, WILLIAM W.**, Asst. Prof.; Forage Crops Research Agronomist, Southeast Kansas Branch Agr. Exp. Sta. (1972). BA 1954, Univ. of Okla.; MS 1970, PhD 1973, Okla. St. Univ.
- GEYER, WAYNE A.**, Asst. Prof. of Horticulture and Forestry; Research Forester, Ecology, Agr. Exp. Sta. (1966). BS 1955, Iowa St. Univ.; MS 1962, Purdue Univ.; PhD 1971, Univ. of Minn.
- GOOD, DON L.**, Prof., Head of Department of Animal Science and Industry; Meat Animal Research Scientist, Agr. Exp. Sta. (1947, 1966). BS 1947, Ohio St. Univ.; MS 1950, Kan. St. Univ.; PhD 1956, Univ. of Minn. (GF)
- GREIG, JR., JAMES K.**, Prof. of Horticulture and Forestry; Research Horticulturist, Vegetable Crops, Agr. Exp. Sta. (1952, 1969). BS 1949, MS 1950, Univ. of Ark.; PhD 1960, Kan. St. Univ. (GF)
- GRONAU, DON M.**, Instr. of Agronomy; Research Agronomist In Charge, Newton Experimental Field (P.O. Newton) Agr. Exp. Sta. (1965). BS 1962, Kan. St. Univ.
- GROTHUSEN, DAVID W.**, Instr. of Dairy and Poultry Science; Kansas Artificial Breeding Service Unit (KABSU) Agr. Exp. Sta. (1972). BS 1970, Kan. St. Univ.
- GRUVER, CLIFFORD N.**, Instr. of Agronomy; Research Agronomist In Charge, East Central Experimental Field (P.O. Ottawa) Agr. Exp. Sta. (1967). BS 1962, MS 1971, Kan. St. Univ.
- GWIN, JR., ROY E.**, Asst. Prof. and Supt. in Charge, Tribune Branch Agr. Exp. Sta. (1957, 1966). BS 1943, MS 1963, Kan. St. Univ.
- HACKEROTT, HAROLD LEROY**, Prof.; Sorghum Research Geneticist, Fort Hays Branch Agr. Exp. Sta. (1954, 1970). BS 1945, MS 1946, Kan. St. Univ.
- HADLE, FRED BENTON**, Asst. Prof. of Horticulture and Forestry; Research Horticulturist, Farm Supt., Agr. Exp. Sta. (1951). BS 1951, MS 1958, Kan. St. Univ.
- HAGAN, LAWRENCE J.**, Instr. of Agronomy; Research Agricultural Engineer, Wind Erosion Laboratory, U.S.D.A., Agricultural Research Service (1967). BS 1962, MS 1967, N.D. St. Univ. (Courtesy Appointment)
- HALL, CHARLES V.**, Prof. of Horticulture and Forestry; Research Horticulturist, Vegetable Crop Geneticist, Agr. Exp. Sta. (1953, 1969). BS 1950, MS 1953, Univ. of Ark.; PhD 1960, Kan. St. Univ. (GF)
- HANSING, EARL DAHL**, Prof. of Plant Pathology; Cereal Crops Research Pathologist, Agr. Exp. Sta. (1935, 1947). BS 1933, Univ. of Minn.; MS 1937, Kan. St. Univ.; PhD 1941, Cornell Univ. (GF)
- HARBERS, LENIEL H.**, Assoc. Prof. of Animal Science and Industry; Meat Animal Research Nutritionist, Agr. Exp. Sta. (1964). BS 1957, MS 1958, Tex. A & M Col.; PhD 1961, Okla. St. Univ. (GF)
- HARVEY, T. L.**, Prof. of Entomology; Research Entomologist, Insects of North Central and Northwest Kan. (P.O. Hays) Agr. Exp. Sta. (1954, 1970). BS 1950, MS 1951, Kan. St. Univ.; PhD 1963, Okla. St. Univ. (GF)
- HERRON, GEORGE M.**, Assoc. Prof.; Research Agronomist, Soil Testing, Garden City Branch Agr. Exp. Sta. (1956, 1971). BS 1949, MS 1950, Oklahoma State Univ.; PhD 1968, Univ. of Neb.
- HESS, CARROLL V.**, Dean, Col. of Agriculture; Assoc. Dir., Agr. Exp. Sta. (1966). BS 1947, Pa. St. Univ.; MS 1948, PhD 1953, Iowa St. Univ. (GF)
- HEYNE, ELMER GEORGE**, Prof. of Agronomy; Small Grains Research Geneticist, Agr. Exp. Sta. (1936, 1947). BS 1935, Univ. of Neb.; MS 1938, Kan. St. Univ.; PhD 1952, Univ. of Minn. (GF)
- HINES, ROBERT H.**, Assoc. Prof. of Animal Science and Industry; Swine Research Scientist, Agr. Exp. Sta. (1966, 1969). BS 1957, Purdue Univ.; MS 1961, PhD 1966, Mich. St. Univ. (GF)
- HOBBS, JAMES A.**, Prof. of Agronomy; Soil Management Research Scientist, Agr. Exp. Sta. (1950, 1958). BS 1935, MS 1940, Univ. of Manitoba (Winnipeg); PhD 1948, Purdue Univ. (GF)
- HOOVER, JIMMY D.**, Instr. of Animal Science and Industry; (1966). BS 1961, MS 1970, Kan. St. Univ.
- HOOVER, WILLIAM J.**, Prof.; Head, Department of Grain Science and Industry; Dir., Food and Feed Grain Institute and Research Grain Scientist, Agr. Exp. Sta. (1966). BS 1950, MS 1954, PhD 1961, Univ. of Ill. (GF)
- HOPKINS, T. L.**, Prof. of Entomology; Research Entomologist, Insect Physiology, Toxicology, Radiolotope Tracers and Pesticidal Residues, Agr. Exp. Sta. (1960, 1970). BS 1951, MS 1956, Ore. St. Univ.; PhD 1960, Kan. St. Univ. (GF)
- HORBER, ERNST K.**, Prof. of Entomology; Research Entomologist, Hostplant Resistance to Insects, Agr. Exp. Sta. (1970). BS 1945, DSc 1951, Swiss Federal Institute of Technology; PhD 1954, Kan. St. Univ. (GF)
- HOSENEY, R. CARL**, Assoc. Prof. of Grain Science and Industry, Research Cereal Chemist, Agr. Exp. Sta. (1971). BS 1957, MS 1960, PhD 1968, Kan. St. Univ. (GF)
- HOWE, HAROLD**, Dean of Graduate School Emeritus; Prof. of Agricultural Economics Emeritus (1925, 1964). BS 1922, Kan. St. Univ.; MS 1923, Univ. of Md.; PhD 1937, Univ. of Wis.; LLD 1950, St. Benedict's Col.
- HUMBURG, NEIL E.**, Asst. Prof. of Agronomy; Research Agronomist In Charge, Kan. River Valley Experimental Field (P.O. Topeka), Agr. Exp. Sta. (1970). BS 1955, MS 1965, Colo. St. Univ.; PhD 1970, Univ. of Wis.
- HUSTON, KEITH**, Prof.; Assoc. Dir. of Agr. Exp. Sta., Adjunct Research Geneticist, Department of Pathology (1954, 1971). BS 1949, MS 1950, PhD 1951, Univ. of Wis. (GF)
- IBBETSON, R. WESLEY**, Instr.; Research Dairy Scientist, Southeast Kan. Branch Agr. Exp. Sta. (1972). BS 1962, MS 1971, Kan. St. Univ.
- JACKSON, WILLIAM P.**, Instr. of Dairy and Poultry Science; Kan. Artificial Breeding Service Unit (KABSU) Agr. Exp. Sta. (1965). BS 1965, Colo. St. Univ.
- JACOBS, HYDE S.**, Prof.; Head, Department of Agronomy; Dir., Kan. Water Resources Research Institute; Dir., Evapotranspiration Lab.; Research Soil Scientist, Agr. Exp. Sta. (1957, 1971). BSA 1952, MS 1953, Univ. of Idaho; PhD 1957, Mich. St. Univ. (GF)
- JOHNSON, JOHN A.**, Prof. of Grain Science and Industry; Baking Technology Research Scientist, Agr. Exp. Sta. (1940, 1955). BS 1940, N.D. Agricultural Col.; MS 1942, Kan. St. Univ.; PhD 1954, Univ. of Minn. (GF)
- JOHNSON, LOWELL B.**, Assoc. Prof. of Plant Pathology; Research Plant Disease Physiologist, Agr. Exp. Sta. (1968, 1971). BS 1957, Univ. of Ill.; MS 1962, PhD 1964, Purdue Univ. (GF)
- KADOUH, AHMED M.**, Asst. Prof. of Entomology; Research Entomologist, Pesticidal Chemistry, Agr. Exp. Sta. (1966). BS 1958, Alexandria Univ.; MS 1963, PhD 1966, Univ. of Neb. (GF)
- KAHRS, AMOS J.**, Instr. of Dairy and Poultry Science; Poultry Research Farm Supt., Agr. Exp. Sta. (1956, 1958). BS 1953, Kan. St. Univ.
- KANEMASU, EDWARD T.**, Asst. Prof. of Agronomy; Research Micrometeorologist, Agr. Exp. Sta. (1969). BS 1962, MS 1964, Mont. St. Univ.; PhD 1969, Univ. of Wis. (GF)
- KEEN, RAY A.**, Prof. of Horticulture and Forestry; Research Horticulturist, Turfgrass, Agr. Exp. Sta. (1947, 1956). BS 1942, Kan. St. Univ.; MS 1947, PhD 1956, Ohio St. Univ. (GF)
- KELLEY, PAUL LEO**, Prof.; Head, Department of Agricultural Economics; Research Economist, Agr. Exp. Sta. (1943, 1968). BS 1943, MS 1946, Kan. St. Univ.; PhD 1956, Iowa St. Univ. (GF)
- KIRACOFE, GUY H.**, Assoc. Prof. of Animal Science and Industry; Meat Animal Research Physiologist, Agr. Exp. Sta. (1966, 1969). BS 1958, MS 1960, Va. Polytechnic Col.; PhD 1965, Kan. St. Univ. (GF)
- KNIGHT, DALE A.**, Assoc. Prof. of Agricultural Economics; Research Agr. Econ., Regional and Community Dev., Agr. Exp. Sta. (1948, 1957). BS 1945, Kan. St. Univ.; MS 1946, Cornell Univ.; AM 1948, PhD 1952, Univ. of Chicago. (GF)
- KNUTSON, HERBERT**, Prof.; Head, Department of Entomology; Research Entomologist, Grasshoppers, Agr. Exp. Sta. (1953). AB 1936, Iowa Wesleyan Col.; MS 1937, Southern Methodist Univ.; PhD 1941, Univ. of Minn. (GF)
- KOCH, BERL A.**, Prof. of Animal Science and Industry; Swine Research Nutritionist, Agr. Exp. Sta. (1956, 1963). BS 1949, Iowa St. Univ.; MS 1951, Cornell Univ.; PhD 1955, Univ. of Calif. (GF)
- KOUDELE, JOSEPH WENDELL**, Assoc. Prof. of Agricultural Economics; Research Agr. Econ., Marketing Animal Products, Agr. Exp. Sta. (1947, 1958). BS 1943, Univ. of Neb.; MS 1947, Univ. of Minn.; PhD 1956, Mich. St. Univ. (GF)
- KROPF, DONALD HARRIS**, Prof. of Animal Science and Industry; Meats Research Scientist, Agr. Exp. Sta. (1962, 1972). BS 1952, Univ. of Wis., MS 1953, Univ. of Florida; PhD 1956, Univ. of Wis. (GF)
- KYLE, JACK H.**, Asst. Prof.; Research Horticulturist, Garden City Branch Agr. Exp. Sta. (1968). BS 1953, Kan. St. Univ.; MS 1955, Univ. of Idaho.; PhD 1959, Wash. St. 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.; Range Research Ecologist, Fort Hays Branch Agr. Exp. Sta. (1955, 1967). AB 1947, MS 1948, Fort Hays Kan. St. Col.; PhD 1952, Tex. A & M Col.
- LAWLESS, JOHN R.**, Asst. Prof.; Crops Research Scientist, Colby Branch Agr. Exp. Sta. (1960, 1965). BS 1958, Univ. of Neb.; MS 1960, Wash. St. Univ.
- LIANG, GEORGE H. L.**, Assoc. Prof. of Agronomy; Research Cytogeneticist, Agr. Exp. Sta. (1964, 1969). BS 1956, Taiwan Provincial Col.; MS 1961, Univ. of Wyoming; PhD 1964, Univ. of Wis. (GF)
- LINEBACK, DAVID R.**, Assoc. Prof. of Grain Science and Industry; Research Biochemist, Agr. Exp. Sta. (1969). BS 1956, Purdue Univ.; PhD 1962, Ohio St. Univ. (GF)
- LIVERS, RONALD W.**, Prof.; Wheat Research Geneticist, Fort Hays Branch Agr. Exp. Sta. (1962, 1966). BS 1948, MS 1949, Kan. St. Univ.; PhD 1957, Univ. of Minn.
- LONG, CHARLES E.**, Asst. Prof. of Horticulture and Forestry; Research Horticulturist, Herbicides, Agr. Exp. Sta. (1965, 1972). BS 1964, MS 1965, Okla. St. Univ.; PhD 1972, Kan. St. Univ.
- LUNDAQUIST, MARVIN C.**, Asst. Prof. of Agronomy; Research Agronomist, Sandyland Experimental Field (P.O. St. John), Agr. Exp. Sta. (1951, 1965). BS 1950, MS 1952, Kan. St. Univ.
- LYLES, LEON**, Assoc. Prof. of Agronomy; Research Agricultural Engineer, Wind Erosion Laboratory, U.S.D.A., Agricultural Research Service (1968). BS 1955, Okla. St. Univ.; MS 1959, Kan. St. Univ. (Courtesy Appointment)
- MACKINTOSH, DAVID L.**, Prof. of Animal Science and Industry Emeritus (1921, 1965). BS 1920, Univ. of Minn.; MS 1925, Kan. St. Univ.
- MACMASTERS, MAJEL M.**, Prof. of Grain Science and Industry Emeritus; (1960, 1970). BS 1926, MS 1928, PhD 1934, Univ. of Massachusetts.
- MADER, ERNEST LEE**, Prof. of Agronomy; Crops Research Scientist, Agr. Exp. Sta. (1948, 1968). BS 1936, MS 1944, Okla. St. Univ.; PhD 1948, Univ. of Neb. (GF)
- MANUEL, MILTON LLOYD**, Prof. of Agricultural Economics, Research Agr. Econ., Cooperatives and Marketing, Agr. Exp. Sta. (1945, 1959). BS 1941, MS 1948, Kan. St. Univ.; PhD 1952, Univ. of Minn. (GF)
- MARTIN, WILLARD HUNGATE**, Prof. of Dairy Science Emeritus (1925, 1964). BS 1918, Purdue Univ.; MS 1922, Pa. St. Univ.
- MATTSON, RICHARD H.**, Asst. Prof. of Horticulture and Forestry; Research Horticulturist, Floriculture, Agr. Exp. Sta. (1969). BS 1964, Univ. of Neb.; PhD 1969, Univ. of Minn. (GF)
- MCCOLLOUGH, RICHARD A.**, Instr. of Animal Science and Industry (1970). BS 1968, MS 1970, Kan. St. Univ.
- MCCORMICK, DEWEY Z.**, Asst. Prof. of Animal Science and Industry Emeritus; International Agricultural Programs (1960, 1968). BS 1921, Kan. St. Univ.
- MCCOY, JOHN HENRY**, Prof. of Agricultural Economics; Research Agr. Econ., Livestock Marketing, Agr. Exp. Sta. (1940, 1960). BS 1940, MS 1942, Kan. St. Univ.; PhD 1955, Univ. of Wis. (GF)
- MAHAFFEY, BEN D.**, Asst. Prof. of Horticulture and Forestry (1972). BS 1963, Colo. St. Univ.; MS 1969, PhD 1972, Tex. A & M Col. (GF)
- McKEE, R. MILES**, Assoc. Prof. of Animal Science and Industry; Beef Cattle Research Scientist, Agr. Exp. Sta. (1959, 1969). BS 1951, MS 1963, Kan. St. Univ.; PhD 1967, Univ. of Ky. (GF)
- MELCHERS, LEO EDWARD**, Prof. of Plant Pathology Emeritus (1913, 1956). BS 1912, MS 1913, Ohio St. Univ.
- MEYER, LOUIS J.**, Instr.; Crops and Soils Research Agronomist, Southeast Kan. Branch Agr. Exp. Sta. (1972). BS 1970, MS 1972, Kan. St. Univ.
- MICHAELS, CHARLES L.**, Asst. Prof. of Dairy and Poultry Science; In Charge Kan. Artificial Breeding Service Unit (KABSU), Agr. Exp. Sta. (1965, 1970). BS 1959, Kan. St. Univ.
- MICKELSEN, ROSS**, Assoc. Prof. of Dairy and Poultry Science; Dairy Foods Research Scientist, Agr. Exp. Sta. (1957, 1972). BS 1953, MS 1957, Utah State Univ.; PhD 1971, Univ. of Wis. (GF)
- MIDCAP, JAMES T.**, Instr. of Horticulture and Forestry (1969). BS 1965, Colo. St. Univ.; MS 1969, Univ. of Neb.



- MILES, NEIL W., Asst. Prof. of Horticulture and Forestry; Research Horticulturist, Fruit and Nut Crops, Agr. Exp. Sta. (1966). BS 1959, MS 1964, PhD 1965, Univ. of Minn. (GF)
- MILLER, GERALD DALE, Asst. Prof. of Grain Science and Industry; Research Cereal Chemist, Agr. Exp. Sta. (1946, 1947). BS 1924, Univ. of Neb.; MS 1953, Kan. St. Univ. (GF)
- MILLS, ROBERT B., Assoc. Prof. of Entomology; Research Entomologist, Stored Product Insects, Agr. Exp. Sta. (1963, 1970). BS 1949, Kan. St. Univ.; MEd 1953, Univ. of Colo.; PhD 1963, Kan. St. Univ. (GF)
- MONGOLD, RONALD D., Instr. of Dairy and Poultry Science; Kan. Artificial Breeding Service Unit (KABSU), Agr. Exp. Sta. (1971). BS 1966, Kan. St. Univ.
- MONTGOMERY, GEORGE, Prof. of Agricultural Economics Emeritus (1926, 1972). BS 1925, MS 1927, Kan. St. Univ.; PhD 1954, Univ. of Minn.
- MOORE, WALTER ASHTON, Asst. Prof. of Agronomy; Research Agronomist in Charge Hutchinson Experimental Field (PO Hutchinson), Agr. Exp. Sta. (1943, 1951). BS 1944, Kan. St. Univ.
- MORRILL, JR., JAMES L., Assoc. Prof. of Dairy and Poultry Science; Dairy Cattle Research Nutritionist, Agr. Exp. Sta. (1962, 1969). BS 1958, Murray St. Col.; MS 1959, Univ. of Ky.; PhD 1963, Iowa St. Univ. (GF)
- MUGLER, DAVID J., Asst. Prof., Asst. Dean, Col. of Agriculture (1965, 1972). BS 1959, Kan. St. Univ.; MS 1962, Univ. of Wis.; PhD 1969, Kan. St. Univ. (GF)
- MULENBURG, GRACE E., Asst. Prof.; Asst. Agricultural Editor (1969). BS 1947, Univ. of Kan.; MA 1969, Univ. of Mo.-Columbia.
- MULLEN, CLYDE WILLIAM, Asst. Dean Emeritus (1937, 1961). BS 1915, Okla. St. Univ.; MS 1917, Kan. St. Univ.
- MURPHY, LARRY S., Assoc. Prof. of Agronomy; Soil Fertility Research Scientist, Agr. Exp. Sta. (1965, 1968). BS 1959, MS 1960, PhD 1965, Univ. of Mo. (GF)
- NAUHEIM, CHARLES W., Assoc. Prof. of Agricultural Economics; Research Agr. Econ., U.S.D.A. Economic Research Service (1954). BS 1932, MS 1934, Kan. St. Univ. (Courtesy Appointment)
- NIBLETT, CHARLES L., Asst. Prof. of Plant Pathology; Research Plant Virologist, Agr. Exp. Sta. (1969). BS 1965, Univ. of New Hampshire; PhD 1969, Univ. of Calif. (GF)
- NICKELL, CECIL D., Asst. Prof. of Agronomy; Research Soybean Geneticist, Agr. Exp. Sta. (1967). BS 1963, Purdue Univ.; MS 1965, PhD 1967, Mich. St. Univ. (GF)
- NORMAN, DAVID W., Assoc. Prof. of Agricultural Economics (1968, 1971). BS 1961, Wye Col.; MS 1963, PhD 1965, Ore. St. Univ. (GF)
- NORTON, CHARLES L., Prof.; Head of Department of Dairy and Poultry Science; Research Dairy and Poultry Scientist, Agr. Exp. Sta. (1958, 1964). BS 1940, Univ. of Ill.; PhD 1944, Cornell Univ. (GF)
- NORWOOD, CHARLES A., Asst. Prof.; Research Agronomist, Dryland Soils, Garden City Branch Agr. Exp. Sta. (1972). BS 1961, Tex. A & I; MS 1969, PhD 1971, Okla. St. Univ.
- ODOM, RICHARD E., Assoc. Prof. of Horticulture and Forestry; Research Horticulturist, Floriculture, Agr. Exp. Sta. (1965, 1969). BS 1951, Tex. A & M Col.; MS 1953, Colo. St. Univ.; PhD 1965, Kan. St. Univ. (GF)
- OHMES, FRANCIS E., Instr.; Research Engineer Irrigation, Garden City Branch Agr. Exp. Sta. (1971). BS 1969, MS 1971, Kan. St. Univ.
- OLSON, RAYMOND V., Prof.; Chief of Party, Nigeria (1947, 1970). AB 1939, N.D. School of Forestry; BS 1941, N.D. St. Col.; MS 1942, PhD 1947, Univ. of Wis. (GF)
- ORAZEM, FRANK, Prof. of Agricultural Economics; Research Agr. Econ., Production Economics; Regional and Community Dev., Agr. Exp. Sta. (1956, 1966). Cand. Rer. Pol., Dr. Rer. Pol., 1947, Karl Franzen Univ. (Graz, Austria); MS 1953, Kan. St. Univ.; PhD 1956, Iowa St. Univ. (GF)
- OTTO, MERTON L., Assoc. Prof. of Agricultural Economics Emeritus (1939, 1967). BS 1921, MS 1942, Kan. St. Univ.
- OVERLEY, CARL BENJAMIN, Assoc. Prof. of Agronomy; Research Crop Scientist, Foundation Seed Production, Agr. Exp. Sta. (1946, 1971). BS 1946, Kan. St. Univ.; MS 1967, Univ. of Neb.
- OWENSBY, CLENTON E., Asst. Prof. of Agronomy; Range Management Research Agronomist, Agr. Exp. Sta. (1964, 1970). BS 1964, N.M. St. Univ.; PhD 1969, Kan. St. Univ. (GF)
- PAIR, JOHN C., Asst. Prof. of Horticulture and Forestry; Research Horticulturist in Charge, Sedgwick Co. Experimental Field (PO Wichita), Agr. Exp. Sta. (1971). BS 1959, N.M. St. Univ.; MS 1961, PhD 1971, Kan. St. Univ.
- PARTIDA, JR., GREGORY J., Asst. Prof. of Entomology; Research Entomologist Stored Product Insects, 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; Crops Research Physiologist, Agr. Exp. Sta. (1965, 1968). BS 1961, MS 1963, PhD 1965, Univ. of Wis. (GF)
- PEDERSEN, JOHN R., Instr. of Grain Science and Industry; Stored Grain Research Entomologist, Agr. Exp. Sta. (1968). BS 1954, MS 1959, Kan. St. Univ.
- PENAS, PAUL E., Asst. Prof.; Research Agronomist Irrigation, Garden City Branch Agr. Exp. Sta. (1967). BS 1959, MS 1967, Univ. of Neb.
- PFOST, HARRY B., Prof. of Grain Science and Industry; Feed Technology Research Engineer, Agr. Exp. Sta. (1959). BS 1940, Univ. of Mo.; MS 1948, Ala. Polytechnic Institute; PhD 1959, Mich. St. Univ. (GF)
- PHILLIPS, RICHARD, Prof. of Agricultural Economics; Research Agr. Econ., International Agr. Dev., Agr. Exp. Sta. (1970). BS 1948, MS 1949, PhD 1952, Iowa St. Univ. (GF)
- PHILLIPS, WILLIAM M., Assoc. Prof.; Research Agronomist, Weed Control, U.S.D.A. Agricultural Research Service, Fort Hays Branch Agr. Exp. Sta. (1952, 1966). BS 1947, MS 1949, Kan. St. Univ. (Courtesy Appointment)
- PICKETT, WILLIAM F., Prof. of Horticulture and Forestry Emeritus (1918, 1965). BS 1917, MS 1923, Kan. St. Univ.; PhD 1935, Mich. St. Univ.
- PINE, WILFRED HAROLD, Prof. of Agricultural Economics; Research Agr. Econ. Natural Resources, Agr. Exp. Sta. (1934, 1949). BS 1934, MS 1938, Kan. St. Univ.; PhD 1948, Univ. of Minn. (GF)
- PITTS, CHARLES W., Assoc. Prof. of Entomology; Research Entomologist Livestock Insects in Charge, Scanning Electron Microscope Laboratory, Agr. Exp. Sta. (1962, 1969). BS 1960, Miss. St. Col.; MS 1962, PhD 1965, Kan. St. Univ. (GF)
- POWERS, WILLIAM L., Assoc. Prof. of Agronomy; Research Soil Physicist, Agr. Exp. Sta. (1966, 1970). BS 1958, Colo. St. Univ.; MS 1962, PhD 1966, Iowa St. Univ. (GF)
- QUINLAN, LEON REED, Prof. of Landscape Architecture Emeritus (1927, 1965). BS 1921, Colo. St. Univ.; MLA 1925, Harvard Univ.
- RANEY, ROBERT J., Asst. Prof. of Agronomy; Research Agronomist in Charge, Irrigation Experimental Field (PO Scandia), Agr. Exp. Sta. (1953, 1965). BS 1952, MS 1954, Kan. St. Univ.
- RICHARDSON, DRAYTFORD, Prof. of Animal Science and Industry; Meat Animal Research Nutritionist, Agr. Exp. Sta. (1951). BS 1938, Clemson Agricultural Col.; MS 1950, PhD 1951, Iowa St. Univ. (GF)
- RILEY, JACK G., Assoc. Prof. of Animal Science and Industry; Beef Cattle Research Scientist, Agr. Exp. Sta. (1971). BS 1962, MS 1963, PhD 1968, Univ. of Mo. (GF)
- ROBERTS, HAROLD A., Asst. Prof. of Dairy and Poultry Science; In Charge Dairy Foods Processing Center and Dairy Foods Research Technologist, Agr. Exp. Sta. (1963, 1969). BS 1959, MS 1967, Kan. St. Univ.
- ROBINSON, ROBERT J., Assoc. Prof. of Grain Science and Industry; Research Cereal Chemist, Agr. Exp. Sta. (1957, 1970). BS 1939, Shaw Univ.; HA 1949, Cornell Univ.; MA 1950, N.Y. Univ.; PhD 1957, Kan. St. Univ. (GF)
- RUSS, OLIVER G., Assoc. Prof. of Agronomy; Weed Control Research Agronomist, Agr. Exp. Sta. (1949, 1965). BS 1950, MS 1953, Kan. St. Univ. (GF)
- SANCHEZ, CARLOS R., Instr. of Grain Science and Industry; Baking Research Technologist, Agr. Exp. Sta. (1970). BS 1970, Kan. St. Univ.
- SANFORD, PAUL EVERETT, Prof. of Dairy and Poultry Science; Poultry Research Nutritionist, Agr. Exp. Sta. (1949, 1960). BS 1941, Kan. St. Univ.; MS 1942, PhD 1949, Iowa St. Univ. (GF)
- SAUER, DAVID B., Asst. Prof. of Plant Pathology; Research Stored Grain Plant Pathologist, U.S.D.A., Agricultural Research Service (1967). BA 1961, Kent St. Univ.; MS 1964, PhD 1967, Univ. of Minn. (GF) (Courtesy Appointment)
- SCHALLES, ROBERT R., Assoc. Prof. of Animal Science and Industry; Meat Animal Research Geneticist, Agr. Exp. Sta. (1966, 1970). BS 1963, Colo. St. Univ.; MS 1966, PhD 1966, Virginia Polytechnic Institute. (GF)
- SCHNAKE, LAWRENCE D., Asst. Prof. of Agricultural Economics; Research Agricultural Economist Grain Marketing, U.S.D.A. Economic Research Service (1971). BS 1960, Univ. of Missouri; MS 1967, PhD 1972, Okla. St. Univ. (Courtesy Appointment)
- SCHRUBEN, LEONARD WILLIAM, Prof. of Agricultural Economics; Research Agr. Econ. Grain Marketing; Associate Director, Food and Feed Grain Institute, Agr. Exp. Sta. (1949, 1951). BS 1939, Kan. St. Univ.; MS 1940, Univ. of Ill.; MPA 1948, MA 1949, PhD 1949, Harvard Univ. (GF)
- SCHWENK, FRED W., Asst. Prof. of Plant Pathology; Research Soybean Pathologist, Agr. Exp. Sta. (1969). BS 1960, MS 1964, N.D. St. Univ.; PhD 1969, Univ. of Calif. (GF)
- SCOVILLE, ORLIN J., Prof. of Agricultural Economics; Research Agr. Econ., International Agr. Dev., Agr. Exp. Sta. (1966). BS 1931, MS 1933, Colo. St. Univ.; PhD 1949, Harvard Univ. (GF)
- SEIB, PAUL A., Assoc. Prof. of Grain Science and Industry; Research Biochemist, 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, Kan. St. Univ.; PhD 1934, Univ. of Minnesota.
- SJO, JOHN B., Prof. of Agricultural Economics; Research Agr. Econ., Regional and Community Dev., Agr. Exp. Sta. (1948, 1967). BS 1949, MS 1952, Kan. St. Univ.; PhD 1960, Mich. St. Univ. (GF)
- SKIDMORE, EDWARD L., Assoc. Prof. of Agronomy; Research Soil Physicist, Wind Erosion Lab., U.S.D.A. Agricultural Research Service (1963). BS 1958, Utah St. Univ.; PhD 1963, Okla. St. Univ. (GF) (Courtesy Appointment)
- SLOAN, ROBERT F., Assoc. Prof. of Agronomy; Research Agronomist in Charge Cornbelt Experimental Field (PO Powhattan), Agr. Exp. Sta. (1936, 1967). BS 1938, MS 1941, Kan. St. Univ.
- SMITH, EDGAR FITZHUGH, Prof. of Animal Science and Industry; Beef Cattle Research Scientist and Range Management Research, Agr. Exp. Sta. (1946, 1961). BS 1941, Tex. A & M Col.; MS 1947, Kan. St. Univ.; PhD 1956, Tex. A & M Col. (GF)
- SMITH, FLOYD W., Prof., Director, Agr. Exp. Sta. (1946, 1965). BS 1942, Kan. St. Univ.; MS 1946, PhD 1949, Mich. St. Univ. (GF)
- SMITH, ROGER CLETUS, Prof. of Entomology Emeritus (1920, 1958). A.B. 1911, Miami Univ.; AM 1915, Ohio State Univ.; PhD 1917, Cornell Univ.
- SMITH, WALTER H., Assoc. Prof. of Animal Science and Industry; Meat Animal Research Geneticist and Horse Husbandry Research, Agr. Exp. Sta. (1948, 1965). BS 1943, MS 1949, Kan. St. Univ. (GF)
- SORENSEN, EDGAR LAVELL, Prof. of Agronomy; Research Alfalfa Geneticist, U.S.D.A., Agricultural Research Service (1955, 1970). BS 1941, MS 1952, Utah Agricultural Col.; PhD 1955, Univ. of Wis. (GF) (Courtesy Appointment)
- SORENSEN, LEONARD ORLO, Prof. of Agricultural Economics; Research Agr. Econ. Transportation and Marketing, Agr. Exp. Sta. (1955, 1968). BA 1951, MS 1953, PhD 1963, Univ. of Minnesota. (GF)
- STEGMEIER, WILLIAM D., Assoc. Prof.; Research Agronomist Forage and Specialty Crops, Fort Hays Branch Agr. Exp. Sta. (1958, 1971). BS 1956, MS 1959, Colo. St. Univ.; PhD 1971, S.D. St. Univ.
- STINSON, T. BRUCE, Asst. Prof. Emeritus, Tribune Branch Agr. Exp. Sta. (1924, 1970). BS 1924, Kan. St. Univ.
- STUTEVILLE, DONALD L., Assoc. Prof. of Plant Pathology; Research Forage Pathologist, Agr. Exp. Sta. (1964, 1969). BS 1959, MS 1961, Kan. St. Univ.; PhD 1964, Univ. of Wis. (GF)
- SWALLOW, CLARENCE W., Asst. Prof. of Agronomy; Research Agronomist in Charge, Agronomy Research Farms, Agr. Exp. Sta. (1954, 1964). BS 1951, MS 1955, Kan. St. Univ.
- TEARE, IWAN D., Assoc. Prof. of Agronomy; Crops Research Physiologist, 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; Research Soil Scientist, Agr. Exp. Sta. (1970). BS 1966, Iowa State Univ.; MS 1968, PhD 1971, Purdue Univ.
- THOMPSON, CARLYLE A., Asst. Prof.; Soils Research Scientist, Fort Hays Branch Agr. Exp. Sta. (1964). BS 1958, MS 1959, Kan. St. Univ.



- THOMPSON, HUGH E.**, Assoc. Prof. of Entomology; Research Entomologist, Trees, Turf, Ornamental Shrubs and Forest Insects, Agr. Exp. Sta. (1956, 1963). BS 1941, Univ. of R.I.; PhD 1953, Cornell Univ. (GF)
- THROCKMORTON, RAY IAMS**, Dean and Director Emeritus, Agriculture (1911, 1952). BS 1911 Pa. St. Univ.; MS 1922, Kan. St. Univ.
- TSEN, CHO C.**, Prof. of Grain Science and Industry; Research Cereal Chemist, Agr. Exp. Sta. (1969). BS 1944, MS 1946, National Chekiang Univ.; PhD 1958, Univ. of Calif. (GF)
- TUMA, HAROLD J.**, Assoc. Prof. of Animal Science and Industry; Meats Research Scientist, Agr. Exp. Sta. (1965). BS 1955, MS 1958, Kan. St. Univ.; PhD 1961, Okla. St. Univ. (GF)
- TUMA, JIMMIE L.**, Asst. Prof.; Soils Research Scientist, Colby Branch Agr. Exp. Sta. (1972). BS 1970, MS 1972, Kan. St. Univ.
- VANDERLIP, RICHARD L.**, Assoc. Prof. of Agronomy; Crop Production Research Agronomist, Agr. Exp. Sta. (1964, 1969). BS 1960, Kan. St. Univ.; MS 1962, PhD 1965, Iowa St. Univ. (GF)
- WALTER, TED L.**, Asst. Prof. of Agronomy; Crop Research Scientist, Crop Performance Testing, Agr. Exp. Sta. (1951). BS 1949, Univ. of Neb.; MS 1951, Colo. St. Univ.
- WARD, ARLIN B.**, Prof. of Grain Science and Industry; Milling Technology Research Scientist, Agr. Exp. Sta. (1961, 1967). BS 1942, MS 1951, Kan. St. Univ. (GF)
- WARD, GEORGE M.**, Prof. of Dairy and Poultry Science; Dairy Cattle Research Nutritionist, Agr. Exp. Sta. (1955, 1966). BS 1941, Univ. of Vt.; MS 1947, Rutgers Univ.; PhD 1950, Mich. St. Univ. (GF)
- WASSOM, CLYDE E.**, Assoc. Prof. of Agronomy; Corn Research Geneticist, Agr. Exp. Sta. (1954, 1962). BS 1949, MS 1951, PhD 1953, Iowa St. Univ. (GF)
- WATSON, CLIFFORD A.**, Prof. of Grain Science and Industry; Administrator, U.S.D.A. Grain Marketing Laboratory (1968). BS 1956, Mont. St. Univ.; MS 1958, PhD 1963, Kan. St. Univ. (GF) (Courtesy Appointment)
- WHEAT, JOHN D.**, Prof. of Animal Science and Industry; Meat Animal Research Geneticist, Agr. Exp. Sta. (1954, 1969). BS 1942, MS 1951, Tex. A & M Col.; PhD 1954, Iowa St. Univ. (GF)
- WILBUR, DONALD A.**, Prof. of Entomology Emeritus (1928, 1970). BS 1925, Ore. St. Col.; AM 1928, Ohio St. Univ.
- WILDE, GERALD E.**, Asst. Prof. of Entomology; Research Entomologist Field Crop Insects, Agr. Exp. Sta. (1966). BS 1962, Tex. Tech. Col.; 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; Research Horticulturist in Charge, Southeast Kansas Experimental Field (PO Chetopa), Agr. Exp. Sta. (1963, 1966). BS 1957, MS 1959, Tex. A & M Col.
- WITHEE, LAURESTON VAN**, Prof. of Agronomy; Soil Management Research Scientist, Agr. Exp. Sta. (1953, 1972). BS 1947, Kan. St. Univ.; MS 1952, Univ. of Neb.; PhD 1963, Kan. St. Univ. (GF)
- WITT, MERLE D.**, Asst. Prof.; Research Agronomist, Garden City Branch Agr. Exp. Sta. (1969). BS 1967, Fort Hays State Col.; MS 1969, Kan. St. Univ.
- WOODRUFF, NEIL PARKER**, Prof. of Agronomy; Research Investigations Leader, Research Agr. Engineer, Wind Erosion Lab., U.S.D.A. (1949, 1970). BS 1949, MS 1953, Kan. St. Univ. (GF) (Courtesy Appointment)
- ZAHNLEY, JAMES WALTER**, Prof. of Agronomy Emeritus (1915, 1954). BS 1909, BS in Agric. 1918, MS 1926, Kan. St. Univ.
- 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)
- GALLIS, PAUL L.**, Instr., Pre-Design Professions (1972), BA 1969, Univ. of Ill.; MA 1972, Univ. of Ill.
- GODDARD, JAMES F.**, Instr., Building Construction (1972), BS 1969, Kan. St. Univ.; MS 1972, Univ. of Fla.
- HALL, CHARLES L.**, Assoc. Prof. of Architecture (1964, 1968). BArch 1953, Pa. St. Univ.; MArch 1967, Kan. 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, Mass. Institute of Technology; MArch 1941, Columbia Univ. Registered Architect, 1953. (GF)
- HOGUE, SAMUEL R.**, Instr. (temporary) Landscape Architecture (1971). BSLA (1966), Kan. St. Univ.
- JAHNKE, WILLIAM R.**, Assoc. Prof. of Construction Science (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, Kan. St. Univ.
- KELLER, JOHN W.**, Asst. Prof., Regional & Community Planning (1972). BA 1967, St. Benedict's; MA 1968, Kan. St. Univ.; MS 1971, Rutgers Univ.
- KRIDER, ALDEN**, Prof. of Architecture (1949, 1962). BS 1933, MS 1955, Kan. St. Univ. Registered Architect in Missouri, 1945; in Kansas, 1949. (GF)
- LIPPENBERGER, RAY E.**, Asst. Prof. of Architecture (1964). BS 1936, Kan. St. Univ. Registered Architect in Kansas, 1949; in Nebraska, 1955.
- LISTER, ROBERT K.**, Asst. Prof. (temp.) Regional & Community Planning, 1972. BS Wichita St. Univ.; 1958; MA Maxwell School of Citizenship, 1968.
- MARSHALL, THOMAS R.**, Instr. of Pre-Design Professions (1972). BA 1970, Syracuse Univ.; MA 1972, Syracuse Univ.
- MARTIN, WILLIAM MICHAEL**, Asst. Prof. of Architecture (1971). BArch 1969, Univ. of Colo.; MArch 1971, Univ. of Wash.
- McGRAW, EUGENE THOMAS**, Assoc. Prof. of Architecture & Planning (1958, 1964, 1968). BArch 1957, Okla. St. Univ.; MRP 1963, Kan. St. Univ. (GF)
- MURPHY, STEPHEN M.**, Instr. in Interior Architecture (1968). BS 1968, Kan. St. Univ.
- OBINGER, WARREN J.**, Assoc. Prof. of Landscape Architecture (1969, 1970). BSLA 1950, Iowa St. Univ. Registered Landscape Architect. (GF)
- PAGE, ROBERT L.**, Asst. Prof. of Landscape Architecture (1971). BSLA 1963, Kan. St. 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 Ill.; MS 1957, Kan. St. Univ. Registered Landscape Architect. (GF)
- PENN, PERCY J.**, Instr. (Temporary) of Architecture (1972). BS 1952, Tuskegee Institute.
- QUINLAN, LEON REED**, Prof. of Landscape Architecture Emeritus; Ornamental Horticulturist and Landscape Architect, Agr. Exp. Sta. (1927, 1931, 1964). BS 1921, Colorado St. Univ.; MLA 1925, Harvard Univ. Registered Landscape Architect. (GF)
- REID, RONALD L.**, Asst. Prof. of Architecture and Planning (1969). BArch 1962, Kan. St. Univ.; MArch 1968, Univ. of Calif. Registered Architect, 1965. (GF)
- SAMUCHIN, MICHAEL G.**, Instr. of Construction Science (1972). BA 1969, Univ. of Ill.; MS 1971, Northwestern Univ.; PhD 1972, Northwestern Univ.
- SANNER, ALBERT E.**, Assoc. Prof. of Architecture (1963). BSArch 1947, BSArch Engg 1948, Univ. of Ill.; MArch 1966, Univ. of Neb. Registered Architect in Ill., 1950; in Ind., 1959. (GF)
- SCOTT, CHARLES S.**, Asst. Prof. (temp.) Regional & Community Planning, 1972. BArch, Washburn, 1948; Juris Doctorate, Washburn, 1970.
- SELFIDGE, O. JOHN**, Asst. Prof. in Architecture and Planning (1969). BArch 1959, Kan. Univ.; MCP 1964, Yale Univ.
- SHEPARD, JIM B.**, Asst. Prof. (1967). BA 1959, Kan. St. Univ. Registered Architect in Kan., Mo. and Neb.
- SIMCOX, DONALD L.**, Instr. (Temporary) (1971). BSCE 1952, Kan. St. Univ.
- SLACK, EARL REX**, Assoc. Prof. of Architecture (1965, 1969). BArch 1952, Univ. of Okla. Registered Architect in Oklahoma 1957.
- SURGEON, BETTY K.**, Instr. of Pre-Design Professions (1972). BBLdg Sci 1970, Rensselaer Polytechnic Institute; BArch 1970, Rensselaer Polytechnic Institute; MArch 1972, Columbia Univ.
- STAHL, FRED I.**, Instr. of Pre-Design Professions (1972). BS 1970, City Col. of N.Y.; BArch 1971, City Col. of N.Y.; MArch 1972, Rensselaer Polytechnic Institute.
- STOTESBURY, SIDNEY D.**, Assoc. Prof. of Architecture (1972). BS 1957, Fla. St. Univ.; MArch 1969, Univ. of Calif. at Berkeley.
- THORSON, INGOLF EUGENE**, Prof. of Construction Science (1948, 1951, 1966). Head, Department of Construction Science (1969). BS 1940, Univ. of Wash., Prof. Engineer in Wash., 1947; in Kan. (GF)
- WEIGEL, PAUL**, Prof. of Architecture Emeritus (1921, 1924, 1959). BArch 1912, Cornell Univ. Registered Architect in N.Y., 1917; in Kan., 1950. (GF)
- WEISENBURGER, RAY B.**, Assoc. Prof. of Planning (1964, 1970). BArch 1959, Univ. of Ill.; MCP 1971, Cornell Univ. Registered Architect, 1962.
- WENDT, EUGENE G.**, Asst. Prof. of Architecture (1962, 1969). BArch 1959, Kan. St. Univ.; MArch 1970, Kan. St. Univ.
- WILLIS, RAY G.**, Asst. Prof. of Planning (1971). BA 1968, MRP 1971, Kan. St. Univ.
- WINDLEY, PAUL G.**, Asst. Prof. of Architecture (1972). BA 1967, Idaho St. Univ.; BArch 1969, Univ. of Colo.; MArch 1970, Univ. of Mich.; DArch 1972, Univ. of Mich. (GF)

## College of Architecture and Design

- BARTLETT, LARRY E.**, Asst. Prof. (temporary) Landscape Architecture (1971). BSLA 1964, Kan. St. Univ.
- BISSEY, CHARLES R.**, Assoc. Prof. of Construction Science. BS 1957, Colo. St. Univ.; MS (Architecture) 1961, Kan. St. Univ. (GF)
- BLACKMAN, MERRILL EMMETT**, Assoc. Prof. of Construction Science (1971). BS 1949, Kan. St. Univ. Registered Architect, 1955. Professional Engineer, 1949.
- BURTON, CHARLES L.**, Asst. Prof. of Construction Science (1970). BS 1963, Kan. St. Univ. Registered Professional Engineer.
- CHADWICK, THEODORE AVERY**, Prof. of Architecture (1927, 1947). BS 1927, N.D. Agriculture Col.; MArch 1954, Mass. Institute of Technology. Registered Architect in New York, 1936; in Kansas, 1953. (GF)
- CHANG, AMOS I. T.**, Assoc. Prof. of 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 Neb.; MArch 1957, Univ. of Mich. Registered Architect, 1960. (GF)
- DAY, DENNIS J.**, Asst. Prof. of Landscape Architecture (1966). BS 1964, Mich. St. Univ.; MLA 1966, Univ. of Mich. 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, Kan. St. Univ., Registered Professional Engineer, 1952. (GF)
- DURGAN, JACK CLYDE**, Prof. of Interior Architecture (1954, 1962, 1967); Head, Department of Interior Architecture (1969). BArch 1951, Okla. St. Univ.; MS 1958, Kan. St. 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, Okla. St. Univ.; MS 1946, Kan. St. Univ.; PhD 1955, La. St. Univ. Registered Landscape Architect. (GF)
- EDMONDS, LELAND R.**, Assoc. Prof. of Planning (1967, 1969). BA 1949, Univ. of Kan.; MA 1952, Univ. of Kan. (GF)
- ERNST, F. GENE**, Assoc. Prof. (1967); Head, Department of Architecture (1971). BArch 1953, Kan. St. Univ.; MArch (Urban Design) 1971; Univ. of Wash.; Registered Architect in Kansas, 1953; in Louisiana, 1957. (GF)



## College of Arts and Sciences

- ABERLE, NELLIE**, Prof. of English Emerita (1921, 1959). BS 1912, MS 1914, Kan. St. Univ. (GF)
- ABRAHAM, JUDY**, Instr. of Art (1970). A of A 1961, Cottey Col.; BFA 1964, Kansas City Art Institute; MFA 1967, Univ. of Neb.
- ADAMS, MARJORIE**, Asst. Dean; Assoc. Prof. of English (1954, 1961). BA 1941, Louisiana Polytechnic; MA 1948, PhD 1951, Univ. of Tex. (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 N.M. (GF)
- AKERS, JUDY A.**, Instr. in Physical Education (1970). BS 1967, MS 1970, Kan. St. Univ.
- AKKINA, KRISHNA RAO**, Asst. Prof. of Economics (1972). BA 1963, Univ. of Andhra, MA 1965, Delhi School of Economics, PhD 1972, Univ. of Minn.
- ALEXANDER, LOREN R.**, Asst. Prof. of Modern Languages (1965, 1971). BM 1951, Southwestern Col.; MA 1954, Colo. St. Col. of Education; MA 1965, Mich. St. Univ.; PhD 1971, Mich. St. Univ.
- ALM, OSCAR WILLIAM**, Prof. of Psychology Emeritus (1929, 1957). AB 1917, Univ. of Neb.; MA 1918, Columbia Univ.; PhD 1920, Univ. of Minn.
- ALSON, INEZ**, Assoc. Prof. of History Emerita (1923, 1960). BS 1916, Kan. St. Teachers Col. (Emporia); MS 1920, Univ. of Kan. (GF)
- ALTHOFF, PHILLIP STANLEY**, Asst. Prof. of Political Science (1970). BA 1963, Ill. St. 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 Mich. (GF)
- ANDERSON, LORAN C.**, Assoc. Prof. of Biology; Plant Anatomist, Agr. Exp. Sta. (1963, 1970). BS 1958, MS 1959, Utah St. Univ.; PhD 1962, Claremont Graduate School (GF)
- ANDREWS, ARTHUR CLINTON**, Prof. of Chemistry Emeritus (1926, 1970). BS 1924, Univ. of Wis.; MS 1929, Kan. St. Univ.; PhD 1938, Univ. of Wis. (GF)
- ANDELL, ORA JOYE**, Assoc. Prof. of English (1946, 1957). BS 1932, Kan. St. Univ.; MA 1939, Univ. of Mich.; BLS 1946 Univ. of Chicago; PhD 1956, Univ. of Colorado (GF)
- APPLEGATE, ROBERTA G.**, Asst. Prof. of Journalism and Mass Communications. (1964). AB 1940, Mich. St. Univ.; MS 1942, Northwestern Univ.
- ASENETA, LYDIA**, Instr. in Speech (1967). BS 1949, MA 1958, The National Teachers' Col. of the Philippines; MA 1968, Kan. St. Univ.
- AVERY, MADALYN**, Assoc. Prof. of Physics Emerita (1924, 1946). BS 1924, MS 1932, Kan. St. 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 Calif.
- BABCOCK, MICHAEL W.**, Asst. Prof. in Economics, (1972). BS, BA 1967, Drake Univ., MA 1969, PhD 1972, Univ. of Ill.
- BABCOCK, RODNEY WHITEMORE**, Prof. of Mathematics Emeritus; Dean Emeritus (1930, 1960). AB 1912, Univ. of Mo.; MA 1915, PhD 1924, Univ. of Wis. (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 Calif. at Los Angeles; PhD 1950, St. Univ. of Iowa (GF)
- BAKER, LYMAN A., JR.**, Instr. in English (1972). BA 1964, Univ. of Mo., MA 1968, Stanford Univ.
- BARFOOT, DOROTHY**, Prof. of Art Emerita (1930, 1962). BA, St. 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., Division of Biology; Curator of the Herbarium; Taxonomist, Agr. Exp. Sta. (1961, 1967). BS 1955, Kan. St. Univ.; MS 1957, Ore. St. Univ.; PhD 1960, Columbia Univ. (GF)
- BARLOW, W. MACK**, Instr. of Biochemistry (1970). AB 1938, MA 1945, Univ. of Kan.
- BARNES, VERNON L.**, Instr. of Speech (1969). BA 1957, Ottawa Univ.; MA 1964, Kan. St. Univ.
- BARRETT, ERNIE D.**, Athletic Director (1969). BS 1951, MS 1956, Kan. St. Univ.
- BATES, GYLL C.**, Instr. in Physical Education (1970). BS 1966, Youngstown Univ.
- BECK, HENRY VOORHEES**, Prof. of Geology (1946, 1961). BS 1946, MS 1949, Kan. St. Univ.; PhD 1951, Univ. of Kan. (GF)
- BEESON, MARGARET E.**, Assoc. Prof. of Modern Languages (1960, 1968). AB 1948, Wesleyan Col.; MA 1949, Emory Univ.; PhD 1954, Univ. of Tex. (GF)
- BENSON, JANET**, Acting Asst. Prof. of Anthropology (1972). BA 1964, Ariz. St., MA 1969, Brandeis.
- BHALLA, CHANDER P.**, Prof. of Physics (1966, 1972). BS 1952, BSc 1954, MS 1955, Punjab Univ.; PhD 1960, Univ. of Tenn. (GF)
- BISHOP, RAYMOND D., JR.**, Asst. Prof. of Chemistry (1972). BA 1966, Univ. of Colo.; PhD 1972, Univ. of Kan.
- BIRD, RICHARD P.**, Research Assoc. of Physics (1971). BS 1960, Univ. of Colo.; MS 1962, Univ. of Colo.; MS Bioradiology 1968, Univ. of Calif. at Berkeley; PhD 1971, Univ. of Calif. at Berkeley.
- BODE, VERNON C.**, Prof. of Biology (1970). BS 1955, Univ. of Mo.; PhD 1961, Univ. of Ill.
- BOLAN, JOHN ELDON**, Instr. in Physical Education (1967). BA 1952, Ottawa Univ.; MS 1970, Kan. St. 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)
- BORN, RICHARD J.**, Asst. Prof. of Political Science (1972), BS 1968, Mass. Inst. of Technology, MA, PhD 1972, Stanford Univ.
- BREDE, RICHARD M.**, Asst. Prof. of Sociology (1971). BA 1962, Univ. of Ore., MS 1964, Univ. of Ore.; PhD 1971, Univ. of Ill.
- BREWER, RICHARD KEMP**, Asst. Prof. of Computer Science (1970). BS 1959, MS 1964, PhD 1972, Univ. of Wis. (GF)
- BROWDELL, WILLIAM JOHN**, Asst. Prof. of English (1964). AB 1959, MA 1964, PhD 1964, Univ. of Mo. (GF)
- BROWN, MATT D.**, Research Assoc. of Physics (1972). BS 1961, MS 1964, PhD 1972, Univ. of Tenn.
- BROWN, MERLE**, Asst. Prof. of Physics (1964). (State Climatologist). BS 1942, Kan. St. Col. at Pittsburg.
- BROWN, SAM C.**, Prof. of Psychology (1963, 1971). BBA 1957, City Col. of N.Y.; MA 1961, PhD 1963, Univ. of Va. (GF)
- BROWN, WILBUR E.**, Asst. Prof. of Journalism (1970). BS 1949, Kan. St. Univ.
- BUCK, CLAYTON A.**, Assoc. Prof. of Biology; Virologist, Agr. Exp. Sta. (1970). BS 1959, Kan. St. Univ.; PhD 1964, Mont. St. Univ. (GF)
- BULMAHN, HEINZ**, Instr. in Modern Languages (1972). BSE 1966 Drake Univ., MA 1969, ABD 1971, Univ. of Wis.
- BUNCH, WILLIAM A.**, Asst. Prof. of Modern Languages (1972). BA 1965, Hanover Col.; MA 1966, Univ. of Wis.; PhD 1972, Univ. of Texas.
- BUNGE, WALTER**, Assoc. Prof. and Head of Journalism and Mass Communications Dept., (1973). BS 1956, MS 1961, Univ. of Wis.; PhD 1972, Univ. of Minn.
- BUNTON, NORMA D.**, Prof.; Head, Department of Speech (1954, 1960). BS 1939, Southwest Tex. St. Col.; MEd 1947, Univ. of Texas; PhD 1954, St. 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)
- BURKHARD, RAYMOND KENNETH**, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1950, 1957). AB 1947, Ariz. St. Col.; PhD 1950, Northwestern Univ. (GF)
- BURLINGHAM, BYRON T.**, Assoc. Prof. in Biology (1973). BA 1961, MS 1965, MD 1966, Univ. of Iowa; PhD 1970, The Rockefeller Univ.
- BURNS, KENNETH R.**, Asst. Prof. Military Science (1971). BS 1966, Univ. of Houston.
- BUSSENG, CHARLES EARL**, Asst. Prof. of Geography (1954, 1966). AB 1959, Colo. St. Col.; MA 1961, Univ. of Colo.; PhD 1968, Univ. of Neb.
- CAINE, HOMER D.**, Asst. Prof. of Music (1966). BM 1940, Drake Univ.; MS 1957, Kan. St. Univ. (GF)
- CALHOUN, MYRON AMMON**, Asst. Prof. of Computer Science and Electrical Engineering (1971). AA 1961, Graceland Col.; BS 1963, Univ. of Kan.; MS 1964, Colo. St. Univ.; PhD 1967, Ariz. St. Univ. (GF)
- CAMP, HENRY J.**, Asst. Prof. of Sociology (1971). BS 1966, Ill. St. Univ.; MA 1969, Univ. of Neb.; PhD 1972, Univ. of Neb.
- 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 Wis. (GF)
- CAREY, JAMES CHARLES**, Prof. of History (1948, 1954). BA 1937, Neb. St. Teachers Col. (Wayne); MA 1940, PhD 1948, Univ. of Colo. (GF)
- CENTER, MELVIN S.**, Asst. Prof. of Biology (1970). BS 1962, Univ. of Ga.; MS 1964, PhD 1967, Medical Col. of Ga. (GF)
- CHALMERS, JOHN**, Vice President for 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 Mich. (GF)
- CHAUDHURI, SAMBHUDAS**, Asst. Prof. of Geology (1966). BS 1956, Calcutta Univ., India; MS 1958, Jadavpur Univ., India; MS 1961, Univ. of Ind.; PhD 1966, Ohio St. 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, Kan. St. Univ.
- CLEARY, ELIZABETH**, Asst. Prof. of Speech (1961, 1968). BS 1934, Boston Univ.; MS 1961, Kan. St. Univ.
- CLEGG, ROBERT E.**, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1948, 1954). BS 1936, R.I. St. Col.; MS 1939, N.C. St. Col.; PhD 1948, Iowa St. Univ. (GF)
- CLELAND, MARJORIE V.**, Instr.; Asst. to the Dean (1970). BA 1968, Kan. St. Univ.; MS 1970, Kan. St. Univ.
- CLIMENHAGA, JOEL**, Assoc. Prof. of Speech (1968). BA 1953, MA 1958, Univ. of Calif. 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 Colo.
- 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, Calif. Institute of Technology. (GF)
- COHEN, PETER Z.**, Instr. in English (1961). BS 1953, MA 1961, Univ. of Wyo.
- CONOVER, WILLIAM JAY**, Assoc. Prof. of Statistics; Statistical Consultant, Agr. Exp. Sta. (1964, 1967). BS 1958, Iowa St. 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 Ill. (GF)
- CONROW, MARGARET E.**, Asst. Prof. of English (1964, 1969). BA, Swarthmore Col.; MA 1955, PhD 1962, Univ. of Ill.
- CONSIGLI, RICHARD ALBERT**, Prof. of Biology (1963, 1969). BS 1954, Brooklyn Col.; MA 1956, PhD 1960, Univ. of Kan. (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 Ill.; PhD 1962, Ind. Univ. (GF)
- CORBIN, CHARLES B.**, Prof. and Head of Physical Education (1971). BS 1960, Univ. of N.M.; MS 1962, Univ. of Ill.; PhD 1965, Univ. of N.M. (GF)
- COWAN, THADDEUS M.**, Assoc. Prof. of Psychology (1970). BA 1957, Centre Col. of Ky.; MS 1959, Univ. of Conn.; PhD 1964, Univ. of Conn. (GF)
- COX, WILLIAM L.**, Asst. Football Coach (1973). BS 1968, Fla. St.
- CRAWFORD, GOLDA MILDRED**, Assoc. Prof. of History (1946, 1964). BS 1928, MS 1940, Kan. St. Univ.; PhD 1963, Syracuse Univ. (GF)



- CRAWFORD, FRANCIS W., Assoc. Prof. of Physics Emeritus (1960, 1972). AB 1924, Phillips Univ.; MS 1929, Univ. of Okla. (GF).
- CRAWFORD, NAOMI Z., Instr. in Chemistry Emeritus (1922, 1963). BS 1919, MS 1922, Univ. of Neb.
- CULLERS, ROBERT L., Asst. Prof. of Geology (1971). BS 1959, Ind. Univ.; MA in Chemistry 1962, Ind. Univ.; PhD 1971, Univ. of Wis.
- CULLEY, LOUANN F., Asst. Prof. of Art (1971). BFA 1957, Univ. of N.M.; MA 1967, Univ. of N.M.; PhD 1971, Stanford Univ.
- CUNNINGHAM, BRYCE A., Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1963). BA 1955, BS 1958, PhD 1963, Univ. of Minn. (GF).
- 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 St. Univ. (GF).
- CURTIS, W.D., Asst. Prof. of Mathematics (1970). BA 1966, Univ. of Fla.; PhD 1970, Univ. of Mass. (GF).
- DACE, WALLACE, Prof. of Speech (1963, 1968). AB 1943, Ill. 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 Okla.; PhD 1953, Ohio St. Univ. (GF).
- DANEN, WAYNE C., Assoc. Prof. of Chemistry (1967, 1972). BA 1964, St. Norbert Coll.; PhD 1967, Iowa St. Univ. (GF).
- DAVIS, EARLE ROSCO, Prof. of English (1949). AB 1927, BM 1929, Monmouth Coll.; MA 1928, Univ. of Ill.; PhD 1935, Princeton Univ. (GF).
- DAVIS, GEORGE LEE, Instr. in Art (1971). BFA 1966, Atlanta School of Arts; MFA 1971, Ind. Univ.
- DAVIS, MARJORIE M., Instr. of Biology (1971). BS 1959, Panhandle A & M Coll.; MA 1962, Kan. Univ.; PhD 1970, Kan. St. Univ.
- DAWSON, ROBERT H., Instr., Aerospace studies (1973).
- DAYTON, ARTHUR D., Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1966). BS 1960, Berea Coll.; MS 1964, PhD 1967, Mich. St. Univ. (GF).
- DECOU, DONALD FRANK, Assoc. Prof. of Economics (1947). BS 1929, Kan. St. 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 Kan.; M. Phil. 1971, Univ. of Kan.
- DEIBLER, GERALD WILLIAM, Assoc. Prof. of Art (1956, 1963). BA 1951, Univ. of Neb.; MFA 1955, Univ. of Colo. (GF).
- DELEHANTY, JOHN A., Assoc. Prof. of Economics (1966). BBA 1952, MA 1956, Univ. of Miami; PhD 1962, Indiana Univ.
- DENELL, ROBIN, Asst. Prof. of Biology (1972). BA 1965, Univ. of Calif.; MA 1968, PhD 1969, Univ. of Tex.
- DENNIS, JR., EVERETTE E., Acting Head; Asst. Prof. of Journalism and Mass Communications (1968). BS 1964, Univ. of Ore.; MA 1966, Syracuse Univ. (GF).
- DESMARTEAU, DARRYL D., Asst. Prof. of Chemistry (1971). BS 1963, Wash. St. Univ.; PhD 1966, Univ. of Wash. (GF).
- DIMITROFF, TOM G., Asst. Football Coach (1973). BS 1968, Miami Univ.
- DIXON, LYLE J., Prof. of Mathematics (1963). BS 1948, MS 1950, Okla. St. Univ.; PhD 1963, Univ. of Kan. (GF).
- DODDS, DARRELL DELOSS, Asst. Prof. of Athletics (1963). BS 1959, MS 1960, Kan. St. Univ.
- DOEZEMA, C. PHILIP, Asst. Prof. of Biology (1970). BS 1961, Mich. St. Univ.; PhD 1967, Stanford Univ. (GF).
- DONNELLY, MICHAEL L., Asst. Prof. of English (1972). AB 1963 Harvard Coll.; PhD 1970, Harvard 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 Coll.; MA 1937, PhD 1949, Univ. of Neb. (GF).
- DRAGSDORF, R. DEAN, Prof. of Physics (1948, 1956). SB 1944, PhD 1948, Mass. Institute of Technology. (GF).
- DRESSLER, ROBERT E., Asst. Prof. of Mathematics (1970). BA 1965, Univ. of Rochester; MA 1966, Univ. of Ore.; PhD 1969, Univ. of Ore. (GF).
- DRISS, ANN, Instr. in Modern Languages (1967). AB 1952, Washburn Univ.; MS 1966, Kan. St. Teachers Col.
- DUSKIN, LELAH, Asst. Prof. of Sociology (1968). AB 1953, Smith Coll.; MS 1956, Univ. of Pa.
- EASTWOOD, BRUCE S., Assoc. Prof. of History (1970). AB 1959, MA 1960, Emory Univ.; PhD 1964, Univ. of Wis. (GF).
- EATON, GEORGE R., Director of KSU Printing Service, Asst. Prof. of Journalism and Mass Communications (1955). BS 1947, S. D. St. Col.
- EBBERTS, GEORGE ORVAL, Asst. Dean; Asst. Prof. (1946, 1956). BS 1949, MS 1951, Kan. St. Univ.
- ECK, JOHN S., Asst. Prof. of Physics (1969). BS 1962; PhD 1967, The Johns Hopkins Univ. (GF).
- EDWARDS, ROBERT L., Asst. Prof. of Music (1972). BM 1961, MM 1963, Wichita St.; DMA 1972, Univ. of Ore. (GF).
- EITNER, WALTER HUGO, Assoc. Prof. of English (1954, 1959). AB 1948, Univ. of Denver; AM 1949, Univ. of Mich.; PhD 1959, Univ. of Denver. (GF).
- ELLSWORTH, LOUIS DANIEL, Prof. of Physics (1946, 1954). BS 1937, Case Institute of Technology; MS 1938, PhD 1941, Ohio St. Univ. (GF).
- EMERSON, M. JARVIN, Prof. of Economics, Dir. of Reg. & Comm. Dev. Res. (1962, 1972). 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 Tex. (GF).
- EVANS, JOHN C., Asst. Prof. of Physics (1966). BS 1960, Univ. of Okla.; MS 1962, Rensselaer Polytechnic Institute; MS 1964, PhD 1966, Univ. of Mich. (GF).
- EVANS, THOMAS MARION, Prof. of Physical Education (1942, 1950). BS 1930, Kan. St. Univ.; MS 1942, Univ. of Mich.; PEDIR 1958, Ind. Univ. (GF).
- EVANS, WILLIAM E., Asst. Prof. of English (1969). BA 1963, Wayne St. Univ.; MA 1965, Univ. of Mich.
- EXDELL, JOHN B., Asst. Prof. in Philosophy (1972). BA 1967 Dickinson College.
- FALKS, FRANKLIN C., Asst. Football Coach (1971). BA 1967, Parsons Col.
- FATELEY, WILLIAM G., Prof. and Head of Chemistry Department (1972). AB 1951, Franklin Col.; PhD 1955 Kan. St. Univ.
- FEDDER, NORMAN J., Assoc. Prof. of Speech (1970). BA 1955, Brooklyn Col.; MA 1956, Columbia Univ.; PhD 1962, N. Y. Univ. (GF).
- FERGUSON, CLYDE RANDOLPH, Asst. Prof. of History (1960, 1963). BA 1955, Univ. of Okla.; MA 1957, PhD 1960, Duke Univ. (GF).
- FERGUSON, GARY W., Asst. Prof. of Biology (1969). BS 1963, Tulane Univ.; MS 1965, Tex. Technological Col.; PhD 1968, Univ. of Mich. (GF).
- FEYERHERM, ARLIN M., Prof. of Statistics; Statistical Consultant, Agr. Exp. Sta. (1953, 1964). BS 1946, Univ. of Minn.; MS 1948, Univ. of Iowa; PhD 1952, Iowa St. Univ. (GF).
- FIDLER, ROBERT B., Instr. in Journalism (1972). BA 1963 Cedarville Coll.; MA 1967, Central Mo. St. Col.
- FINA, LOUIS R., Prof. of Biology, Microbiologist, Agr. Exp. Sta. (1954, 1962). AB 1942, MS 1948, PhD 1950, Univ. of Ill. (GF).
- FISHER, PAUL S., Asst. Prof. of Computer Science; Consultant, Agr. Exp. Sta. (1967). BA 1963, MA 1964, Univ. of Utah; PhD 1969, Ariz. St. Univ. (GF).
- FLANAGAN, BRUCE, Prof. of Speech (1966). BS 1953, Western Mich. Univ.; MS 1958, Southern Ill. Univ.; PhD 1966, Univ. of Fla. (GF).
- FLORA, CORNELIA BUTLER, Asst. Prof. of Sociology (1970). BA 1965, Univ. of Calif.; MS 1966, PhD 1970, Cornell Univ. (GF).
- FLORA, JAN L., Asst. Prof. of Sociology (1970). BA 1964, Univ. of Kan.; MS 1967, PhD 1971, Cornell Univ. (GF).
- FLOUER, JACK, Assoc. Prof. of Music (1971). BME 1960, Marshall Univ.; MM 1962, Eastman School of Music; DM 1971, Ind. Univ.
- FOLLAND, NATHAN O., Assoc. Prof. (1966, 1972). BA 1959, Concordia Col.; PhD 1965, Iowa St. Univ. (GF).
- FRANKLIN, ALBERT B., Director, South Asia Center; Prof. of 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 Neb.; PhD 1930, Univ. of Chicago. (GF).
- FRETWELL, STEPHEN D., Asst. Prof. of Biology (1969). BS 1964, Bucknell Univ.; PhD 1968, N.C. St. Univ. (GF).
- FRIEDMANN, EUGENE ALVIN, Prof., Head of Department of Sociology and Anthropology (1965). AB 1947, MA 1949, PhD 1953, Univ. Chicago. (GF).
- FRIEMAN, JEROME, Asst. Prof. of Psychology (1968). BA 1963, MS 1965, Western Reserve Univ.; PhD 1963, Kent St. Univ. (GF).
- FRYER, HOLLY CLAIRE, Prof.; Head, Department of Statistics; Dir., Statistical Laboratory, Agr. Exp. Sta. (1940, 1959). BS 1931, Univ. of Ore.; MS 1933, Ore. St. Univ.; PhD 1940, Iowa St. Univ. (GF).
- FULLER, LEONARD EUGENE, Prof. of Mathematics (1952, 1959). BA 1941, Univ. of Wyo.; MS 1947, PhD 1950, Univ. of Wis. (GF).
- GALLAGHER, TOM L., Director, Computing Center, Assoc. Prof. of Computer Science (1970). BA 1953, MS 1954, North Tex. St. Col.; DSc 1967, Wash. Univ. (GF).
- GARRETT, CHARLES ROY, Asst. Basketball Coach (1970). BA 1965, McKendree Col.; MS 1969, Southern Ill. Univ.
- GARZIO, ANGELO C., Prof. of Art (1957). BA 1949, BS 1949, Syracuse Univ.; Diploma di Proffito, 1950, Univ. of Florence, Italy; MA 1954, MFA 1955, St. Univ. of Iowa. (GF).
- GEISSLER, WINNIFRED J., Instr. in English (1954). B Music Ed 1940, Bethany Col.; MS 1954, Kan. St. Univ.
- GENCH, BARBARA E., Asst. Prof. in Physical Education (1968, 1970). BS 1963, MS 1967, Kan. St. Univ.
- GEYER, KATHERINE, Prof. of Physical Education (1927, 1945). BS 1927, Ohio St. Univ.; MA 1934, Columbia Univ. (GF).
- GIBSON, HAROLD VINCE, Head Football Coach (1967). BS 1955, MA 1956, Fla. St. Univ.
- GIER, HERSCHEL THOMAS, Prof. of Biology, Embryologist, Agr. Exp. Sta. (1947, 1960). AB 1931, Kan. St. Col. of Pittsburg; PhD 1936, Ind. Univ. (GF).
- GILLESPIE, VINCENT E., Asst. Prof. of English (1966). BA 1952, Sterling Coll.; MA 1956, Univ. of Kan.; PhD 1970, Univ. of Kan.
- GIVEN, KINGSLEY WALTON, Prof. of Speech Emeritus (1920, 1950). BS 1926, Park Col.; MA 1929, St. Univ. of Iowa. (GF).
- GLENN, ESTHER BEACHEL, Asst. Prof. of English Emerita (1948, 1954). AB 1930, Kan. Wesleyan Univ.; MS 1938, Kan. St. Univ. (GF).
- GONZALEZ-DEL-VALLE, LUIS T., Asst. Prof. in Modern Languages (1972). BA 1968, Wilmington Coll.; MA 1971, PhD 1972, Univ. of Mass. (GF).
- 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 St. Univ.; PhD 1957, Univ. of Calif. at Los Angeles. (GF).
- GOTTlieb, BOB H., Asst. Basketball Coach (1971). BA 1962, Ohio St. Univ.; MA 1969, Columbia Univ.
- GRAY, BARBARA A., Instr. in Music (1972). BS 1968 Southwest Mo. St., MM 1970, Okla. Univ.
- GRAY, JR., MARION WILSON, Asst. Prof. of History (1969). BA 1964, Tex. Christian Univ.; MA 1966, PhD 1972, Univ. of Wis. (GF).
- GREECHIE, RICHARD J., Assoc. Prof. of Mathematics (1967, 1970). BS 1962, Boston Col.; PhD 1966, Univ. of Fla. (GF).
- GREEN, RALPH EMERSON, Instr. in Physics Emeritus (1961, 1972). BS 1939, Tri-State Col.; MS 1954, Univ. of Ala.
- GREENBERG, ARTHUR R., Asst. Prof. of Philosophy (1969). BS 1960, Lehigh Univ.; PhD 1972, Univ. of Iowa.
- GREENWOOD, MICHAEL JAMES, Assoc. Prof. of Economics (1965). BS 1962, De Paul Univ.; MA 1965, PhD 1967, Northwestern Univ. (GF).
- GRINDELL, ROBERT M., Asst. Prof. in English (1972). AB 1956, Harvard Univ.; MA 1964, N.Y. Univ.; PhD 1972, Univ. of Ariz. (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, Kan. St. Univ.; PhD 1956, Univ. of Neb. (GF).
- HAGAN, KENNETH JAMES, Asst. Prof. of History (1969). AB 1955, MA 1964, Univ. of Calif. at Berkeley. (GF).



- HAJDA, JOSEPH**, Dir. of International Activities (1965). Assoc. Prof. of Political Science (1960). AB 1951, Miami Univ.; MA, PhD 1955, Ind. Univ. (GF)
- HAMILTON, JAMES R.**, Instr. of Philosophy (1971). BA 1964, Pfeiffer Col.; MA 1967, Emory Univ.; BD 1968, Union Theological Seminary.
- HAMMAKER, ROBERT M.**, Assoc. Prof. of Chemistry (1961, 1967). BS 1956, Trinity Col.; PhD 1960, Northwestern Univ. (GF)
- HAMSCHER, III, ALBERT N.**, Asst. Prof. of History (1972). BA 1968, Penn St. Univ.; MA 1972, Emory Univ.
- HAMSHER, ROSS M.**, Asst. Prof. of Mathematics (1972). AB 1966 Rutgers Univ.; SM 1972, Univ. of Chicago.
- HANKLEY, WILLIAM JOHN**, Assoc. Prof. of Computer Science (1972). BSEE 1962, MS 1964, Northwestern Univ.; PhD 1967, Ohio St. Univ. (GF)
- HANSEN, MERLE FREDERICK**, Prof. of Biology; Parasitologist, Agr. Exp. Sta. (1950, 1963). AB 1939, MA 1941, Univ. of Minn.; PhD 1948, Univ. of Neb. (GF)
- HANSING, EARL DAHL**, Prof. of Plant Pathology; Plant Pathologist, Agr. Exp. Sta. (1935, 1947). BS 1933, Univ. of Minn.; MS 1937, Kan. St. Univ.; PhD 1941, Cornell Univ. (GF)
- HARRIS, JOHN ORVILLE**, Prof. of Biology; Bacterial Physiologist, Agr. Exp. Sta. (1941, 1952). BS 1939, Kan. St. Univ.; MS 1941, Univ. of Hawaii; PhD 1943, Kan. St. Univ. (GF)
- HARRIS, VIDA AGNES**, Assoc. Prof. of Art Emerita (1924, 1963). BS 1914, Kan. St. Univ.; AM 1927, Univ. of Chicago. (GF)
- HARRISS, STELLA**, Asst. Prof. of Chemistry Emeritus (1919, 1953). BS 1917, Kan. St. Univ.; MS 1919, Kan. St. Univ.
- HARTMAN, JOHN HOWARD**, Head Basketball Coach (1970). BS 1950, Okla. St. Univ.; MS 1954, Okla. St. Univ.
- HATHAWAY, CHARLES**, Assoc. Prof. and Head of Physics (1964, 1969). BS 1958, Tex. A & M Col.; PhD 1964, Univ. of Okla. (GF)
- HAWES, JOSEPH M.**, Asst. Prof. of History (1971). BA 1960, Rice Univ.; MA 1962, Okla. St. Univ.; PhD 1969, Univ. of Tex. at Austin. (GF)
- HAWLEY, M. DALE**, Assoc. Prof. of Chemistry (1966, 1970). BA 1960, MA 1962, Univ. of Northern Iowa; PhD 1965, Univ. of Kan. (GF)
- HAZLETT, EMERSON L.**, Instr. of Economics (1969). BS 1949, MS 1964, Univ. of Kan.
- HEAD, EDWARD C.**, Asst. Athletics Director (1967). BS 1952, MS 1954, Kan. St. Univ.
- HEATH, THEODORE**, Asst. Football Coach (1972). BS 1964, MA 1966, Western St. 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 Calif.; 1966 Air War Col.
- HEBRANK, KENNETH E.**, Asst. Prof. of Military Science (1972). BS 1955, Kan. St. Univ.; 1967, Command and General Staff Col.; 1972, Univ. of Mo., K.C.
- HEDGCOCK, JR., CHARLES**, Assoc. Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1965, 1968). BS 1961, PhD 1965, Univ. of Tex. (GF)
- HERMAN, LOUIS M.**, Asst. Prof. of Mathematics (1970). BS 1963, Univ. of Fla.; MS 1965, Univ. of Fla.; PhD 1970, Univ. of Mass. (GF)
- HIGGINSON, FRED H.**, Prof. and Head of English (1950, 1969). AB 1942, MA 1947, Univ. of Wichita; PhD 1953, Univ. of Minn. (GF)
- HIGHAM, ROBIN DAVID STEWARD**, Prof. of History (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, Kan. St. Univ. (GF)
- ✓ **HILL, RANDALL CONRAD**, Prof. of Sociology Emeritus (1929, 1970). BS 1924, MS 1927, Kan. St. Univ.; PhD 1929, Univ. of Mo. (GF)
- HINRICHS, CARL**, Asst. Prof. of Speech (1964). AB 1959, MA 1960, Univ. of N. C. (GF)
- HITCH, ROBERT L.**, Asst. Football Coach (1973). BS 1962, Miss. St. Univ.
- HOFFMAN, MICHAEL K.**, Asst. Prof. of Chemistry (1971). BS 1963, Univ. of Pa.; PhD 1968, Bryn Mawr Col. (GF)
- HOLBROOK, TERRY**, Asst. Track Coach (1972). BS 1971, Kan. St. Univ.
- HOSTETTER, HELEN PANSY**, Prof. of Journalism Emerita (1926, 1964). AB 1917, Univ. of Neb.; BS 1940, Kan. St. Univ. MS 1926, Northwestern Univ. (GF)
- HOUSER, DAVID J.**, Asst. Prof. of English (1969). BS 1964, Iowa St. Univ.; MS 1966, PhD 1970, Univ. of Wis. (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, Elmir 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.**, Prof. of Biology; Ecologist, Agr. Exp. Sta. (1955, 1972). BS 1940, Mich. St. Univ.; PhD 1953, Wash. St. Univ. (GF)
- IANDOLO, JOHN J.**, Asst. Prof. of Biology, Microbiologist, Agr. Exp. Sta. (1967). BS 1961, Loyola Univ. (Chicago); MS 1963, PhD 1965, Univ. of Ill. (GF)
- ILES, IVOR VICTOR**, Prof. of Political Science Emeritus (1911, 1949). BA 1904, MA 1905, Univ. of Kan. (GF)
- IYENGAR, SHANTO**, Asst. Prof. of Political Science (1972). BA 1966, Osmania Univ.; MA 1968, PhD 1972, Univ. of Iowa.
- JACK, HULAN E., JR.**, Asst. Prof. of Physics (1971). BS 1960, N. Y. Univ.; MS 1964, N. Y. Univ.; PhD 1971, N. Y. 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 St. Col.; MA 1968, Calif. St. Col. at Long Beach. (GF)
- JANES, WILLIAM CHARLES**, Assoc. Prof. of Mathematics Emeritus (1922, 1968). BS 1919, Northwestern Univ.; MA 1922, Univ. of Neb.
- JEFFCOTT, BARBARA**, Asst. Prof. of Mathematics (1972). BA 1966, Reed Col.; MS 1968, Portland St. Univ.; PhD 1972, Univ. of Mass.
- JOHNSON, GEORGE DANA**, Assoc. Prof. of Chemistry (1952, 1967). AB 1940, MA 1941, Oberlin Col.; PhD 1946, Univ. of Mich. (GF)
- JOHNSON, MICHAEL P.**, Assoc. Prof. of Biology (1972). BS 1959, Univ. of Calif.; PhD 1966, Univ. of Ore. (GF)
- JOHNSTON, KENNETH GORDON**, Assoc. Prof. of English (1966, 1972). BA 1948, Univ. of Calif. at Berkeley; MA 1951, Univ. of Calif. at Los Angeles; PhD 1966, Univ. of Minn. (GF)
- JONES, DALE VINCENT**, Assoc. Prof. of English (1946, 1951). BS 1931, MS 1941, Kan. St. Univ. (GF)
- JONES, KENNETH W.**, Assoc. Prof. of History (1965, 1970). AB 1958, MA 1959, PhD 1966, Univ. of Calif. (GF)
- JORDAN, DAVID D.**, Asst. Prof. of Journalism (1972). BS 1966, Univ. of Ore.
- KAMMER, ANN E.**, Assoc. Prof. of Biology; Neural Biologist (1972). BS 1956, NY St. Coll. for Teachers; MS 1958, Univ. of N.H., Durham; PhD 1966, Univ. of Calif., Berkeley. (GF)
- KAY, KENNETH G.**, Asst. Prof. of Chemistry (1971). BS 1965, Polytechnic Institute of Brooklyn; MS 1965, Polytechnic Institute of Brooklyn; PhD 1970, Johns Hopkins Univ. (GF)
- KEMP, KENNETH E.**, Assoc. Prof. of Computer Science; Consultant, Agr. Exp. Sta. (1968); BS 1963, MS 1965, PhD 1967, Mich. St. 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 St. Col.; MA 1967, Pa. St. Univ.; PhD 1970, Pa. St. Univ. (GF)
- KLAASSEN, HAROLD E.**, Asst. Prof. of Biology (1967). AB 1957, Tabor Col.; MS 1959, Kan. St. Univ.; PhD 1967, Univ. of Wash. (GF)
- KLOPFENSTEIN, WILLIAM E.**, Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1964). BS 1958, MS 1961, PhD 1964, Pa. St. Univ. (GF)
- KNOWLES, HAROLD R.**, Instr. of Speech (1970). BS 1967, MS 1970, Kan. St. Univ.
- KOCH, WILLIAM E.**, Asst. Prof. of English (1946, 1947). BS 1938, N.D. St. Teachers Col.; MS 1949, Kan. St. Univ. (GF)
- KRAMER, CHARLES LAWRENCE**, Assoc. Prof. of Biology, Mycologist, Agr. Exp. Sta. (1958, 1966). AB 1950, MA 1953, PhD 1957, Univ. of Kan. (GF)
- KREN, GEORGE M.**, Assoc. Prof. of History (1965). BA 1948, Colby Col.; MA 1949, PhD 1960, Univ. of Wis. (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 Mich. Univ.; MA 1964, PhD 1966, Mich. St. Univ. (GF)
- LANAN, RUSSELL**, Asst. Prof. Emeritus of English (1935, 1972). BS 1932, Kan. St. Univ.; MA 1933, St. Univ. of Iowa. (GF)
- LAMBERT, JACK L.**, Prof. of Chemistry (1950, 1958). AB 1947, MS 1947, Kan. St. Col. of Pittsburg; PhD 1950, Okla. St. Univ. (GF)
- LANGENKAMP, JERRY REESE**, Assoc. Prof. of Music; BM 1953, Univ. of Okla.; MM 1958, Univ. of Mich.; A Music D 1970, Univ. of Mich. (GF)
- LANGFORD, ROY CLINTON**, Prof. of Psychology Emeritus (1925, 1941). BS 1925, MS Kan. St. 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 Minn. (GF)
- LARMER, OSCAR VANCE**, Prof. of Art (1950, 1970). BFA 1949, Univ. of Kan.; MFA 1955, Wichita Univ. (GF)
- LARSON, SARA CHARLOTTE**, Instr. in Geography Emerita (1946, 1964). AB 1917, Know Col.; BE 1927, Ill. St. Normal Univ.; MS 1942, Univ. of Chicago.
- LASH, MENDEL ELMER**, Prof. of Chemistry Emeritus (1922, 1966). AB 1920, MS 1922, PhD 1928, Ohio St. Univ. (GF)
- LASHBROOK, RALPH RICHARD**, Prof. and Head Emeritus, Department of Journalism (1934, 1944). BS 1929, Kan. St. Univ.; MS 1942, Univ. of Wis. (GF)
- LAUMER, HELMUT W.**, Research Assoc. of Physics (1971). BS 1965, Univ. of Chicago; MS 1967, Michigan St. Univ.; PhD 1971, Michigan St. Univ.
- LAURIE, DAVID R.**, Instr. in Physical Education (1968). BS 1963, MS 1966, Kan. St. Univ.
- LEACHMAN, ROBERT B.**, Prof. of Physics; Dir., Nuclear Science Laboratories (1967). BS 1942, Case Institute of Technology; PhD 1950, Iowa St. Univ. (GF)
- LEAVENGOOD, LUTHER OMAR**, Prof. of Music, BM 1929, Univ. of Kan.; MM 1936, Univ. of Mich. (GF)
- LEE, RONALD S.**, Asst. Prof. of Physics (1967). BA 1961, Luther Col.; PhD 1967, Iowa St. Univ. (GF)
- LEE, YU-LEE**, Assoc. Prof. of Mathematics (1967). BS 1955, MA 1959, National Taiwan Univ.; PhD 1964, Univ. of Ore. (GF)
- LEGG, JAMES C.**, Assoc. Prof. of Physics (1967). BS 1958, Ind. 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 N.M. (GF)
- LEWIS, JOHN TIMOTHY**, Asst. Prof. of English (1970). AB 1962, AM 1968, Univ. of Tex.
- 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 Wis.; PhD 1931, St. Univ. of Iowa. (GF)
- LINDER, ROBERT D.**, Assoc. Prof. of History (1965, 1967). BS 1956, Kan. St. 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 St. Univ.; MS 1958, PhD 1964, Univ. of Wis. (GF)
- LOCKHART, CHARLES HOWARD**, Assoc. Prof. of Biology (1940, 1972). BS 1934, MS 1938, Kan. St. Univ. (GF)
- LONG, GLENN WESLEY**, Asst. Prof. of Sociology Emeritus (1938, 1970). AB 1926, Baker Univ.; MS 1940, Kan. St. Univ. (GF)
- LONGHURST, THOMAS M.**, Asst. Prof. of Speech (1971). BS 1966, MS 1968, PhD 1970, Univ. of Minn. (GF)
- LORD, GERALD**, Asst. Professor of Military Science (1973). BS 1961 North Ga. Col.; MS 1972, Kan. St. Univ.
- LYMAN, A. ASHLEY**, Asst. Prof. of Economics (1972). BS 1967, Idaho St.; MA 1968, PhD 1972, Northwestern Univ.
- LYNN, NAOMI B.**, Asst. Prof. of Political Science (1970). BA 1954, Maryville Col.; MA 1958, Univ. of Ill.; PhD 1970, Univ. of Kan. (GF)



- MacDONALD, JAMES ROBERT, Assoc. Prof. of Physics (1968). BA 1958, Univ. of Toronto; MS 1964, PhD 1966, McMaster Univ. (GF)
- MacFARLAND, DAVID T., Asst. Prof. of Journalism and Mass Comm. (1972). BA 1965, MA 1966, Stetson Univ.; PhD 1972, Univ. of Wisc.
- MACY, ELBERT BONEBRAKE, Assoc. Prof. of Journalism and Mass Communications (1946, 1951). BS 1930, MS 1939, Kan. St. Univ.
- MANNEY, THOMAS R., Assoc. Prof. of Physics (1971). BA 1958, Western Wash. St. Col.; PhD 1964, Univ. of Calif. (GF)
- MARCHIN, GEORGE L., Asst. Prof. of Biology (1970). BA 1962, Rockhurst Col.; PhD 1967, Univ. of Kan. (GF)
- MARR, JOHN MAURICE, Prof. of Mathematics (1953, 1958). BS 1941, Central Mo. St. Col.; MA 1949, Univ. of Mo.; PhD 1953, Univ. of Tenn. (GF)
- MARZOLF, G. RICHARD, Assoc. Prof. and Assoc. Dir., Division of Biology (1962, 1973). AB 1957, Wittenberg Univ.; PhD 1962, Univ. of Mich. (GF)
- MAXFIELD, JOHN E., Prof. and Head of Department of Mathematics (1967). BS 1947, Mass. Institute of Technology; MS 1949, Univ. of Wis., PhD 1951, Univ. of Ore. (GF)
- MAXWELL, GEORGE WILLARD, Asst. Prof. of Physics Emeritus (1927, 1960). AB 1912, MS 1920, Univ. of Mich.
- MCCARTHY, PAUL E., Assoc. Prof. of English (1967). BA 1948, MFA 1951, St. Univ. of Iowa; PhD 1958, Univ. of Tex. (GF)
- MCCRACKEN, ELIZABETH UNGER, Assoc. Prof. of Biology Emerita (1938, 1970). AB 1929, MA 1932, Wellesley Col.; PhD 1937, Univ. of Calif. (GF)
- MCDONALD, LYMAN L., Asst. Prof. of Statistics (1971). BS 1963, MS 1964, Okla. St. Univ.; PhD 1970, Colo. St. Univ. (GF)
- MCDONALD, RICHARD N., Prof. of Chemistry (1960, 1968). BS 1954, MS 1955, Wayne St. Univ.; PhD 1957, Univ. of Wash. (GF)
- MCDOWELL, EPHRAIM E., Asst. Football Coach (1970). BS 1963, Fla. St. Univ.
- McGHEE, RICHARD D., Assoc. Prof. of English (1967). BA 1962, Univ. of Mo. at KC; MA 1964, PhD 1967, Univ. of Okla. (GF)
- McGRAW, BETTY R., Asst. Prof. in Modern Languages (1963, 1970). Licence es Lettres, 1961, De L'Université de Paris, La Sorbonne.
- McGUIRE, JAMES H., Asst. Prof. of Physics (1972). BS 1964, Rensselaer Polytechnic Institute; MS 1966, PhD 1969, Northeastern Univ.
- McILVAIN, ROBERT J., Instr. in Art (1971). BSE 1966, Kan. St. Teach. Coll.; MFA 1970, Wichita St. Univ.
- McKINNEY, KATHERYN ANN, Assoc. Prof. of Physical Education (1946, 1972). BS 1934, Kan. St. Univ.; MA 1935, George Peabody Col. for Teachers (GF)
- MELOAN, CLIFTON E., Prof. of Chemistry (1959, 1968). BS 1953, Iowa St. Univ.; PhD 1959, Purdue Univ. (GF)
- MERRIMAN, JOHN W., Asst. Prof. in Physical Education (1968). BS 1957, Univ. of Kan.; MA 1967, EDD 1971, Univ. of Northern Colo. (GF)
- MILEY, JAMES D., Asst. Prof. of Sociology (1970). BA 1959, Millsaps Col.; MA 1963, La. St. 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 Kan.; MA 1939, Univ. of Calif. (GF)
- MILLER, FORREST R., Asst. Prof. of Mathematics (1968). BS 1962, Univ. of Okla.; MA 1968, PhD 1968, Univ. of Mass. (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 St. Univ.
- MILLIKEN, GEORGE A., Asst. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1969). BS 1965, MS 1968, PhD 1969, Colo. St. Univ. (GF)
- MILLSAP, WILLIAM, Instr. of Sociology (1972). BA 1967, Los Angeles St. Col.; MA 1970, Northern Ill.
- MITCHELL, HOWARD LEE, Prof. of Biochemistry, Biochemist, Agr. Exp. Sta. (1946, 1961). BS 1938, Okla. St. Univ.; PhD 1946, Purdue Univ. (GF)
- MITCHELL, JAMES C., Assoc. Prof. of Psychology (1966). BS 1957, MA 1959, PhD 1962, Ohio St. Univ. (GF)
- MOLINEUX, BARRY R., Instr. of Speech (1970). BS 1966, Kan. St. Univ.; MA 1968, Kan. St. Univ.
- MOORE, FRITZ, Prof. of Modern Languages Emeritus (1934, 1971). AB 1927, Univ. of Akron; MA 1930, PhD 1932, Univ. of Ill. (GF)
- MOORE, LESTER R., Asst. Prof. Aerospace Studies (1972). BS 1966, MS 1967, Kan. St. Teachers Col.
- 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 Tex.; MA 1964, Univ. of Ga.; EDD 1969, North Tex. St. Univ. (GF)
- MOSER, HERBERT CHARLES, Prof. of Chemistry (1957, 1967). BA 1952, San Jose St. Col.; PhD 1957, Iowa St. Univ. (GF)
- MOSES, WILLIAM R., Prof. of English (1950, 1954). BA 1932, MA 1933, PhD 1939, Vanderbilt Univ. (GF)
- MOSSMAN, THIRZA ADELIN, Assoc. Prof. of Mathematics Emerita (1922, 1965). BA 1916, Univ. of Neb.; MA 1922, Univ. of Chicago. (GF)
- MROZEK, DONALD J., Asst. Prof. of History (1972). BA 1966 Georgetown Univ.; MA 1968, Rutgers Univ. (GF)
- MUELLER, DELBERT D., Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1968). BS 1962, PhD 1966, Univ. of Okla. (GF)
- MULHOLLAN, PAIGE E., Assoc. Dean; Assoc. Prof. of History (1970). BSBA 1956, MA 1961, Univ. of Ark.; PhD 1966, Univ. of Tex. (GF)
- MUNCE, JAMES C., Asst. Prof. of Art (1972). BFA 1966, Minneapolis School of Art; MFA 1971, Indiana Univ.
- MUNRO, DONALD FARNHAM, Assoc. Prof. of Modern Languages Emeritus (1940). BS 1926, MA 1927, Acadia Univ. (Canada); PhD 1933, Univ. of Ill. (GF)
- NAFZIGER, ESTEL WAYNE, Asst. Prof. of Economics (1966). BA 1960, Goshen Col.; MA 1962, Univ. of Mich.; PhD 1967, Univ. of Ill. (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 Calif., Davis. (GF)
- NELSON, DEVERE V., Asst. Prof. of Athletics, Dir. of Sports Information (1966). BS 1949, Kan. St. Univ.
- NESLER, JOHN, Instr. of Military Science (1971).
- NEWCOMB, MARGARET ALICE, Assoc. Prof. of Biology Emerita (1925, 1970). BS 1925, MS 1927, Kan. St. Univ. (GF)
- NICHOLS, HAROLD J., Asst. Prof. of Speech, (1971). BS 1967, Iowa St. Univ.; MA 1969, Indiana St. Univ.; PhD 1971, Ind. St. Univ.
- NOBLE, M. LARRY, Asst. Prof. of Physical Education (1972). BS 1966 Eastern Ky. Univ.; MA 1968, Univ. of Md.; PhD 1970, Univ. of Tex. (GF)
- NOONAN, JOHN P., Assoc. Dean of Graduate School; Assoc. Prof. of English (1947, 1966). BS 1947, Rockhurst Col.; MS 1950, Kan. St. Univ.; PhD 1955, Denver Univ. (GF)
- NORDIN, JOHN A., Prof. of Economics (1961). BA 1935, MA 1937, PhD 1941, Univ. of Minn. (GF)
- NORDIN, PHILIP, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1954, 1969). BS 1949, MS 1950, Univ. of Saskatchewan (Canada); PhD 1953, Iowa St. Univ. (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 Ariz.; PhD 1965, Univ. of Colo. (GF)
- O'BRIEN, PATRICIA J., Assoc. Prof. of Anthropology (1967, 1972). BA 1962, MA 1966, PhD 1969, Univ. of Ill. (GF)
- OGG, ROSELLA A., Instr. of Art (1965). BA 1958, Kan. St. Univ.; MA 1963, Kan. St. Univ.
- OLLINGTON, MARCUS H., Asst. Prof. of Speech and Auditorium Manager (1969). Diploma, 1940, Conservatorium of Music; BA 1964, MA 1967, Univ. of N. C.
- OLSON, EDWIN G., Asst. Prof. of Economics (1969). BA 1956, MA 1960, Univ. of Calif.; PhD 1971, Univ. of Wash.
- ORBACH, HAROLD L., Lecturer in Sociology (1969). BSS 1959, The City Col. of N. Y.; PhD 1970, The Univ. of Minn.
- O'SHEA, JOHN WILLIAM, Asst. Prof. of Art (1956, 1968). BFA 1954, Denver Univ.; MFA 1956, St. Univ. of Iowa. (GF)
- OSSAR, MICHAEL, Instr. in Modern Languages (1971). AB 1961, Cornell Univ.; MS 1963, Univ. of Pa.; MA 1967, Univ. of Pa.
- 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 N.D.; 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 Ark.; BS 1955, MChemEng 1958, PhD 1963, Univ. of Okla. (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 Ore.; BD 1964, Fuller Theological Seminary; MA 1966, Univ. of Ore.; PhD 1970, Univ. of Ore. (GF)
- PARRISH, DONALD BAKER, Prof. of Biochemistry; Biochemist and Nutritionist, Agr. Exp. Sta. (1943, 1952). BS 1935, MS 1938, PhD 1949, Kan. St. Univ. (GF)
- PARRISH, FRED LOUIS, Prof. of History Emeritus (1927, 1963). AB 1917, MA 1927, Northwestern Univ.; BD 1920, Garrett Biblical Institute; PhD 1927, Yale Univ. (GF)
- PAUKSTELIS, JOSEPH V., Asst. Prof. of Chemistry (1966). BS 1960, Univ. of Wis.; PhD 1964, Univ. of Ill. (GF)
- PELISCHEK, MILTON Z., Instr. in English (1965). BS 1948, MA 1950, Kan. St. Univ.
- PELLETIER, PAUL, Asst. Prof. of Sociology (1972). BA 1949, Sacred Heart Seminary; STL 1953 Gregorian Univ.; MSV 1958, Catholic Univ. of America.
- PELTON, MARION HERFORD, Assoc. Prof. of Music Emerita (1928, 1972). BM 1927, Univ. of Wis.; BS 1932, Kan. St. Univ.; MA 1957, Columbia Univ. (GF)
- PERKINS, JR., CHARLES C., Prof. of Psychology (1969). BA 1941, Harvard; MA 1942, PhD 1946, St. Univ. of Iowa. (GF)
- PERNG, SHIAN-KOONG, Assoc. Prof. of Statistics (1968, 1972). BS Chung-Hsien Univ., Taiwan; MS 1961, Va. Polytechnic Institute; PhD 1967, Mich. St. Univ. (GF)
- PETERS, GEORGE R., Asst. Prof. of Sociology; Assoc., Institute for Environmental Research (1967, 1970). BA 1962, MA 1964, PhD 1968, Univ. of Neb. (GF)
- PETERS, RICHARD L., Adm. Asst. in Athletics (1971). BS 1946, Kans. St. Univ.
- PETT, S. DOROTHY BRADFORD, Assoc. Prof. of Modern Languages Emerita (1927, 1966). BA 1919, MA 1924, Univ. of Neb.; 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 St. Univ. (GF)
- PIERCE, FREDDY L., Instr. of Military Science, 1972.
- PIGNO, LOUIS, Asst. Prof. of Mathematics (1969). BS 1961, Polytechnic Institute of Brooklyn; MA 1965, Univ. of Conn.; PhD 1969, SUNY at Stony Brook. (GF)
- PITTENGER, THAD H., Prof. of Biology; Geneticist, Agr. Exp. Sta. (1959). BS 1947, PhD 1951, Univ. of Neb. (GF)
- POLICH, GERALD, Asst. Prof. of Music (1966). BME 1961, Univ. of Colo.; MME 1966, Univ. of Colo.
- POOLE, MIRIAM PICK, Instr. in Physical Education (1961). BS 1943, Savage School for Physical Education and Columbia Univ.; MA 1945, Columbia Univ.
- PRESS, ALLAN N., Asst. Prof. of Psychology (1970). BS 1964, Mass. Institute of Technology; MA 1967, Clark Univ.; PhD 1972, Clark Univ. (GF)
- PSIOLOS, 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 Col.; PhD 1965, Univ. of Ill. (GF)
- RAINBOLT, HARRY R., Assoc. Prof. of Speech (1966). BS 1960, Southern Ill. Univ.; MS 1962, PhD 1965, Univ. of Ind. (GF)
- RAPPOPORT, LEON H., Assoc. Prof. of Psychology (1964, 1968). BA 1953, N.Y. Univ.; MA 1962, PhD 1963, Univ. of Colo. (GF)



- RATCLIFFE, LAMAR CECIL**, Instr. in Mathematics (1964). BS 1933, United States Military Academy; MAT 1964, Duke Univ.
- RAY, BERYL H.**, Asst. Prof. of History (1972). BA 1964, Graceland Col.; MA 1965, Univ. of S.D.; PhD 1972, Univ. of British Columbia. (GF)
- REAGAN, CHARLES E.**, Asst. Prof. of Philosophy (1967). AB 1964, Holy Cross Col.; MA 1966, PhD 1967, Univ. of Kan. (GF)
- REED, MERWYN J.**, Instr. of Military Science (1971).
- REES, JOHN O.**, Assoc. Prof. of English (1965, 1972). BA 1947, Amherst Col.; PhD 1965, St. Univ. of Iowa. (GF)
- RICHARD, PATRICK**, Prof. of Physics (1972). BS 1961, Univ. of Southwestern La.; PhD 1964, Fla. St. Univ. (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 Kan. (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, Mich. St. Univ.; BMS 1959, Univ. of Idaho; PhD 1961, Utah St. Univ. (GF)
- ROBERTSON, JR., CHARLES W.**, Research Assoc. in Department of Physics (1970). BS 1965, Southwestern at Memphis; PhD 1969, Fla. St. Univ.
- ROBY, PAUL E.**, Asst. Prof. of Music (1966). BM 1958, Oberlin Conservatory; MS 1961, Catholic Univ. of America (GF)
- RODKEY, L. SCOTT**, Asst. Prof. of Biology, Immunologist, Agr. Exp. Sta. (1970). BA 1964, PhD 1968, Univ. of Kan. (GF)
- ROGERSON, BREWSTER**, Prof. of English (1953, 1967). AB 1941, Univ. of N.C.; PhD 1946, Princeton Univ. (GF)
- ROHLES, FREDERICK H.**, Prof. of Psychology (1963, 1966). BS 1942, Roosevelt Univ.; MA 1950, PhD 1956, Univ. of Tex. (GF)
- ROHRER, WAYNE C.**, Prof. of Sociology; Rural Sociologist, Agr. Exp. Sta. (1959, 1965). BS 1946, MS 1948, Tex. A & M Col.; PhD 1955, Mich. St. Univ. (GF)
- ROSENKILDE, CARL EDWARD**, Asst. Prof. of Physics (1970). BS 1959, Wash. St. 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, Ind. Univ.; MS 1955, Northwestern Univ.; PhD 1957, Univ. of Chicago. (GF)
- SAGESER, ADELBERT BOWER**, Prof. of History (1938, 1941). AB 1925, Neb. St. Teachers Col. (Wayne); MA 1930, PhD 1934, Univ. of Neb. (GF)
- SAMELSON, FRANZ**, Prof. of Psychology (1957, 1969). Diploma in Psychology, 1952, Univ. of Munich (Germany); PhD 1956, Univ. of Mich. (GF)
- SANNER, JANICE E.**, Asst. Prof. of Journalism (1972). BA 1960, Muskingum Col.; MS 1967, PhD 1972, Ind. Univ.
- SASAKI, CHESTER N.**, Asst. Prof. of Aerospace Studies (1971). BS 1964, Univ. of Ill.; MS 1969, Ariz. St. Univ.
- SCHNEER, RICHARD K.**, Assoc. Prof. of Philosophy (1968). AB 1950, Univ. of Neb.; MA 1951, Univ. of Fla.; PhD 1958, Univ. of Neb. (GF)
- SCHNEIDER, HAROLD WILLIAM**, Asst. Prof. of English (1961, 1969). BA 1950, Univ. of Minn.
- SCHNEIDER, MARY W.**, Asst. Prof. of English (1966). BA 1949, MA 1952, St. Univ. of Iowa; PhD 1964, Univ. of Minn. (GF)
- SCHNUR, ALFRED C.**, Prof. of Sociology (1970). BA 1941, Univ. of Pittsburgh; PhD 1944, PhD 1949, Univ. of Wis. (GF)
- SCHRENK, WILLIAM G.**, Prof. of Chemistry (1938, 1951). AB 1932, Westmar Col.; MS 1936, PhD 1945, Kan. St. 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 Wis. (GF)
- SELF, HUBER**, Asst. Prof. of Geography (1947, 1953). BS 1941, Central Okla. St. Col.; MS 1947, Okla. St. Univ. (GF)
- SETSER, DONALD W.**, Prof. of Chemistry (1963, 1970). BS 1956, MS 1958, Kan. St. Univ.; PhD 1961, Univ. of Wash. (GF)
- SEYLER, H.L.**, Asst. Prof. of Geography (1970). BA 1963, MA 1967, Kan. St. Univ.; PhD 1971, Ind. Univ.
- SHANTEAU, JAMES C.**, Asst. Prof. of Psychology (1971). BA 1966, San Jose St. Col.; PhD 1970, Univ. of Calif., San Diego. (GF)
- SHAYER, HAROLD C.**, Asst. Prof. of Journalism (1972). BA 1960, Muskingum Col.; MS 1963, Syracuse Univ.
- SHENKEL, JR., CLAUDE WESLEY**, Prof. of Geology (1949, 1958). BS 1941, Kan. St. Univ.; MS 1947, PhD 1952, Univ. of Colo. (GF)
- SHORE, BRUCE W.**, Assoc. Prof. of Physics (1968). BS 1956, Col. of Pacific; PhD 1960, Mass. Institute of Technology (GF)
- SHULL, PAUL**, Assoc. Prof. of Music (1960). BME 1950, MME 1951, Univ. of Colo.; DMA 1966, Eastman School of Music (Univ. of Rochester).
- SIDDALL, WILLIAM R.**, Prof. of Geography; Head, Department of Geography (1962, 1972). AB 1950, Harvard Univ.; MA 1955; PhD 1959, Univ. of Wash. (GF)
- SIDORFSKY, FRANK M.**, Asst. Prof. of Music (1965). BME 1952, Kan. St. 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, St. Univ. of Iowa. (GF)
- SINCOVEC, R. F.**, Asst. Prof. of Computer Science (1970). BS 1964, Univ. of Colo.; MS 1967, PhD 1968, Iowa St. Univ. (GF)
- SIOGANI, 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, Mich. St. Univ. (GF)
- SLOAT, FLOYD B.**, Assoc. Prof. of Mathematics (1946, 1947). BA 1938, Ouachita Col.; MS 1941, Univ. of Ark.
- 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 Colo.; MA 1963, PhD 1965, Univ. of Wash. (GF)
- SNOW, KENNETH R.**, Gymnastics Coach (1972). BS 1972, Kans. St. Univ.
- SNYDER, VERTLE E.**, Asst. Prof. of Physical Education (1954). BS 1942, MS 1950, Kan. St. Univ. (GF)
- SOCOLOFSKY, HOMER E.**, Prof. of History (1946, 1963). BS 1944, MS 1947, Kan. St. Univ.; PhD 1954, Univ. of Mo. (GF)
- SPANGLER, JOHN D.**, Assoc. Prof. of Physics (1965, 1969). BS 1958, Kan. St. Univ.; PhD 1961, Duke Univ. (GF)
- SPEAR, PETER D.**, Asst. Prof. of Psychology (1972). BA 1966, Rutgers Univ.; PhD 1970, Yale Univ. (GF)
- SPEARS, WILLIAM**, Asst. Prof. of Mathematics (1968). BS 1964, MS 1966, Univ. of Fla. (GF)
- SPEERY, ARTHUR BRADLEY**, Prof. of Geology Emeritus (1921, 1953). BS 1919, Univ. of Chicago. (GF)
- 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 Colo.; PhD 1955, Clark Univ. (GF)
- STALLINGS, DAVID L.**, Asst. Prof. of Geography (1972). BA 1964, Univ. of Colo.; MA 1966, PhD 1972, Univ. of Wash.
- STAMEY, WILLIAM L.**, Dean; Prof. of Mathematics; Acting Director of Bureau of General Research (1953, 1970). AB 1947, Univ. of North Colo.; MA 1949, PhD 1952, Univ. of Mo. (GF)
- STEINBAUER, ROBERT ANDRUS**, Prof. and Head, Department of Music (1970). BM 1950, Univ. of Mich.; MM 1951, Univ. of Mich.; Doc of Music 1959, Ind. Univ. (GF)
- STEUNENBERG, THOMAS BERNARD**, Prof. of Music (1947). BME 1933, Northwestern Univ.; MM 1938, Univ. of Mich.; PhD 1947, Eastman School of Music (Univ. of Rochester). (GF)
- STEWART, DONALD C.**, Asst. Prof. of English (1968). BA 1952, MA 1955, Univ. of Kan.; PhD 1962, Univ. of Wis. (GF)
- STOVER, STEPHEN L.**, Assoc. Prof. of Geography (1964, 1969). AB 1940, McPherson Col.; MA 1941, Univ. of Kan.; MS 1955, PhD 1960, Univ. of Wis. (GF)
- STRAHM, RICHARD M.**, Asst. Football Coach (1973). BA 1958, MA 1966, Univ. of Toledo.
- STRECKER, GEORGE E.**, Assoc. Prof. of Mathematics (1972). BS 1961, Univ. of Colo.; PhD 1966, Tulane Univ.
- STROMBERG, KARL ROBERT**, Prof. of Mathematics (1968). BA 1953, MA 1954, Univ. of Ore.; PhD 1959, Univ. of Wash. (GF)
- SULEIMAN, MICHAEL WADIE**, Prof. of Political Science (1965, 1972). BA 1960, Bradley Univ.; MS 1962, PhD 1965, Univ. of Wis. (GF)
- SULLIVAN, JERRY M.**, Asst. Football Coach (1971). BS 1968, MSE 1969, Delta St. Coll.
- SUMMERHILL, R. RICHARD**, Asst. Prof. of Mathematics (1972). BA 1966, Monmouth Col.; MS 1967, PhD 1969, Univ. of Iowa.
- SWEEDLUN, VERNE SEBASTIAN**, Prof. of History Emeritus (1941, 1970). AB 1923, Bethany Col.; MA 1928, Univ. of Kan.; PhD 1940, Univ. of Neb. (GF)
- SWIETLICKI, ALAIN**, Instr. in Modern Languages (1968). BA 1962, Kan. St. Univ.; MA 1965, Univ. of Tex.
- SWILER, JAMES P.**, Instr. of Art (1970). BSE 1966, Kan. St. Teachers Col.; MFA 1970, Wichita St. Univ.
- TATSCHEL, ANNEHARA K.**, Instr. of Biology (1970). BS 1964, MS 1966, Univ. of New Mexico; PhD 1970, Univ. of Kan.
- TAYLOR, ROBERT BARTLEY**, Assoc. Prof. of Anthropology (1957, 1969). BS 1949, Wheaton Col.; MA 1956, PhD 1960, Univ. of Ore. (GF)
- THOMAS, LLOYD B.**, Asst. Prof. of Economics (1968). AB 1963, AM 1964, Univ. of Mo.; PhD 1971, Northwestern Univ. (GF)
- THOMPSON, CHARLES P.**, Prof. of Psychology (1965, 1972). BS 1958, Wis. St. Col.; MS 1960, PhD 1962, Univ. of Wis. (GF)
- THOMPSON, FRANK JAMES**, Asst. Prof. of Physical Education Emeritus (1937, 1972). BED 1934, Minn. St. Teachers Col. (Mankato); MED 1936, Springfield Col. (Mass.). (GF)
- THOMSON, JOHN W.**, Asst. Prof. of Music (1972). BM 1963, MM 1965, Wichita St. Univ.; Doc of Mus Arts 1968, Univ. of Mo. at KC.
- TIEMEIER, OTTO WILLIAM**, Prof. of Biology; Wildlife Conservationist, Agr. Exp. Sta. (1947, 1964). AB 1937, MA 1939, Univ. of Kan.; PhD 1947, Univ. of Ill. (GF)
- TILGHMAN, BENJAMIN R.**, Prof. of Philosophy and Head of Department of Philosophy (1967). BA 1950, MA 1954, Wash. Univ.; PhD 1959, Univ. of Wash. (GF)
- TOMASCH, ELMER JOHN**, Assoc. Prof. of Art (1947, 1959). BS 1935, Western Reserve Univ.; MS 1956, Kan. St. Univ. (GF)
- TWISS, PAGE CHARLES**, Prof. and Head of Geology (1953, 1969). BS 1950, MS 1955, Kan. St. Univ.; PhD 1959, Univ. of Tex. (GF)
- UHLARIK, JOHN JEFFERY**, Asst. Prof. of Psychology (1970). BS 1965, Univ. of Wis.; MS 1967, Univ. of Wash.; PhD 1970, Univ. of Wash. (GF)
- UNGER, ELIZABETH A.**, Asst. Prof. of Computer Science; Assoc. Director, Computing Center (1966, 1969). BS 1961, MS 1963, Mich. St. Univ.
- URBAN, JAMES E.**, Asst. Prof. of Biology (1970). BA 1965, PhD 1968, Univ. of Tex. (GF)
- 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 St. Col.; MA 1963, Univ. of N.C.; PhD 1969, Univ. of Denver. (GF)
- VAZQUEZ, BURNEY L.**, Asst. Prof. of Modern Languages (1965). BA 1950, Washburn Univ.; MS 1953, Kan. St. Teachers Col.; PhD 1964, Univ. of Kan. (GF)
- VOGT, JOHN L.**, Assoc. Prof. of Art (1963). BFA 1960, Kan. City Art Institute; MFA 1963, Univ. of Ill. (GF)
- WAGNER, G. JACK**, Instr. of Aerospace Studies (1972).
- WALKER, MARGARET Y.**, Instr. of Music (1971). BM 1970, Kan. St. Univ.
- WALKER, RODNEY G.**, Asst. Prof. of Music (1966). BME 1959, Univ. of Neb.; MME 1961, Wichita St. Univ. (GF)
- WALKER, WARREN VINCENT**, Prof. of Music (1948, 1959). BA 1946, Univ. of Wash.; MM 1948, Cincinnati Conservatory of Music. (GF)
- WALL, HINDMAN P.**, Administrative Asst., Athletics (1967). BS 1958, Auburn Univ.
- WALLENTINE, VIRGIL E.**, Asst. Prof. of Computer Science, (1972). BS 1965, MS, 1970, PhD 1972, Iowa St. Univ. (GF)



- WALLER, RAY A., Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1967). BA 1959, Southwestern Col.; MS 1963, Kan. St. Univ.; PhD 1967, The John Hopkins Univ. (GF)
- WALTERS, CHARLES P., Prof. of Geology (1936, 1972). BS 1936, MS 1937, Kan. St. Univ.; PhD 1957, Cornell Univ. (GF)
- 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, Calif. Institute of Technology; PhD 1970, Duke Univ. (GF)
- WEBER, ROBERT W., Asst. Football Coach (1973). BS 1958, MS 1962, Colo. St. Univ.
- WEIS, JERRY S., Assoc. Prof. and Asst. Director, Division of Biology; Plant Physiologist, Agr. Exp. Sta. (1966, 1972). AB 1958, Kan. Wesleyan Univ.; MA 1960, PhD 1964, Univ. of Kan. (GF)
- WEST, RONALD R., Asst. Prof. of Geology (1969). AA 1955, Centralia Junior Col.; BS 1958, Univ. of Mo. at Rolla; MS 1962, Univ. of Kan.; PhD 1970, Univ. of Okla. (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, Kan. St. Univ.; PhD 1955, Denver Univ. (GF)
- WHITTEMORE, DONALD O., Acting Asst. Prof. of Geology (1972). BS 1966, Univ. of N.H.
- WILCOXON, GEORGE DENT, Prof. of History (1946, 1948). AB 1936, MA 1938, PhD 1941, Univ. of Calif. at Los Angeles. (GF)
- WILLIAMS, DUDLEY, Distinguished Regents Prof. of Physics (1964). AB 1933, MA 1934, PhD 1936, Univ. of N.C. (GF)
- WILLIAMS, LARRY G., Asst. Prof. of Biology (1970). BS 1961, MS 1963, Univ. of Neb.; PhD 1968, Calif. Institute of Technology. (GF)
- WILLIAMS, NETA C., Instr. of Speech (1970). BA 1958, MA 1970, Kan. St. Univ.
- WILLIAMS, ROBERT E., Asst. Prof. of Mathematics (1965). BS 1959, MA 1961, PhD 1965, Univ. of Mo. (GF)
- WILLIAMS, TIMOTHY ALDEN, Assoc. Prof. of Political Science (1967). AB 1954, Davidson Col.; PhD 1964, Univ. of N.C. (GF)
- WILSON, FRED E., Assoc. Prof. of Biology; Physiologist, Agr. Exp. Sta. (1965). AB 1958, MA 1960, Univ. of Kan.; PhD 1965, Wash. St. Univ. (GF)
- WILSON, PHILLIP B., Baseball Coach (1971). BS 1969, Kan. St. Univ.
- WIMMER, EDWARD JOSEPH, Prof. of Biology Emeritus (1928, 1971). AB 1925, MA 1927, PhD 1928, Univ. of Wis. (GF)
- WINEGARDNER, CARROL, Asst. Prof. in Art (1966, 1972). BFA 1960, Kan. City Art Institute; MFA 1963, Univ. of Okla.
- WOLDT, GRACE S., Instr. In Mathematics Emerita (1946). AB 1927, Ohio Wesleyan Univ.
- WOODWARD, GARY L., Asst. Prof. in Art (1971, 1972). AB 1961, Northern Colo. Univ.; MA 1964, Univ. of Iowa; MFA 1969, Univ. of Wash.
- YEE, KANE, Assoc. Prof. of Mathematics (1968). BS 1957, MS 1958, PhD 1963, Univ. of Calif. at Berkeley. (GF)
- YOUNG, PAUL M., Prof. of Mathematics, Vice President for Univ. Development (1970). AB 1937, Miami Univ.; MA 1939, Ohio St. Univ.; PhD 1941, Ohio St. Univ. (GF)
- ZIMMERMAN, JOHN L., Assoc. Prof. of Biology (1963, 1968). BS 1953, MS 1958, Mich. St. Univ.; PhD 1963, Univ. of Ill. (GF)
- ZOLLMAN, DEAN ALVIN, Asst. Prof. of Physics (1970). BS 1964, MS 1965, Ind. Univ.; PhD 1970, Univ. of Maryland. (GF)
- ZUTI, WILLIAM B., Asst. Prof. of Physical Education (1972). BS 1965 Slippery Rock St. Col.; MA 1971, PhD 1972, Kent St. Univ. (GF)

## College of Business Administration

- ALLEN, JR., A. DALE, Prof. of Business Administration (1967, 1972). BS 1959, MBA 1960, Ind. Univ.; DBA 1966, Univ. of Colo. (GF)
- BARTON-DOBENIN, JOSEPH, Prof. of Business Administration (1958, 1972). BS 1956, MA 1958, PhD 1966, Univ. of Neb. (GF)
- BROWN, THOMAS L., Asst. Prof. of Business Administration (1972). BS 1966, Okla. St. Univ.; MBA, 1968, PhD 1972, Okla. St. Univ.
- BUZENBERG, MILDRED E., Asst. Dean; Asst. Prof. of Business Administration (1964, 1968). BA 1938, Mich. St. Univ.; MS 1951, Kan. St. Univ.
- CLARK, WILLIAM J., Prof. of Business Administration Emeritus (1946, 1961). BS 1929, Kan. St. Teach. Col. (Pittsburg); MA 1940, St. Univ. of Iowa; CPA 1954, Kansas (GF)
- COLEMAN, RAYMOND J., Assoc. Prof. of Business Administration (1965, 1969). BS 1948, Univ. of Kan.; MA 1963, Central Mo. St. Col.; PhD 1967, Univ. of Ark. (GF)
- DONNELLY, JOHN T., Asst. Prof. of Business Administration (1972). BBA 1963, MA 1966, PhD 1970, Univ. of Iowa.
- ERIKSEN, CONRAD J.K., Assoc. Prof. of Business Administration Emeritus (1946, 1947). BA 1929, Univ. of Kan.; MBA 1931, Harvard Univ.
- FINLEY, ROBERT L., Asst. Prof. of Business Administration (1971). BBA 1965, MA 1970, Univ. of Okla.
- 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 Ill. (GF)
- GRAHAM, JOHN, Asst. Prof. of Business Administration (1970). BA 1967, Kan. St. Univ.; MA 1968, PhD 1970, Univ. of Ark. (GF)
- GUDGELL, DOROTHY B., Asst. Prof. of Business Administration (1943, 1954). BS 1938, MS 1946, Kan. St. Univ.
- GUGLER, MERLE E., Assoc. Prof. of Business Administration (1947, 1959). BS 1940, Kan. St. Teach. Col. (Emporia); MS 1948, Kan. St. Univ.; CPA 1956, Kansas. (GF)
- HOLLINGER, ROBERT D., Instr. in Business Administration (1966). BS 1964, MS 1968, Kan. St. 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 Tex. St. Univ.; DBA 1970, Tex. Tech. Univ. (GF)
- LANGE, MARITA K., Instr. in Business Administration (1972). BS 1971; MS 1972, Kan. St. Univ.
- LAUGHLIN, EUGENE J., Prof. of Business Administration (1955, 1970). BS 1951, Rockhurst Col.; MS 1959, Kan. St. Univ.; CPA 1960, Kan.; PhD 1965, Univ. of Ill. (GF)
- LYNN, ROBERT A., Dean, Prof. of Business Administration (1968). BS 1951, Maryville Col.; MS 1955, Univ. of Tenn.; PhD 1958, Univ. of Ill. (GF)
- McMANIS, DONALD L., Asst. Prof. of Business Administration (1970). BS 1949, MBA 1968, Univ. of Iowa, PhD 1971, Univ. of Neb.
- MAY, CAROLYN A., Instr. in Business Administration (1971). BS 1968, MS 1969, Okla. St. Univ.
- MILLER, JAMES J., Asst. Prof. of Business Administration (1973). BS 1964, MS 1965, Univ. of N. Dak.
- MULANAX, ALVIN E., Assoc. Prof. of Business Administration (1947, 1966). BS 1946, MS 1951, Kan. St. Univ. (GF)
- NIX, HAROLD M., Asst. Prof. of Business Administration (1972). BA 1967, MA 1969, Western St. Col.
- RAPP, CHARLES W., Asst. Prof. of Business Administration Emeritus (1955, 1968). BS 1931, MS 1946, Kan. St. Teach. Col. (Emporia).
- RICHARDS, VERLYN D., Assoc. Prof. of Business Administration (1965, 1969). BS 1956, MS 1960, Kan. St. Univ.; CPA 1961, Kansas; PhD 1967, Univ. of Ill.
- RILEY, MERRILL J., Asst. Prof. of Business Administration (1966). BS 1951, John Brown Univ.; MBA 1955, Univ. of Ark.
- STEWART, KAY C., Instr. in Business Administration (1972). BS, 1966, W. Va. Institute of Tech.; MS 1971, Ft. Hays St. Col.
- STOCKARD, JANE B., Instr. in Business Administration (1971). BS 1969, MS 1971, Kan. St. Univ.; CPA 1971, Kan.
- THIESSEN, EMIL A., Asst. Prof. of Business Administration (1968). AB 1948, Tabor Col.; MS 1951, Kan. St. Teach. Col. (Emporia); EdD 1959, Colo. St. Col.
- VADEN, RICHARD E., Asst. Prof. of Business Administration (1969). BBA 1960, The Univ. of Tex. at Austin; MBA 1965, DBA 1970, Tex. Tech. Univ. (GF)

## College of Education

- ALBRACHT, JAMES J., Assoc. Prof. of Education (1966, 1970). BS 1948, MS 1954, Univ. of Neb.; PhD 1966, Mich. St. Univ. (GF)
- ALEXANDER, LOREN R., Asst. Prof. of Education and Modern Languages (1972). BM 1951, Southwestern Col.; MA 1954, Colo. St. Col. of Education; MA 1965, PhD 1972, Mich. St. Univ.
- APEL, J. DALE, Assoc. Prof.; Assoc. State Club Leader (1962, 1967). BS 1950, Kan. St. Univ.; MS 1961, The American Univ.; PhD 1966, Univ. of Chicago. (GF)
- BAILEY, GERALD D., Asst. Prof. (1972). BS 1966, MEd 1969, EdD 1972, Univ. of Neb.
- BAKER, HARRY LEIGH, Prof. of Education Emeritus (1946, 1963). AB 1920, LLD 1951, Baker Univ.; BS 1922, Kan. St. 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 Kan. (GF)
- BLOOMQUIST, MARGARET CHRISTINE, Instr. in Education and Dir. 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, Fla. A & M Univ.; PhD 1969, Ohio St. Univ. (GF)
- BRADLEY, FRED O., Asst. Prof. (1972). BA 1962, Colo. St. Col.; MEd 1970, PhD 1972, Univ. of Wyo.
- BRADLEY, HOWARD RALEY, Assoc. Prof. of Education (1951, 1963). BS 1930; MS 1937, Kan. St. Univ. (GF)
- BYARS, JACKSON A., Asst. Prof. (1969). BA 1959, Municipal Univ. of Omaha; MA 1964, Colo. St. Col.; PhD 1970, Univ. of Neb. (GF)
- CAINE, HOMER D., Asst. Prof. of Education and Music (1966). BM 1940, Drake Univ.; MS 1957, Kan. St. Univ. (GF)
- CALVANO, MICHAEL A., Instr. (1972). BS 1968, Georgetown Univ.; Wash., D.C.; MS 1970, Univ. of Bridgeport (Conn.).
- CAMPBELL, ALBERT B., Asst. Prof. (1970). BS 1956, Ft. Hays Kan. St. Col.; MA 1963, Western St. (Colo.); EdD 1970, Ariz. St. Univ. (GF)
- CARPENTER, FRANK R., Asst. Dean, Col. of Agriculture; Assoc. Prof. (1961, 1969). BS 1948, MS 1951, Kan. St. Univ.; PhD 1967, Univ. of Mo.
- CLARK, EARL D., Assoc. Prof. (1972). BS 1954, MEd 1957, EdD 1969, Wayne St. Univ., Detroit, Mich. (GF)
- CLORE, ROBERT, Instr. (1970). BA 1968, MA 1970, Univ. of Northern Colo.
- CRAIG, M. DOROTHY, Asst. Prof. of Education Emeritus (1959, 1973). BS 1931, Bethany Col.; BS 1941, Kan. St. Teach. Col. (Emporia); MA 1944, Columbia Univ.
- DE MAND, JOHN WESLEY, Prof. of Education (1940, 1959). AB 1937, Univ. of Kan.; MS 1940, Kan. St. Univ.; EdD 1953, Univ. of Colo. (GF)
- DIXON, LYLE, Prof. of Mathematics (1963, 1969). BS 1948, MS 1950, Okla. St. Univ.; PhD 1963, Univ. of Kan. (GF)
- FIELD, RALPH G., Assoc. Prof. of Education (1972). BS 1950, MS 1966, Kan. St. Univ.; PhD 1970, Purdue Univ.
- FLANAGAN, BRUCE, Prof. of Speech (1966). BS 1953, Western Mich. Univ.; MS 1958, Southern Ill. Univ.; PhD 1966, Univ. of Fla. (GF)
- GOODENOW, PHILIP E., Asst. Instr. in Education (1967). BA 1953, Kan. Wesleyan (Salina).
- GREEN, FINIS McGRADY, Prof. of Education Emeritus (1948, 1967). BS 1922, Kan. St. Teach. Col. (Pittsburg); MS 1929, Univ. of Kan.; EdD 1949, Univ. of Colo. (GF)
- GRIFFITH, MARY EVAN, Assoc. Prof. (1969). BS 1950, Kan. St. Univ.; MS 1957, Iowa St. Univ.; PhD 1966, Ohio St. Univ.
- HALL, LAWRENCE FENOR, Assoc. Prof. of Education Emeritus (1926, 1966). BS 1923, MS 1927, Kan. St. Univ. (GF)



**HANNA, GERALD**, Assoc. Prof. (1967, 1972). AB 1956, MA 1959, Long Beach St. Col.; EdD 1965, Univ. of Southern Calif. (GF)

**HARRIS, JAMES L.**, Asst. Prof. of Education (1971). BS 1961, MS 1968, EdD 1970, Okla. St. Univ.

**HAUSE, RICHARD G.**, Assoc. Prof. of Education (1966, 1970). AB 1954, MA 1955, Colo. St. Col.; EdD 1966, Univ. of Colo. (GF)

**HAZLETT, EMERSON L.**, Instr. in Education, Economics and Commerce (1969). BS 1948, MS 1964, Univ. of Kan.

**HEINRICH, LAURA J.**, Instr. (1971). AB 1959, Kalamazoo Col., Mich.; AMLS 1968, MA 1970, Univ. of Mich.; PhD 1972, Univ. of Mich.

**HELLEBUST, GWEN L.**, Asst. Prof. (1972). BS 1953, Minot St. Col.; MA 1956, EdD 1971, Univ. of Northern Colo.

**HOLEN, MICHAEL C.**, Asst. Prof. of Education (1971). BA 1967, Stanford Univ.; MA 1968 and PhD 1971, Univ. of Ore.

**HOLLIS, JOHN**, Assoc. Prof. (1972). BA 1958, Wichita St. Univ.; MS 1963, Kan. St. Col. of Pittsburg; EdD 1968, Univ. of Kan. (GF)

**HOYT, DONALD P.**, Prof. and Dir. of Office of Educational Research (1968). BS 1948, Univ. of Illinois; MA 1950, PhD 1954, Univ. of Minn. (GF)

**HUDSON, WANDA L.**, Instr. in Education (1966). BS 1949, MEd 1957, Univ. of Tex.

**JAMES, ROBERT K.**, Asst. Prof. (1969). BS 1959, Northwest Mo. St.; 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 Neb.; MS 1956, PhD 1958, Univ. of Wis. (GF)

**JORNS, WILLIAM J.**, Asst. Prof. (1971). BS 1954, MS 1960, Kan. St. Univ.; EdD 1971, N.C. St. Univ.

**JULIAN, ROBERT E.**, Asst. Prof. of Education (1971). BS 1955, Kan. St. Univ.; MS 1967, Univ. of Ariz.

**KAISER, HERBERT EMIL**, Assoc. Prof. of Education (1961, 1969). BS 1941, Concordia Teachers Col.; MS 1943, Okla. St. Univ.; PhD 1959, Univ. of Neb. (GF)

**KASPER, EUGENE C.**, Dean of Students, Assoc. Prof. of Education (1968). BS 1956, MS 1956, Kansas St. Teach. Col.; EdD 1963, Univ. of N.D. (GF)

**KEYS, SAMUEL R.**, Prof. and Dean of Col. of Education (1969). AB 1948, Olivet Col., Kankakee, Ill.; MA 1949, Univ. of Mo.-Kansas City; PhD 1959, Univ. of Minn. (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, Ft. Hays Kan. St. Col.; EdD 1967, Univ. of Neb. (GF)

**LITTRELL, J. HARVEY**, Prof. of Education (1954, 1966). BA 1935, Iowa St. Teachers Col.; MA 1939, St. Univ. of Iowa; EdD 1950, Univ. of Mo. (GF)

**LITZ, CHARLES E.**, Asst. Prof. of Education (1971). BA 1963, Ohio Univ.; MA 1967, Univ. of Mich.; PhD 1970, Univ. of Mich. (GF)

**LOEB, JOE HENRY**, Asst. Prof. of Education (1956). BA 1948, Northeastern St. Col.; MS 1951, Kan. St. Teach. Col. (Pittsburg); EdD 1957, Univ. of Ark. (GF)

**MCANARNEY, HARRY EDWARD**, Assoc. Prof. of Education (1957, 1966). BS 1943, Kan. St. Teach. Col. (Emporia); MS 1947, EdD 1958, Univ. of Kan. (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, Mont. St. Univ.; LLD 1965, Colo. St. Univ.; DSc 1967, Andhra Pradesh St. Univ. (India). (GF)

**MCILVAINE, JOSEPH**, Asst. Prof. (1970). BS 1961, Pa. St. Univ.; MS 1967, Central Mo. St. Col.; PhD 1970, Ohio Univ. (GF)

**MEISNER, ROBERT G.**, Assoc. Prof. and Head, Department of Adult and Occupational Education (1969). BS 1948, Okla. A & M Col.; MS 1957, Okla. St. Univ.; EdD 1967, Univ. of Calif., Berkeley. (GF)

**MERRELL, JERRY L.**, Instr. (1972). BS 1962, MA 1964, Northeast Mo. St. Col.; EdS 1971, Central Mo. St. Col.

**MILLER, PAUL E.**, Instructor (1973). BS 1950, Ft. Hays Kan. St. Col.; MS 1965, Colo. St. Col. at Greeley.

**MOGGIE, MAURICE CHARLES**, Prof. of Education Emeritus (1930, 1945, 1973). BS 1929, MS 1931, Kan. St. Univ.; PhD 1941, Ohio St. Univ. (GF)

**MOORE, ARNOLD J.**, Prof. of Education and Head, Department of Curriculum and Instruction (1967). BA 1949, St. Col. of Iowa; MA 1955, PhD 1961, St. Univ. of Iowa. (GF)

**NELSON, WILLARD J.**, Instr. in Education (1971). AA 1952, Luther Junior Col.; BA 1954, Bethany Col.

**NEWHOUSE, ROBERT C.**, Asst. Prof. (1972). BS 1967, MA 1969, Western Mich. Univ.; PhD 1972, Univ. of Ore.

**NORDIN, MARGARET N.**, Assoc. Dean of Students and Dean of Women; Assoc. Prof. (1957). BS 1941, MA 1953, PhD 1962, Univ. of Minn.

**OLSON, GEORGE ARTHUR**, Prof. of Education Emeritus (1949, 1969). AB 1928, AM 1931, Univ. of Kan.; PhD 1953, Northwestern Univ. (GF)

**OWENS, RICHARD E.**, Assoc. Prof. of Education (1964, 1969). AB and BS 1949, Northwest Mo. St. Col.; MA 1953, EdD 1964, Univ. of Northern Colo.

**PAUL, WARREN I.**, Asst. Prof. of Education (1969). AB 1954, Rutgers, the State Univ.; AM 1966, Newark St. Col., Union, N.J.

**PRICE, FLOYD HAMILTON**, Assoc. Prof. of Education (1963, 1965). AB 1951, Friends Univ.; MEd 1957, Wichita St. Univ.; EdS 1960, George Peabody Col.; EdD 1965, Univ. of Oklahoma. (GF)

**RANKIN, CHARLES I.**, Instr. of Education (1971). BA 1964, Wichita Univ.; ME 1968, Wichita St. Univ.

**REPLOGLE, RENATA J.**, Instr. in Education and Art (1966). AB 1963, AM 1964, Colo. St. Col.

**RUST, LUCILE OSBORN**, Prof. of Education Emerita (1924, 1960). BS 1921, Kan. St. Teach. Col. (Pittsburg); MS 1922, Kan. St. Univ. (GF)

**SARTHORY, JOSEPH A.**, Assoc. Prof. of Education (1969). BA 1961, MA 1964, PhD 1967, Univ. of N.M. (GF)

**SCHELL, LEO M.**, Assoc. Prof. of Education (1966, 1969). AB 1955, Bethany Col.; MS 1962, Univ. of Kan.; PhD 1964, Univ. of Iowa. (GF)

**SCOTT, ROBERT**, Assoc. Prof. of Education (1970). AA 1951, Independence, Kan. Junior Col.; BS 1953, MS 1956, Kan. St. Teach. Col.; EdD 1965, Univ. of Mo. (GF)

**SMETHERS, HOWARD DEWIGHT**, Asst. Prof. of Education Emeritus (1947, 1972). BS 1927, Kan. St. Teach. Col. (Emporia); MS 1935, Kan. St. Univ.

**STEFFEN, JOHN D.**, Asst. Prof., Center for Student Development (1967). BA 1956, Hamline Univ.; PhD 1968, Univ. of Minn.

**SULLIVAN, RITA J.**, Instr. in Education (1966). BS 1956, Kan. St. Teach. Col. (Pittsburg); MS 1964, Univ. of Kan.

**TEAGUE, FRED A.**, Assoc. Prof. (1966, 1972). BS 1959, Central St. Col., Edmond, Okla.; EdM 1963, EdD 1966, Univ. of Okla. (GF)

**TRENNPOHL, HARLAN JEAN**, Assoc. Prof. of Education (1956, 1963). BS 1947, MS 1951, Kan. St. Teach. Col. (Emporia); EdD 1956, Univ. of Colo. (GF)

**UTSEY, JORDAN**, Assoc. Prof. of Education (1969). BA 1952, Col. of Idaho; MEd 1958, EdD 1963, Univ. of Ore. (GF)

**VAN METER, EDDY J.**, Asst. Prof. of Education (1971). BA 1968, Univ. of N.M.; MA 1969, EdD 1971, N.M. St. Univ. (GF)

**WILSON, ALFRED P.**, Assoc. Prof. of Education and Head, Dept. of Administration and Foundations of Education (1972). BS 1961, MEd 1965, EdD 1969, Utah St. Univ. (GF)

**WILSON, LAVISA K.**, Asst. Prof. (1972). BA 1959, Augustana Col.; MS 1961, Univ. of Neb., Omaha; PhD 1972, Univ. of Iowa.

**WISSMAN, JANICE R.**, Instr. in Education (1968). BS 1963, MS 1968, Kan. St. Univ.

**ZOLLMAN, DEAN A.**, Asst. Prof. (1970). BS 1964, MS 1965, Ind. Univ., Bloomington, Ind.; PhD 1970, Univ. of Md., College Park, Md.

## 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 N.M. (GF)

**AKINS, RICHARD GLENN**, Assoc. Prof. of Chemical Engineering (1963, 1967). BS 1957, MS 1958, Univ. of Louisville; PhD 1962, Northwestern Univ. (GF)

**ANNIS, JASON CARL**, Asst. Prof. of Mechanical Engineering, Assoc., Institute for Environmental Research (1959, 1969). BS 1953, Univ. of Minn.; MS 1956, Mich. Col. of Mining and Technology; PhD 1969, Kan. St. Univ. (GF)

**APPL, FREDERIC 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 Neb.

**AZER, NAIM ZAKE**, Prof. of Mechanical Engineering; Assoc., Institute for Environmental Research (1958, 1964, 1972). BS 1950, MS 1954, Univ. of Alexandria, Egypt; PhD 1959, Univ. of Ill. (GF)

**BALL, HERBERT DEAN**, Asst. Prof. of Mechanical Engineering (1958, 1972). BS 1952, MS 1958, Univ. of Neb.; PhD 1972, Kan. St. Univ. (GF)

**BATES, HERBERT TEMPLETON**, Prof. of Chemical Engineering (1958, 1960). BS 1935, Iowa St. Univ.; MS 1938, Va. Polytechnic Institute; PhD 1941, Iowa St. Univ. Professional Engineer, 1959. (GF)

**BAUGHER, EARL EUGENE**, Asst. Prof. of Agricultural Engineering (1967). BS 1958, MS 1964, Kan. St. Univ.

**BENNETT, CORWIN A.**, Prof. of Industrial Engineering; Assoc., Institute for Environmental Research (1970). BS 1950, Iowa St. Univ.; MA 1951, PhD 1954, Univ. of Neb. (GF)

**BEST, CECIL HAMILTON**, Prof. of Applied Mechanics; Assoc. Dean (1961, 1964, 1968). BS 1955, MS 1956, PhD 1960, Univ. of Calif. Professional Engineer, 1962. (GF)

**BRAINARD, BOYD BERTRAND**, Prof. of Mechanical Engineering Emeritus (1923, 1938, 1967). BS 1922, Univ. of Colo.; SM 1931, Mass. Institute of Technology, Professional Engineer, 1945.

**BUSSEY, LYNN E.**, Assoc. Prof. of Industrial Engineering (1971). BS 1947, Cornell Univ.; MS 1969, PhD 1970, Okla. St. Univ. Professional Engineer, 1948. (GF)

**BYERS, EARLE CONRAD**, Asst. Prof. of Industrial Engineering (1946, 1956). AB 1941, Greenville Col.; MS 1954, Kan. St. Univ.

**CALHOUN, MYRON AMMON**, Asst. Prof. of Computer Science and Electrical Engineering (1971). AA 1961, Graceland Col.; BS 1963, Univ. of Kan.; MS 1964, Colo. St. Univ.; PhD 1967, Ariz. St. Univ. (GF)

**CASEY, JR., KENDALL FRANCIS**, Assoc. Prof. of Electrical Engineering (1970). BS 1961, Calif. Institute of Technology; MS 1962, PhD 1965, Univ. of Southern Calif. (GF)

**CHUNG, DO SUP**, Assoc. Prof. of Agricultural Engineering (1965, 1966). BS 1958, Purdue Univ.; MS 1960, PhD 1965, Kan. St. Univ. (GF)

**CLACK, ROBERT WYNANDUS**, Asst. Prof. of Nuclear Engineering; Dir. 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, Kan. St. Univ.; PhD 1966, Purdue Univ. Professional Engineer, 1969. (GF)

**CLARK, STANLEY R.**, Instr. in Agricultural Engineering; Ag. Exp. Sta. (1969). BS 1969, MS 1971, Kan. St. Univ.

**CLIFTON, JOHN PAUL**, Assoc. Prof. of Industrial Engineering Emeritus (1947, 1956, 1971). BS 1929, Univ. of Kan.; MS 1956, Kan. St. Univ. Professional Engineer, 1956. (GF)

**CONVERSE, HARRY H.**, Assoc. Prof. of Agricultural Engineering (1966). BS 1946, MS 1947, Kan. St. 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 Kan. Professional Engineer in Kan., 1947; in Mo., 1952. (GF)

**CRANK, ROBERT EUGENE**, Prof. of Mechanical Engineering (1947, 1969). BS 1947, MS 1950, Kan. St. Univ. Professional Engineer, 1949. (GF)

**CRARY, JAMES FRED**, Asst. Prof. of Applied Mechanics (1947, 1952). BS 1949, Kan. St. Univ.; MS 1969, Okla. St. Univ. Professional Engineer, 1948.

**CRAWFORD, WILLIAM WESLEY**, Assoc. Prof. of Civil Engineering Emeritus (1923, 1942, 1949). BDI 1903, MDI 1905, Iowa St. Teachers Col.; AB 1912, BS 1917, Iowa St. Univ.



- DARBY, EARL G.**, Prof. of Industrial Arts Emeritus (1941, 1952, 1963). BS 1923, MS 1943, Kan. St. Univ.
- DIETRICH, HARVEY F.**, Asst. Prof. of Industrial Arts Emeritus (1948, 1957, 1967). BS 1957, Kan. St. Univ.
- DOLLAR, JOHN PAUL**, Instr. in Electrical Engineering (1960). BS 1956, MS 1966, Kan. St. 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, 1952). BS 1937, MS 1949, Kan. St. Univ. Professional Engineer, 1948. (GF)
- DURLAND, MERRILL AUGUSTUS**, Dean and Director Emeritus; Prof. of Mechanical Engineering Emeritus (1919, 1961, 1967). BS 1918, MS 1923, Kan. St. Univ. Professional Engineer, 1935.
- EBELING, KENNETH A.**, Instr. in Industrial Engineering (1972). BS 1965, MS 1967, N.D. St. Univ.
- ECKHOFF, N. DEAN**, Assoc. Prof. of Nuclear Engineering; Director of Neutron Activation Analysis Laboratory (1961, 1968, 1972). BS 1961, MS 1963, PhD 1968, Kan. St. Univ. (GF)
- ERICKSON, LARRY EUGENE**, Prof. of Chemical Engineering (1964, 1972). BS 1960, PhD 1964, Kan. St. Univ. (GF)
- FAIRBANKS, GUSTAVE EDMUND**, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1941, 1957). BS 1941, MS 1950, Kan. St. Univ. Professional Engineer, 1948. (GF)
- FAN, LIANG-TSENG**, Prof.; Head, Department of Chemical Engineering; Dir., Institute for Systems Design and Optimization; Kan. Power and Light Distinguished Prof.; Assoc., Institute for Environmental Research (1957, 1963, 1967). BS 1951, National Taiwan Univ.; MS 1954, Kan. St. Univ.; MS 1958, PhD 1957, West Va. Univ. (GF)
- FAW, RICHARD EARL**, Prof.; Head, Department of Nuclear Engineering; Director of Shielding Facility (1962, 1966, 1968, 1972). BS 1959, Univ. of Cincinnati; PhD 1962, Univ. of Minn. (GF)
- FENTON, FREDERICK CHARLES**, Prof. of Agricultural Engineering Emeritus; Ag. Exp. Sta. (1928, 1961). BS 1914, MS 1930, Iowa St. Univ. Professional Engineer, 1947.
- FLINNER, ARTHUR ORAN**, Prof. of Mechanical Engineering (1929, 1947). BS 1929, MS 1934, Kan. St. Univ.; SM 1937, Mass. Institute of Technology. Professional Engineer, 1937. (GF)
- FOSTER, GEORGE H.**, Prof. of Agricultural Engineering (1973). BS 1939, 1953; MS 1942, Kan. St. Univ. U.S.D.A. Grain Marketing Research Center.
- FRAZIER, FORREST FAYE**, Prof. of Civil Engineering Emeritus (1911, 1922, 1954). BS 1910, Ohio St. 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 St. Univ. (GF)
- GERDIS, THOMAS A.**, Instr.; Engineering News Editor (1970). BA 1963, Evangel Col.; MS 1970, Kan. St. Univ.
- GORTON, ROBERT LESTER**, Assoc. Prof. of Mechanical Engineering; Assoc., Institute for Environmental Research (1960, 1969). BS 1953, Louisiana Polytechnic Institute; MS 1960, Louisiana St. Univ.; PhD 1966, Kan. St. 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, Kan. St. Univ.; PhD 1965, Okla. St. Univ. (GF)
- GROSH, DORIS LLOYD**, Asst. Prof. of Industrial Engineering (1965, 1968). BS 1946, Univ. of Chicago; MS 1949, PhD 1969, Kan. St. Univ. (GF)
- GROSH, LOUIS E.**, Assoc. Prof. of Industrial Engineering (1965, 1966). BS 1944, La. St. 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 Wis. Professional Engineer in Wis., 1952. (GF)
- HALL, RAYMOND CLARENCE**, Asst. Prof. of Chemical Engineering (1950, 1952). BS 1941, Iowa St. Univ.; MS 1951, Kan. St. Univ. (GF)
- HANSEN, CARL ULLMAN**, Asst. Prof. of Industrial Engineering (1957, 1962). BS 1936, Kan. St. Univ.; MS 1961, Univ. of Neb. Professional Engineer, 1961.
- HARRIS, FLOYD WAYNE**, Assoc. Prof. of Electrical Engineering (1965, 1969). BS 1956, Univ. of Okla.; MS 1962, PhD 1965, Okla. St. Univ. (GF)
- HAY, DELYNN RODNEY**, Asst. Prof. of Extension Agricultural Engineering (1971). BS 1966, Univ. of Neb.; MS 1967, Univ. of Neb.
- HEARN, JR., NORVAL KELLY**, Instr. in Electrical Engineering (1969). BA 1957, Kan. St. Teachers Col.; MS 1966, Kan. St. Univ.
- HELANDER, LINN**, Prof. of Mechanical Engineering Emeritus (1935, 1961). BS 1915, Univ. of Ill. Professional Engineer, 1941.
- HERPICH, RUSSELL LOUIS**, Prof. of Extension Agricultural Engineering (1951, 1966). BS 1950; MS 1953, Kan. St. Univ.
- HIGHTOWER, RAY E.**, Asst. Prof. of Nuclear Engineering (1961, 1969). BS 1964, Kan. St. Univ.
- HOBBSON, LELAND STANFORD**, Prof. of Mechanical Engineering Emeritus (1946, 1968, 1972). BS 1927, Kan. St. Univ. Professional Engineer, 1946.
- HODGES, TEDDY OMAR**, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1959). BS 1950, Tex. A & M; MS 1951, Iowa St. Univ.; PhD 1959, Mich. St. 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, Kan. St. Univ.; PhD 1956, Iowa St. Univ. Professional Engineer, 1948. (GF)
- HOSTETTER, ABRAHELDRED**, Prof. of Industrial Engineering Emeritus (1931, 1952, 1969). BS 1925, McPherson Col.; MS 1932, PhD 1938, Kan. St. Univ.
- HU, KUO-KUANG**, Asst. Prof. of Applied Mechanics (1968, 1969). Graduation, 1956, Taiwan Provincial Taipei Institute of Technology; MS 1966, PhD 1969, Kan. St. Univ. (GF)
- HUANG, CHI-LUNG**, Assoc. Prof. of Applied Mechanics (1964, 1968). BS 1954, National Taiwan Univ.; MS 1960, Univ. of Ill.; Doctor of Engineering 1964, Yale Univ. (GF)
- HUMMELS, DONALD RAY**, Asst. Prof. of Electrical Engineering (1970). BS 1967, MS 1967, PhD 1969, Ariz. St. Univ. (GF)
- HUNT, ORVILLE DON**, Prof. of Electrical Engineering Emeritus (1923, 1947, 1970). BS 1923, Wash. St. Univ.; MS 1930, Kan. St. Univ. Professional Engineer, 1947.
- HWANG, CHING-LAI**, Assoc. Prof. of Industrial Engineering; Assoc., Institute for Environmental Research (1964, 1968, 1972). BS 1953, National Taiwan Univ.; MS 1960, PhD 1962, Kan. St. Univ. (GF)
- JEPSEN, RICHARD LOUIS**, Asst. Prof. of Extension Agricultural Engineering (1963, 1965). BS 1950, MS 1963, Kan. St. Univ.
- JOHNSON, GARY LEE**, Asst. Prof. of Electrical Engineering (1966). BS 1961, MS 1963, Kan. St. Univ.; PhD 1966, Okla. St. Univ. (GF)
- JOHNSON, WILLIAM H.**, Prof.; Head, Department of Agricultural Engineering (1970). BS Agriculture, BS Agricultural Engineering 1948, MS 1953, Ohio St. Univ.; PhD 1960, Mich. St. Univ. Professional Engineer in Ohio, 1970. (GF)
- JORGENSEN, LOUIS**, Prof. of Electrical Engineering Emeritus (1925, 1951, 1954). BS 1907, MS 1931, Kan. St. Univ.
- KAUFMAN, DALE EDWARD**, Assoc. Prof. of Electrical Engineering (1965, 1972). BS 1959, MS 1963, PhD 1967, Kan. St. Univ. (GF)
- KERCHNER, RUSSELL MARION**, Prof. of Electrical Engineering Emeritus (1922, 1934, 1965). BS 1922, Univ. of Ill.; MS 1927, Kan. St. 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 Kan.; PhD 1968, Okla. St. Univ. Professional Engineer, 1960. (GF)
- KIRMSEER, PHILIP GEORGE**, Prof. of Mathematics; Prof.; Head of Department of Applied Mechanics (1942, 1958, 1962). BS 1939, MS 1944, PhD 1958, Univ. of Minn. Professional Engineer, 1961. (GF)
- KLOEFFLER, ROYCE GERALD**, Prof. of Electrical Engineering Emeritus (1916, 1923, 1960). BS 1913, Univ. of Mich.; MS 1930, Mass. Institute of Technology. Registered Engineer, 1945.
- KNOSTMAN, HARRY DANIEL**, Asst. Prof. of Applied Mechanics (1957, 1965). BS 1951, MS 1961, Kan. St. Univ.; PhD 1965, Univ. of Colo. Professional Engineer, 1959. (GF)
- KOEPSSEL, WELLINGTON WESLEY**, Prof.; Head, Department of Electrical Engineering (1964). BS 1944, MS 1951, The Univ. of Tex.; PhD 1960, Okla. St. Univ. Professional Engineer in Tex., 1952. (GF)
- KONZ, STEPHAN ANTHONY**, Prof. of Industrial Engineering; Assoc., Institute for Environmental Research (1964, 1969). BS 1956, MBA 1956, Univ. of Mich.; MS 1960, St. Univ. of Iowa; PhD 1964, Univ. of Ill. (GF)
- KRICK, MERLYN S.**, Asst. Prof. of Nuclear Engineering (1970). BS 1959, Albright Col.; PhD 1966, Univ. of Pa. (GF)
- KYLE, BENJAMIN GAYLE**, Prof. of Chemical Engineering (1958, 1964). BS 1950, Ga. Institute of Technology; MS 1955, PhD 1958, Univ. of Fla. (GF)
- LARSON, GEORGE HERBERT**, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1939, 1950). BS 1939, MS 1940, Kan. St. Univ.; PhD 1955, Mich. St. Univ. Professional Engineer, 1947. (GF)
- LEE, E. STANLEY**, Prof. of Industrial Engineering (1966, 1970). BS 1953, Ordnance Engineering Col., China; MS 1957, N.C. St. Col.; PhD 1962, Princeton Univ. (GF)
- LENNERT, DONALD HOWARD**, Assoc. Prof. of Electrical Engineering (1966, 1969). BS 1956, Kan. St. Univ.; MS 1958, Syracuse Univ.; PhD 1966, Univ. of N.M. (GF)
- LINDHOLM, JOHN C.**, Assoc. Prof. of Mechanical Engineering (1960). BS 1949, Kan. St. Univ.; MS 1957, Univ. of Kan.; PhD 1961, Purdue Univ. Professional Engineer, 1954. (GF)
- LINDLY, EDWIN CURGUS**, Assoc. Prof. of Applied Mechanics (1949, 1965). BS 1942, Okla. St. Univ.; MS 1949, Purdue Univ.; MS 1957, Kan. St. Univ.; PhD 1964, Iowa St. Univ. Professional Engineer, 1950. (GF)
- LIPPER, RALPH IDEN**, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1946, 1972). BS 1941, MS 1950, Kan. St. 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, 1971). BS 1949, MS 1959, Kan. St. Univ.; PhD 1969, Okla. St. Univ. Professional Engineer, 1960. (GF)
- MATTHEWS, JOHN CARTER**, Assoc. Prof. of Chemical Engineering (1962). BS 1959, DSc 1965, Wash. Univ. (GF)
- MCCALLUM, BRUCE KENNEDY**, Instr. in Civil Engineering (1972). BS 1968, MS 1972, Kan. St. Univ.
- MCCORMICK, FRANK JAMES**, Prof. of Applied Mechanics (1939, 1947). BS 1927, MS 1931, Iowa St. Univ. Professional Engineer, 1944. (GF)
- MCDONALD, CHARLES RICHARD**, Instr. in Applied Mechanics (1969). BS 1960, Kan. St. Univ. Professional Engineer in Ill., 1964, in Ind., 1966.
- MCINTY, RALPH J.**, Asst. Prof. of Agricultural Engineering (1969). BS 1959, MS 1960, Kan. St. 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 Col. of N.Y.; PhD 1963, Univ. of Minn. (GF)
- MESSENHEIMER, ALVA ERNEST**, Assoc. Prof. of Mechanical Engineering Emeritus (1942, 1963, 1971). BS 1924, Kan. St. Univ. Professional Engineer, 1948.
- MILLER, PAUL LEROY**, Prof.; Asst. Head, Department of Mechanical Engineering; Dir. of Center for Effective Teaching; Assoc., Institute for Environmental Research (1958, 1968, 1969, 1972). BS 1957, MS 1961, Kan. St. Univ.; PhD 1966, Okla. St. Univ. Professional Engineer, 1962. (GF)
- MINGLE, JOHN ORVILLE**, Prof. of Nuclear Engineering; Dir., Institute for Computational Research in Engineering (1956, 1965). BS 1953, MS 1958, Kan. St. Univ.; PhD 1960, Northwestern Univ. Professional Engineer, 1961. (GF)
- MORSE, REED FRANKLIN**, Prof. of Civil Engineering Emeritus (1923, 1945, 1968). BA 1921, Cornell Col.; BS 1923, Iowa St. Univ.; MS 1933, Kan. St. Univ.; PhD 1941, Cornell Univ. Professional Engineer, 1939.
- MUNGER, HAROLD HAWLEY**, Assoc. Prof. of Applied Mechanics Emeritus (1939, 1954, 1961). BS 1939, MS 1941, Kan. St. Univ. Professional Engineer, 1941.
- MURPHY, JAMES PATRICK**, Asst. Prof. of Extension Agricultural Engineering (1971). BS 1968, MS 1970, Kan. St. Univ.
- NELSON, CLARENCE LESLIE**, Instr. in Industrial Engineering Emeritus (1943, 1972).
- NESMITH, DWIGHT ALVIN**, Assoc. Prof. of Engineering; Dir., Engineering Exp. Sta. (1948, 1958, 1969). BS 1948, Northwestern Univ.; MS 1952, Kan. St. Univ. Professional Engineer, 1962.



**PAULI, ROSS IRWIN**, Asst. Prof. of Mechanical Engineering (1947, 1954). BA 1941, Westmar Col.; MS 1947, Kan. St. Col. of Pittsburg.

**POPE, DAVID LEE**, Asst. Prof. of Extension Agricultural Engineering (1971). BS 1970, MS 1971, Okla. St. Univ.

**RETZLOFF, DAVID G.**, Asst. Prof. of Chemical Engineering (1969). BS 1963, MS 1965, PhD 1967, Univ. of Pittsburgh. (GF)

**ROHLES, JR., FREDERICK HENRY**, Prof. of Mechanical Engineering; Assoc. Dir., Institute for Environmental Research (1963, 1965). BS 1942, Roosevelt Univ., Chicago; MA 1949, PhD 1956, Univ. of Tex. (GF)

**ROSEBRAUGH, VERNON HART**, Assoc. Prof. of Civil Engineering (1953, 1954). BS 1933, Ore. Institute of Technology; BS 1938, Ore. St. Univ.; MA 1952, Univ. of Portland; CE 1956, Ore. St. Univ. Professional Engineer, 1954. (GF)

**ROTH, THOMAS A.**, Asst. Prof. of Industrial Engineering (1965). BS 1960, MS 1961, PhD 1967, Univ. of Wis. (GF)

**SCHINDLER, DALE EUGENE**, Assoc. Prof. of Extension Agricultural Engineering (1955, 1966). BArch 1953, MS 1960, Kan. St. Univ.

**SCHMID, LAWRENCE A.**, Assoc. Prof. of Civil Engineering (1968, 1972). BS 1962, MS 1963, Iowa St. Univ.; PhD 1968, Univ. of Kan. Professional Engineer, 1969. (GF)

**SELBY, WALTER ELLSWORTH**, Assoc. Prof. of Extension Agricultural Engineering (1944, 1969). BS 1929, Kan. St. Univ.; MS 1957, Univ. of Neb.

**SHULTIS, J. KENNETH**, Asst. Prof. of Nuclear Engineering (1970). BASC 1964, Univ. of Toronto; MS 1965, PhD 1968, Univ. of Mich. (GF)

**SITZ, EARL LEROY**, Prof. of Electrical Engineering Emeritus (1927, 1948, 1969). BS 1927, Iowa St. Univ.; MS 1932, Kan. St. Univ. Professional Engineer, 1947.

**SMALTZ, JACOB JAY**, Prof. of Industrial Engineering (1939, 1952). BS 1939, Bradley Polytechnic Institute; MS 1946, Kan. St. Univ. Professional Engineer, 1960. (GF)

**SMITH, BOB LEE**, Prof. of Civil Engineering (1948, 1965). BS 1948, MS 1953, Kan. St. Univ.; PhD 1964, Purdue Univ. Professional Engineer, 1953. (GF)

**SMUTZ, FLOYD ALONZO**, Prof. of Mechanical Engineering Emeritus (1918, 1934, 1960). BS 1914, Kan. St. Univ.

**SNELL, ROBERT ROSS**, Prof.; Head, Civil Engineering (1957, 1968, 1972). BS 1954, MS 1960, Kan. St. 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 Ill.; PhD 1968, Purdue Univ. (GF)

**SPRAGUE, CLYDE HOWARD**, Assoc. Prof. of Mechanical Engineering; Assoc. Institute for Environmental Research (1963, 1970). BS 1958, MS 1963, Kan. St. Univ.; PhD 1968, Purdue Univ. (GF)

**STEPHENS, LYLE EUGENE**, Prof. of Agricultural Engineering (1973). BS 1966, MS 1968, PhD 1971 Kan. St. Univ. U.S.D.A. Grain Marketing Research Center.

**STEVENSON, PAUL NELSON**, Assoc. Prof. of Agricultural Engineering (1957). BS 1948, Univ. of Mo.; MS 1957, Iowa St. Univ. (GF)

**SWARTZ, STUART ENDISLEY**, Assoc. Prof. of Civil Engineering (1968, 1972). BS 1959, MS 1962, PhD 1968, Ill. Institute of Technology. Professional Engineer, 1970. (GF)

**SWEARINGEN, THOMAS BURKE**, Assoc. Prof. of Mechanical Engineering (1965, 1971). BS 1954, Kan. St. Univ.; MS 1961, Wash. St. Univ.; PhD 1969, Univ. of Ariz. Professional Engineer, 1958. (GF)

**TAYLOR, DELOS CLIFTON**, Prof. of Applied Mechanics Emeritus (1931, 1956, 1970). BS 1925, MS 1937, Kan. St. Univ. Professional Engineer, 1948.

**TENEYCK, GEORGE ROBERT**, Asst. Prof. of Agricultural Engineering; Superintendent, Sandyland Experiment Field (1964, 1970, 1972). BS 1951, MS 1970, Kan. St. 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. Dir., Institute for Systems Design and Optimization (1965, 1966, 1969). BS 1960, MS 1961, Univ. of Mo.; PhD 1965, St. Univ. of Iowa. (GF)

**TRIPP, WILSON**, Prof. of Mechanical Engineering (1936, 1947). BS 1930, MS 1933, Univ. of Calif.; PhD 1956, Univ. of Ill. Professional Engineer, 1946. (GF)

**TURNQUIST, RALPH OTTO**, Assoc. Prof. of Mechanical Engineering (1959, 1969). BS 1952, MS 1961, Kan. St. Univ.; PhD 1965, Case Institute of Technology. (GF)

**VERSER, FORT A.**, Instr. in Nuclear Engineering; Dir., Office of Civil Defense, Professional Advisory Service Center (1970). BS 1948, MS 1950, Tex. A & M; MS 1960, U.S. Naval Post Graduate School.

**WAKABAYASHI, ISAAC**, Instr. in Electrical Engineering (1955). BS 1954, Univ. of Calif.

**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, Kan. St. Univ.

**WALKER, HUGH SANDERS**, Assoc. Prof. of Mechanical Engineering; Assoc. Director, Institute for Computational Research in Engineering (1964, 1968). BS 1957, MS 1960, La. St. Univ.; PhD 1965, Kan. St. Univ. (GF)

**WALLACE, DOUGLAS A.**, Asst. Prof. of Civil Engineering (1971). BS 1960, Univ. of Ill.; MS 1968, PhD 1971, Univ. of Iowa. Professional Engineer, 1965. (GF)

**WARD, JR., JOSEPH EVANS**, Prof. of Electrical Engineering (1940, 1961). BS 1937, The Univ. of Tex.; MS 1940, Univ. of Ill. Professional Engineer, 1948. (GF)

**WENDLING, LEO THEODORE**, Prof. of Extension Agricultural Engineering (1947, 1965). State Leader 1969; BS 1947, MS 1956, Kan. St. Univ.

**WILLIAMS, WAYNE WATSON**, Assoc. Prof. of Civil Engineering (1965). BS 1951, MS 1953, Iowa St. 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, Kan. St. Univ.; MS 1961, PhD 1968, Univ. of Mo. (GF)

**WRIGHT, EARL B.**, Instr. in Agricultural Engineering (1970). BS 1960, Kan. St. Univ.; MS 1969, Colo. St. Univ.

**ZOVNE, JEROME J.**, Asst. Prof. of Civil Engineering (1970). BS 1965, MS 1966, Univ. of Wis.; PhD 1970, Ga. Institute of Technology. Professional Engineer, 1972. (GF)

## College of Home Economics

**AGAN, ANNA TESSIE**, Assoc. Prof. of Family Economics Emerita; Agr. Exp. Sta. (1929, 1944, 1968). BS 1927, Univ. of Neb.; MS 1930, Kan. St. Univ. (GF)

**ALDOUS, CORAL KERR**, Assoc. Prof. of Family and Child Development Emerita (1940, 1958). BS 1911, Utah St. Agricultural Col.; MA 1940, Columbia Univ. (GF)

**ANNIS, PATTY SMITH**, Asst. Prof. of Family Economics; Agr. Exp. Sta. (1958, 1961). BS 1955, Miss. St. Col. for Women; MS 1957, Univ. of Tennessee. (GF)

**BARFOOT, DOROTHY**, Prof. of Art Emerita (1930, 1962, 1966). BSA, St. Univ. of Iowa; MA 1928, Columbia Univ. (GF)

**BARNES, JANE WILSON**, Asst. Prof. Emerita (1939, 1963). BS 1912, MS 1932, Kan. St. Univ. (GF)

**BELLEAU, BONNIE D.**, Instr. of Clothing, Textiles and Interior Design (1972). BS 1970, Univ. of Southwestern La.; MS 1972, La. St. Univ.

**BERGEN, BETSY**, Asst. Prof. of Family and Child Development (1966, 1972). AB 1949, Ottawa Univ.; MS 1964, PhD 1972, Kan. St. Univ. (GF)

**BOLLMAN, STEVE RAY**, Assoc. Prof. of Family and Child Development; Agr. Exp. Sta. (1966, 1969). BS 1957, MS 1963, PhD 1966, Iowa St. Univ. (GF)

**BOWERS, JANE RAYMOND**, Assoc. Prof. of Foods and Nutrition; Agr. Exp. Sta. (1966). BS 1962, MS 1963, PhD 1967, Kan. St. Univ. (GF)

**BRANSUM, SHELBA Y.**, Instr. of Family and Child Development (1971). BS 1970, MA 1971, Okla. St. Univ.

**BROCKMAN, HELEN L.**, Prof. of Clothing, Textiles and Interior Design (1967). BA 1926, Univ. of Iowa. (GF)

**BROWNING, NINA M.**, Assoc. Prof. of Foods and Nutrition Emerita (1930, 1943, 1970). BS 1923, MS 1927, Kan. St. Univ. (GF)

**CAUL, JEAN FRANCES**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1967). AB 1937, Lake Erie Col.; MA 1938, PhD 1942, Ohio St. Univ. (GF)

**COLEMAN, KATHERINE D.**, Instr. of Clothing, Textiles and Interior Design (1969, 1970). BS 1948, Univ. of Kan.; MS 1970, Kan. St. Univ.

**CORMANY, ESTHER MARGARET**, Assoc. Prof. of Clothing, Textiles and Interior Design; Agr. Exp. Sta. (1936, 1941). BS 1926, MS 1932, Kan. St. Univ. (GF)

**CRAIGIE, BARBARA**, Asst. Prof. of Clothing, Textiles, and Interior Design (1954, 1963). BA 1932, Univ. of Minn.; MA 1942, Univ. of Mo. (GF)

**DOLLAR, DIANE A.**, Instr. of Clothing, Textiles and Interior Design (1970). BS 1955, MA 1967, Kan. St. 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 St. Univ.; PhD 1959, Mich. St. Univ. (GF)

**GLASSCOCK, MARLENE K.**, Instr. of Family and Child Development (1972). BA 1969, MS 1970, Kan. St. Univ.

**HARRISON, DOROTHY LUCILE**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1947, 1963). BS 1938, Dakota Wesleyan Univ.; MS 1943, PhD 1947, Iowa St. Univ. (GF)

**HESS, KATHARINE PADDOCK**, Assoc. Prof. of Clothing and Textiles Emerita (1925, 1950). BS 1900, MS 1925, Kan. St. Univ. (GF)

**HILL, OPAL BROWN**, Assoc. Prof. of Clothing, Textiles and Interior Design Emerita (1944, 1954, 1965, 1969). BS 1944, MS 1950, Kan. St. Univ. (GF)

**HOEFELIN, RUTH**, Assoc. Dean; Prof. of Home Economics (1957, 1960). BS 1940, Iowa St. Univ.; MA 1945, Univ. of Mich.; PhD 1950, Ohio St. Univ. (GF)

**HOFFMAN, DORETTA**, Dean, Prof. of Home Economics; Assoc. Dir., Agr. Exp. Sta. (1954). BS 1941, Univ. of Neb.; MS 1943, Mich. St. Univ.; PhD 1949, Cornell Univ.; DSc 1966, Univ. of Neb. (GF)

**HOWE, HAZEL DELL**, Assoc. Prof. of Clothing and Textiles Emerita (1936, 1947, 1967). BS 1921, MS 1935, Kan. St. Univ. (GF)

**JURICH, ANTHONY P.**, Asst. Prof. of Family and Child Development (1972). BS 1969, Fordham Univ.; MS 1971, PhD 1972, Pa. St. Univ.

**KELL, LEONE POWER**, Prof. of Family and Child Development Emerita; Agr. Exp. Sta. (1927, 1947, 1965). BS 1923, MS 1928, Kan. St. Univ. (GF)

**KENNEDY, CARROLL E.**, Prof. of Family and Child Development (1970). AB 1949, Wheaton Col.; MS 1953, Kan. St. Univ.; EdD 1963, Univ. of Md. (GF)

**KILBOURNE, JUANITA N.**, Prof. of Clothing, Textiles and Interior Design (1968). BS 1944, Kan. St. Col. at Pittsburg; MS 1948, PhD 1960, N. Y. Univ.

**KRAMER, MARTHA MORRISON**, Prof. of Home Economics Emerita (1922, 1960). BS 1916, Univ. of Chicago; MS 1919, PhD 1922, Columbia Univ. (GF)

**LATZKE, ALPHIA CORINNE**, Prof. of Clothing and Textiles Emerita (1927, 1960, 1965). BS 1919, MS 1928, Kan. St. Univ. (GF)

**LIENKAEMPER, GERTRUDE ELISE**, Assoc. Prof. of Clothing and Textiles Emerita (1941, 1948, 1966). BS 1921, Ore. St. Col.; MA 1938, Univ. of Wash. (GF)

**MCCARTY, CATHERINE M.**, Asst. Prof. of Foods and Nutrition (1972). BS 1953, Univ. of Wis.; MS 1963, Univ. of Kan.

**MCCORD, IVALEE HEDGE**, Prof. of Family and Child Development (1957, 1963). BS 1933, MS 1951, Kan. St. 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)

**MORRIS, EARL W.**, Assoc. Prof. of Family Economics (1972). BA 1960, MS 1963, Western Mich. Univ.; PhD 1969, Cornell Univ. (GF)

**MORSE, RICHARD L. D.**, Prof.; Head, Department of Family Economics; Agr. Exp. Sta. (1955). BA 1938, Univ. of Wis.; PhD 1942, Iowa St. Univ. (GF)

**MULLEN, IVA MANILLA**, Asst. Prof. of Foods and Nutrition Emerita (1936, 1964). BS 1925, Kan. St. Univ.; MS 1928, Iowa St. Univ. (GF)



MUNSON, DEANNA M., Instr. of Clothing, Textiles and Interior Design (1967). BS 1966, MS 1967, Kan. St. Univ.

NEWBY, FRANCES ANN, Asst. Prof. of Clothing, Textiles and Interior Design (1963, 1971). BFA 1961, Kan. City Art Institute; MA 1970, Kan. St. Univ.

NEWELL, KATHLEEN, Asst. Prof. of Foods and Nutrition (1962). BS 1944, Kan. St. Univ.; MS 1951, Univ. of Wis.

PELLETIER, PAUL C., Asst. Prof. of Family and Child Development (1972). BA 1949, Sacred Heart Seminary; STL 1953, Gregorian Univ.; MSW 1958, Catholic Univ. of America.

PETERSON, MARY D., Instr. of Clothing, Textiles and Interior Design (1968). BS 1958, MS 1959, Univ. of Tenn.

PORESKY, ROBERT H., Asst. Prof. of Family and Child Development (1972). AB 1963, MS 1967, PhD 1969, Cornell Univ. (GF)

RAFFINGTON, MARGARET ELIZABETH, Asst. Prof. of Family and Child Development Emerita (1938, 1939, 1966, 1970). BS 1924, MS 1928, Kan. St. Univ.; Professional Diploma, 1954, Columbia Univ.

RASMUSSEN, ALBIE C., Asst. Prof. of Family Economics (1966, 1967). BS 1942, Univ. of Alaska; MS 1964, Kan. St. Univ.

REEHLING, JEAN ELIZABETH, Asst. Dean; Asst. Prof. of Home Economics (1964, 1967). BS 1962, Kan. St. Univ.; MA 1963, Colo. St. Col.

RIEMANN, NANCY E., Instr. of Family Economics (1969). BS 1963, Mich. St. Univ.; MS 1968, Kan. St. Univ.

ROACH, FAITH RUSSELL, Instr. of Institutional Management (1965). BS 1947, MS 1966, Kan. St. Univ.

ST. JOHN, WAYNE L., Assoc. Prof. of Clothing, Textiles and Interior Design (1972). BS 1948, Univ. of Ill.; MS 1950, Northwestern Univ.; PhD 1952, Univ. of Ore. (GF)

SEGO, R. JEAN WHEELER, Asst. to Dean; Instr. of Home Economics (1967). BA 1960, Friends Univ.; MS 1967, Kan. St. Univ.

SHUGART, GRACE SEVERANCE, Prof.; Head, Department of Institutional Management; Agr. Exp. Sta. (1951, 1961). BS 1931, St. Col. of Wash.; MS 1938, Iowa St. Univ. (GF)

SISTRUNK, JOAN N., Instr. of Family and Child Development (1970). BS 1951, Kan. St. Univ.; MS 1956, Univ. of Minn.

STITH, MARJORIE MAY, Prof.; Head, Department of Family and Child Development; Agr. Exp. Sta. (1961). BS 1943, Ala. St. Col. for Women; MS 1958, PhD 1961, Fla. St. Univ. (GF)

SUKIENNIK, CORRINE A., Instr. of Clothing, Textiles and Interior Design (1972). BS 1970, Buffalo St. Univ.; MS 1972, Fla. St. Univ.

TINKLIN, GWENDOLYN LAVERNE, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1943, 1956). BS 1940, MS 1944, Kan. St. Univ. (GF)

TURNER, KAREN S., Instr. of Home Economics (1972). BSE 1971, Kan. St. Teachers Col.; MS 1972, Kan. St. Univ.

VADEN, ALLENE G., Instr. of Institutional Management (1971). BS 1960, Univ. of Tex. MS 1967, Tex. Technological Col.

VINCENT, MARY JANE, Assoc. Prof. of Family and Child Development (1972). AA 1947, Graceland Col.; BA 1949, MA 1961, Univ. of Calif.; EdD 1966, Univ. of Idaho. (GF)

WAKEFIELD, LUCILLE MARIAN, Prof.; Head, Department of Foods and Nutrition; Agr. Exp. Sta. (1966). BS 1949, MS 1956, Univ. of Conn.; PhD 1965, Ohio St. Univ. (GF)

WEST, BESSIE BROOKS, Prof. of Institutional Management Emerita (1928, 1940). AB 1924, Univ. of Calif.; MS 1951, Mich. St. Normal Col. (GF)

WILLIAMS, JENNIE, Prof. of Family and Child Development Emerita (1932, 1959). BS 1920, MS 1933, Kan. St. Univ.; Graduate, 1925, Univ. of Mich. School of Nursing. (GF)

## College of Veterinary Medicine

ANDERSON, NANCY K., Asst. Instr. of Virology, Diag. Lab. (1972). BS 1969, Stanford Univ.; MS 1971, Univ. of Okla.

ANDERSON, NEIL V., Assoc. Prof. of Comparative Gastroenterology (1967, 1970). Clinical Research Scientist. BS 1953, Mankato St. Col.; BS 1959, DVM 1961, PhD 1968, Univ. of Minn. (GF)

ANTHONY, HARRY D., Prof. and Dir. of Diagnostic Lab. (1955, 1971). Research Pathologist. DVM 1952, MS 1957, Kan. St. Univ. (GF)

BAILIE, WAYNE E., Asst. Prof. of Bacteriology (1972). Research Bacteriologist. BS 1957, DVM 1957, PhD 1969, Kan. St. Univ.

BAUGH, ROBERT C., Instr. (1965, 1968). DVM 1965, Kan. St. Univ.

BESCH, EMERSON L., Prof. and Head, Department of Physiological Sciences (1967, 1971). Staff Assoc., Institute for Environmental Research. Dir., Animal Resource. Research Environmental Physiologist. BS 1952, MA 1955, Southwest Tex. St. Col.; PhD 1964, Univ. of Calif. (GF)

BLAUCH, BRUCE S., Asst. Prof. of Small Animal Medicine (1965, 1972). BS 1949, Pa. St. Univ.; DVM 1956, Univ. of Pa.; MS 1969, Kan. St. Univ.

BRANDT, GARY W., Asst. Prof. of Equine Medicine (1969). BS 1964, DVM 1966, Univ. of Ill.

BURROUGHS, ALBERT L., Assoc. Prof. of Virology (1960). Research Virologist. BS 1938, Univ. of Wyoming; DVM 1958, Tex. A & M Col.; MS 1941, Mont. St. Col.; PhD 1946, Univ. of Calif. (GF)

BUTLER, HUGH C., Prof. of Surgery (1968). DVM 1954, MS 1968, Wash. St. Univ. (GF)

CARDINET, GEORGE H. III, Assoc. Prof. of Anatomy (1966, 1970). Research Neurologist. AA 1957, Diablo Valley Col.; BS 1960, DVM 1963, PhD 1966, Univ. of Calif. (GF)

CARNAHAN, DAVID L., Assoc. Prof. of Obstetrics and Gynecology (1961, 1972). BS 1959, DVM 1959, MS 1964, Kan. St. Univ.

CHAPMAN, THOMAS E., Asst. Prof. of Physiological Chemistry (1969). Research Nutritional Physiologist. BS 1962, DVM 1964, PhD 1969, Univ. of Calif. (GF)

CHEN, CHAO L., Asst. Prof. of Physiology (1969). Assoc., Institute for Environmental Research. Research Endocrinologist. BS 1960, DVM 1960, Nat'l. Taiwan Univ.; MS 1966, Iowa St. Univ.; PhD 1969, Mich. St. Univ. (GF)

CLARENBERG, RUDOLF, Assoc. Prof. of Physiological Chemistry (1966). Research Physiological Chemist. BS 1954, PhD 1959, St. Univ. of Utrecht. (GF)

COFFEE, E. GUY, Asst. Prof., Veterinary Medicine Library (1970). AB 1958, Univ. of Mo.; ML 1970, Kan. St. Teach. Col.

COLES, JR., EMBERT H., Prof. and Head, Department of Infectious Diseases (1954, 1964). Research Clinical Pathologist. DVM 1945, PhD 1958, Kan. St. Univ.; MS 1948, Iowa St. Col. (GF)

COOK, JAMES E., Prof. and Acting Head, Department of Pathology (1969, 1972). Research Pathologist. Diplomate, American Col. of Veterinary Pathologists, 1956; DVM 1951, Okla. St. Univ.; PhD 1970, Kan. St. Univ. (GF)

DENNIS, STANLEY M., Prof. and Head, Department of Pathology (1966, 1968). FRCVS 1962, BVSc 1949, PhD 1961, Univ. of Sydney. (GF) (AID Nigeria 1972-1974).

ERICHSEN, DEBORAH, Instr. of Physiology and Pharmacology (1968). BS 1966, DVM 1968, Kan. St. Univ.

ERICKSON, LARRY E., Assoc. Prof. Chemical Engg. and Physiology (1964, 1968). BS 1960, PhD 1964, Kan. St. Univ. (GF)

FEDDE, M. ROGER, Assoc. Prof. of Physiology (1964, 1968). Research Neurophysiologist. BS 1957, Kan. St. Univ.; MS 1959, PhD 1963, Univ. of Minn. (GF)

FRANK, EDWARD R., Prof. of Surgery Emeritus (1926, 1935, 1962). BS 1918, DVM 1924, MS 1929, Kan. St. Univ.

FREY, RUSSELL A., Assoc. Prof. of Medicine and Physiology (1963, 1970). DVM 1952, PhD 1970, Kan. St. 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, Kan. St. Univ.

GRAY, ANDREW P., Assoc. Prof. of Pathology (1964, 1971). Research Pathologist. DVM 1953, MS 1963, PhD 1966, Kan. St. Univ.

GRONWALL, RONALD R., Assoc. Prof. of Physiology (1966, 1970). Assoc., Institute for Environmental Research. Research Physiologist. BS 1960, DVM 1962, PhD 1966, Univ. of Calif. (GF)

GUFFY, MARK M., Assoc. Prof. of Radiology (1963, 1969). DVM 1949, MS 1966, Colo. St. Univ. (GF)

HARRIS, STANLEY G., Asst. Prof. of Comparative Cardiology (1964, 1969). BS 1958, DVM 1960, MS 1967, Kan. St. Univ.; PhD 1970, Ohio St. Univ. (GF)

HARTKE, GLENN T., Instr. in Anatomy (1962, 1970). BS 1968, DVM 1960, MS 1965, Kan. St. Univ.

HOWARD, DENNIS R., Asst. Instr. Diagnostic Lab. (1972). BS 1972, Kan. St. Univ.

HULSE, DONALD A., Instr. in Surgery and Medicine (1971). BS 1970, DVM 1970, Tex. A & M Univ.

HUSTON, KEITH, Adjunct Prof. of Pathology (1972). Research Geneticist. Assoc. Dir. of Agr. Exp. Sta. (1954, 1971). BS 1949, MS 1950, PhD 1951, Univ. of Wis. (GF)

JERNIGAN, LOYCE D., Temporary Asst. Prof. of Medicine (1965). DVM 1945, Kan. St. Univ.

JULIUS, MARCIA F., Asst. Instr., Assistant to the Dean (1972). BS 1965, Kan. St. Univ.

KELLEY, DONALD C., Prof. of Public Health (1958, 1969). Research Mycologist. Diplomate, American Board of Veterinary Public Health. DVM 1935, MS 1952, Kan. St. Univ. (GF)

KIMBALL, ALICE DAY, Instr. in Pathology, Parasitology and Public Health Emeritus (1934, 1955). BS 1935, Kan. St. Univ.

KITSELMAN, CHARLES H., Prof. of Pathology Emeritus (1919, 1933, 1965). VMD 1918, Univ. of Pa.; MS 1927, Kan. St. Univ. (GF)

KLEMM, ROBERT D., Assoc. Prof. of Anatomy (1972). Research Functional Morphologist. BS 1957, Capital Univ.; MS 1959, Ohio Univ.; PhD 1964, Southern Ill. Univ. (GF)

KRUCKENBERG, SAMUEL M., Asst. Prof. of Surgery and Medicine (1963, 1966, 1972). DVM 1963, Diplomate, American Col. of Lab Animal Med., 1968, MS 1965, PhD 1972, Kan. St. Univ.

LEASURE, ELDEN E., Dean Emeritus; Prof. of Pathology, Parasitology and Public Health Emeritus (1926, 1948, 1964). DVM 1923, MS 1930, Kan. St. Univ. (GF)

LEIPOLD, HORST W., Assoc. Prof. of Pathology (1970). Research Pathologist. DVM 1963, Justus Liebig Univ.; MS 1967, PhD 1968, Kan. St. Univ. (GF)

LELAND, JR., STANLEY E., Prof. of Parasitology (1967). Research Parasitologist. BS 1949, MS 1950, Univ. of Ill.; PhD 1953, Mich. St. Univ. (GF)

LINDQUIST, WILLIAM D., Prof. of Parasitology (1968). Research Parasitologist. BS 1940, MS 1942, Univ. of Idaho; ScD 1949, Johns Hopkins Univ. (GF)

MARTIN, CHARLES L., Assoc. Prof. of Ophthalmology (1971). BS 1963, Mont. St. Univ.; DVM 1965, Wash. St. Univ.; MS 1968, Ohio St. Univ. (GF)

McGAVIN, M. DONALD, Assoc. Prof. of Pathology (1968). Research Pathologist. BVSc 1952, Univ. of Queensland; PhD 1964, Mich. St. Univ.; Diplomate, American Col. of Veterinary Pathologists, 1963. (GF)

MILLERET, ROY J., Asst. Prof. of Pathology (1960, 1964). DVM 1944, MS 1959, Kan. St. Univ.

MINOCHA, HARISH C., Assoc. Prof. of Virology (1969). Research Virologist. BVSc 1955, Ind.; MS 1963, PhD 1967, Kan. St. Univ. (GF)

MOORE, WILLIAM E., Asst. Prof. of Clinical Pathology (1968). Research Clinical Pathologist. BS 1956, DVM 1958, Cornell Univ.; PhD 1968, Univ. of Minn. (GF)

MOSIER, JACOB E., Prof. and Head, Department of Surgery and Medicine (1945, 1961). DVM 1945, MS 1948, Kan. St. Univ. (GF)

MUNGER, LADDIE L., Asst. Prof. of Anatomy (1968, 1971). Research Pathologist. BS 1962, DVM 1962, Univ. of Mo.; MS 1971, Kan. St. Univ. (GF)

NOORDSY, JOHN L., Prof. of Surgery (1960, 1966). Research Clinical Scientist. BS 1943, S.D. St. Col.; DVM 1946, MS 1962, Kan. St. Univ. (GF)

OEHME, FREDERICK W., Assoc. Prof. of Toxicology, Medicine and Physiology (1959, 1969). Research Toxicologist. BS 1957, DVM 1958, Cornell Univ.; MS 1962, Kan. St. Univ.; PhD 1969, Univ. of Mo. (GF)

OLSON, JAY R., Asst. Prof. of Medicine (1970, 1972). DVM 1945, Kan. St. Univ.

PURINTON, P. THOMAS, Asst. Prof. of Anatomy (1971). Research Neuroanatomist. BS 1963, DVM 1965, Kan. St. Univ.; PhD 1971, Univ. of Minn.

RAILSBACK, LEE T., Asst. Dean and Assoc. Prof. (1961, 1971). BS 1936, DVM 1937, Kan. St. Univ.



**RIDLEY, ROBERT K.**, Asst. Prof. of Parasitology (1969). AB 1958, Bowdoin Col.; MS 1960, Univ. of Kentucky; PhD 1967, Fla. St. Univ.

**ROBL, MARTIN G.**, Assoc. Prof. of Pathology (1972). Research Pathologist. DVM 1964, Kan. St. Univ.; MS 1966, PhD 1968, Univ. of Wis.

**SCHNEIDER, JACOB E.**, Assoc. Prof. of Equine Medicine (1972). BS 1958, DVM 1960, Colo. St. Univ.

**SCHONEWEIS, DAVID A.**, Asst. Prof. of Food Animal Medicine (1966, 1972). BS 1956, DVM 1956, MS 1971, Kan. St. Univ.

**SHAW, JOANN S.**, Instr. (1972). BS 1965, St. Univ. of N.Y.; MS 1969, N.C. St. Univ.

**SMITH, JOSEPH E.**, Assoc. Prof. of Pathology (1969). Research Pathologist. BS 1959, DVM 1961, Tex. A & M Univ.; PhD 1964, Univ. of Calif.; Diplomate, American Col. of Veterinary Pathologists, 1972. (GF)

**ST. OMER, VINCENT V.E.**, Asst. Prof. of Pharmacology (1972). Research Neuropharmacologist. MSc 1965, Univ. Manitoba; DVM 1962, PhD 1969, Ontario Veterinary Col.

**STRAFUSS, ALBERT C.**, Assoc. Prof. of Pathology (1968). Research Pathologist. BS 1952, DVM 1954, Kan. St. Univ.; MS 1958, Iowa St. Univ.; PhD 1963, Univ. of Minn. (GF)

**TAUSSIG, ROBERT A.**, Asst. Prof. of Small Animal Medicine (1966, 1970). DVM 1945, Colo. St. Univ.; MS 1970, Kan. St. Univ. (AID Nigeria 1972-1974).

**TROTTER, DONALD M.**, Dean; Prof. of Anatomy (1956, 1971). Research Anatomist. Assoc. Dir., Agr. Exp. Sta. Diplomate, American Col. of Veterinary Pathologists, 1951; DVM 1946, MS 1957, Kan. St. Univ. (GF)

**UNDERBJERG, GRAVERS K.L.**, Prof. Emeritus of Physiology (1948, 1972). BS 1926, Royal Veterinary and Agricultural Col., Copenhagen; DVM 1943, PhD 1939, Iowa St. Univ. (GF)

**UPSON, DAN W.**, Assoc. Prof. of Pharmacology and Asst. Dean (1959, 1972). DVM 1952, MS 1962, PhD 1969, Kan. St. Univ. (GF)

**VESTWEBER, JEROME G.E.**, Instr. of Food Animal Medicine (1967). BS 1962, DVM 1964, Univ. of Minn.

**WESTFALL, JANE A.**, Assoc. Prof. of Micro. Anatomy (1967, 1970). Research Microanatomist. AB 1950, Col. of Pacific; MA 1952, Mills Col.; PhD 1965, Univ. of Calif. (GF)

**WILLARD, LLOYD H.**, Instr. Animal Resource (1972). BS 1970, Kan. St. Univ.

**WILSON, JAMES W.**, Instr. of Surgery and Medicine (1971). BS 1970, DVM 1970, Mich. St. Univ.

## Division of Continuing Education

**DIECKHOFF, KENNETH L.**, Temporary Instr. (1969). BA 1965, Ft. Hays St. Col.; MA 1969, Univ. of Kan.

**FONCANNON, FRANCES A.**, Instr. (1972). BA 1971, Kan. St. Univ.

**HAROLD, E. NORMAN**, Director, Instr. (1963). BA 1960, Kan. St. Teachers Col. at Emporia; MA 1962, Vanderbilt Univ.

**HOOVER, CAROL A.**, Temporary Instr. (1971). BS 1970, Kan. St. Univ.; MS 1971, Kan. St. Univ.

**LOCKHART, WILLIAM**, Instr. (1970). BS 1957, Kan. St. Col. at Pittsburg; MA 1960, Ariz. St. Univ.

**MICHAEL, DAVID E.**, Temporary Instr. (1972). BA 1961, Kan. Wesleyan Univ.

**MIDCAP, LUCILLE E.**, Temporary Instr. (1971). BS 1965, Colo. St. Univ.

**MILLER, MAX B.**, Asst. Prof. (1946). BS 1946, MS 1950, Kan. St. Univ.; Junior Col. Credential 1954, Humboldt St. Col.

**NOBLE, MARION L.**, Asst. Prof. (1972). BS 1966, Eastern Ky. Univ.; MA 1968, Univ. of Md.; PhD 1970, Univ. of Tex. at Austin.

**REICHOW, RONALD W.**, Temporary Instr. (1964). AA 1961, Kan. City Junior Col.; BS 1963, MS 1967, MS 1971, Kan. St. Univ.

**STAMEY, ROBERT W.**, Instr. (1972). BS 1971, Kan. St. Univ.

**SUMNER, JACK A.**, Temporary Instr. (1972). BS 1966, Ariz. St. Univ.; MA 1969, Ariz. St. Univ.

**WILLIAMSON, MICHAEL M.**, Asst. Director, Asst. Prof. (1962). BS 1956, MA 1962, Kan. St. Univ.

## Division of Cooperative Extension

**AHLSCHWEDE, GEORGE A.**, Asst. Prof.; Extension Specialist, Animal Science and Industry (1965). BS 1962, MS 1965, PhD 1969, Kan. St. Univ.

**ALBRIGHT, KENNETH A.**, Instr.; Area Extension Specialist, Rural Development (1972). BS 1952, Kan. St. Univ.; MEd 1967, Colo. St. Univ.

**ALLEN GERTRUDE E.**, Prof. Emeritus; Extension Specialist in Foods and Nutrition (1929, 1947). BS 1923, Univ. of Minn.; MS 1936, Kan. St. Univ.

**AMSTEIN, WILLIAM G.**, Prof. Emeritus; Extension Specialist, International Participant Training (1929, 1968). BS 1927, Univ. of Mass.; MS 1928, Kan. St. Univ.

**ANDERSON, ELINOR A.**, Assoc. Prof.; Extension Specialist, Home Management (1957, 1971). BS 1939, MS 1952, Kan. St. Univ.

**APEL, J. DALE**, Prof.; Assoc. State Leader, 4-H and Youth (1962, 1967). BS 1950, Kan. St. 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, Kan. St. Univ.; MS 1965, Univ. of Md.

**APPLEBY, THOMAS E.**, Instr.; Area Extension Economist in Farm Management (1960). BS 1959, MS 1967, Kan. St. Univ.

**AREA, MARJORIE J.**, Asst. Prof.; Extension Specialist, 4-H and Youth (1964). BS 1956, MS 1961, Kan. St. Univ.

**ARMBRUSTER, STEPHEN L.**, Asst. Prof.; Extension Specialist, Beef Cattle Nutrition and Management (1972). BS 1967, MS 1970, Okla. St. Univ.; PhD 1972, Univ. of Neb.

**ATCHISON, FRED D.**, Asst. Prof.; Area Extension Forester (1964). BS 1954, Univ. of Ga.; MS 1972, Ft. Hays Kan. St. Col.

**ATKINSON, DAISY E.**, Asst. Prof.; Extension Specialist in Foods and Nutrition (1959). BS 1938, Univ. of Iowa; MS 1954, Univ. of Alabama.

**BAKER, E. KIRK**, Asst. Prof.; Extension Economist, Resource Development (1955, 1966). BS 1949, Okla. St. Univ.; MS 1966, Kan. St. Univ.

**BALDING, JAMES L.**, Asst. Prof.; Extension Specialist in Formula Feeds Manufacturing (1965, 1972). BS 1960, MS 1971, Kan. St. Univ.

**BARTLETT, CLARENCE E.**, Instr. Emeritus; Extension Economist in Farm Management (1947). BS 1929, Univ. of Neb.

**BATES, CHARLES T.**, Assoc. Prof.; Extension Specialist in 4-H and Youth (1956, 1972). BS 1951, Okla. A & M; MS 1960, Univ. of Wis.

**BAUGHMAN, MELVIN J.**, Instr.; Area Extension Forester (1971). BS 1970, MS 1971, Mich. St. Univ.

**BIEBERLY, FRANK G.**, Prof.; Section Leader and Extension Specialist in Crops and Soils (1941, 1949). BS 1938, MS 1949, Kan. St. Univ.

**BILES, LARRY E.**, Instr.; Area Extension Forester (1967). BS 1967, Univ. of Mo.

**BISWELL, CLIFFORD R.**, Assoc. Prof.; Asst. St. Extension Forester (1957, 1971). BS 1954, MS 1965, Univ. of Mo.

**BLACKWOOD, HELEN H.**, Instr.; Area Extension Home Economist (1962, 1972). BA 1947, Univ. of Kan.; MS 1969, Kan. St. Univ.

**BLANKENHAGEN, ELMER W.**, Asst. Prof.; Coordinator, Schedules and Reports (1950, 1961). BS 1948, Kan. St. Univ.

**BLECHA, FRANK O.**, Prof. Emeritus; District Agricultural Agent (1919, 1948). BS 1918, MS 1924, Kan. St. Univ.

**BOHANNON, ROBERT A.**, Prof.; Dir. of Extension (1951, 1967). BS 1949, Mich. St. Univ.; MS 1951, Kan. St. Univ.; PhD 1957, Univ. of Ill.

**BONEWITZ, E. RALPH**, Assoc. Prof.; Extension Specialist in Dairy Science (1943, 1949). BS 1941, MS 1955, Kan. St. Univ.

**BORST, WILLIAM H.**, Assoc. Prof.; Area Extension Specialist, 4-H and Youth (1953, 1973). BS 1950, Kan. St. Univ.; MS 1962, Colo. St. Univ.

**BRANNAN, BETTY JEAN**, Prof.; Asst. Dir., Quality of Living Programs (1972). BS 1953, Okla. Col. of Liberal Arts; MS 1955, EdD 1961, Okla. St. Univ.

**BRATTON, GERALD F.**, Instr.; Area Extension Forester (1967). BS 1966, Colorado St. Univ.

**BREEDEN, LOWELL D.**, Asst. Prof.; Extension Specialist, Veterinary Medicine (1971). BS, DVM, 1953, Kan. St. Univ.

**BREWER, DONALD I.**, Instr.; Extension Specialist, Radio and TV (1967). BA 1953, Univ. of Tulsa.

**BRIGGS, VIVIAN B.**, Asst. Prof. Emeritus; Extension Specialist in Family Life (1946, 1951). BS 1942, Univ. of Neb.; MS 1952, Kan. St. Univ.

**BRILL, MARTHA E.**, Asst. Prof.; Extension Specialist in Health (1946, 1948). BS 1940, Kan. St. Univ.; RN 1940, Univ. of Kan.

**BROOKS, H. LEROY**, Asst. Prof.; Extension Specialist, Insecticides (1965). BS 1960, MS 1963, Univ. of Ark.; PhD 1967, Kan. St. Univ.

**BURKE, JACK M.**, Assoc. Prof.; Manager of Radio Station KSAC (1958). BA 1953, ME 1963, N.D. St. Univ.

**BUSSETT, GLENN M.**, Prof.; State Leader, 4-H and Youth (1941, 1966). BS 1941, Kan. St. Univ.; MS 1957, Cornell Univ.; PhD 1965, Univ. of Wis. (GF)

**CALEY, HOMER K.**, Assoc. Prof.; Section Leader and Extension Specialist in Veterinary Medicine (1965). DVM 1952, Kan. St. Univ.

**CARLSON, JEAN K.**, Asst. Prof.; Extension Specialist in Home Management (1950, 1966). BS 1950, Kan. St. Univ.; MS 1965, Okla. St. Univ.

**CLEAVINGER, EUGENE A.**, Prof. Emeritus; Extension Specialist in Crops and Soils (1926, 1947). BS 1925, Kan. St. 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, Kan. St. Univ.; MS 1962, Univ. of Wis.

**COOLIDGE, JOHN H.**, Prof. Emeritus; Extension Economist in Farm Management (1926, 1948). BS 1925, MS 1932, Kan. St. Univ.

**COX, LAWRENCE J.**, Prof.; Area Extension Director (1952, 1971). BS 1948, Okla. St. Univ.; MS 1960, Kan. St. Univ.; EdD 1970, N.C. St. Univ.

**CRAWFORD, TWILA V.**, Instr.; Asst. Extension Editor, Quality of Living (1971). BA 1967, MS 1971, Kan. St. Univ.

**CRIST, ROSEMARY A.**, Asst. Prof.; Area Extension Home Economist (1950, 1965). BS 1947, Kan. St. Univ.; MA 1967, Univ. of Neb.

**DEUTSCH, HENRY A.**, Asst. Prof.; Area Extension Specialist, Resource Conservation and Development (1964, 1972). BS 1957, MS 1964, Univ. of Mo.

**DeWEES, PAUL F.**, Asst. Prof.; Extension Specialist, Radio and TV (1948, 1966). BS 1947, Kan. St. Univ.

**DICKEN, D. DEAN**, Asst. Prof.; Area Extension Specialist, Crops and Soils (1942, 1963). BS 1937, Kan. St. Univ.; MS 1942, Univ. of Ill.

**DICKINSON, ANNABELLE J.**, Assoc. Prof. Emeritus; Assoc. State Leader, Home Economics (1940, 1969). BS 1933, Ft. Hays Kan. St. Col.; MS 1954, Univ. of Mo.

**DICKSON, WILLIAM M.**, Instr.; Area Extension Economist in Farm Management (1961). BS 1956, MS 1961, Kan. St. Univ.

**DIERKING, GARY R.**, Instr.; Extension Specialist, Visual Aids (1961). BFA 1958, Univ. of Kan.

**DUNHAM, JAMES R.**, Asst. Prof.; Extension Specialist, Dairy Science (1969). BS 1959, MS 1967, PhD 1969, Kan. St. Univ.

**EDELBLUTE, DALE H.**, Assoc. Prof.; Area Extension Specialist, Crops and Soils (1947, 1971). BS 1934, Kan. St. Univ.

**ELLING, CARL G.**, Prof. Emeritus; Extension Specialist in Animal Husbandry (1907, 1951). BS 1904, Kan. St. Univ.

**ELLITHORPE, VERA M.**, Assoc. Prof.; Extension Specialist, Home Management (1938, 1947). BS 1935, MS 1939, Kan. St. Univ.; PhD 1963, Ohio St. Univ.

**EYESTONE, CECIL L.**, Assoc. Prof.; Extension Specialist in 4-H and Youth (1943, 1958). BS 1944, Kan. St. Univ.; MS 1958, Colo. St. Univ.

**FAIDLEY, DONALD L.**, Instr.; Area Extension Economist in Farm Management (1956). BS 1953, Kan. St. Univ.

**FENWICK, JR., RICHARD S.**, Asst. Prof.; Extension Economist, Marketing Information and Agricultural Firm Management (1972). BS 1962, MS 1965, Colorado St. Univ.; PhD 1972, Univ. of Mo.

**FERGUSON, JOHN M.**, Prof. Emeritus; State Leader, Extension Engineering (1937, 1958). BS 1934, Kan. St. Univ.

**FIGURSKI, DONALD L.**, Asst. Prof.; Area Extension Economist (1960). BS 1952, MS 1959, Colo. St. Univ.



- FINLEY, PHILIP B.**, Instr.; Area Extension Specialist, Rural Development (1972). BS 1951, MS 1956, Kan. St. Univ.
- FLINCHBAUGH, BARRY L.**, Asst. Prof.; Extension Economist, Public Affairs (1971). BS 1964, MS 1967, Pa. St. Univ.; PhD 1971, Purdue Univ.
- FRANCIS, EUGENE N.**, Assoc. Prof.; Area Extension Specialist, Animal Science (1967). BS 1949, Kan. St. Univ.; MS 1953, Iowa St. Univ.
- FRAZIER, LESLIE P.**, Asst. Prof.; Extension Economist, Resource Development Studies (1943, 1965). BS 1942, Okla. St. Univ.; MA 1962, Colo. St. Univ.
- FREDERICK, A. L. (ROY)**, Asst. Prof.; Extension Economist, Grain Marketing and Agricultural Farm Management (1971). BS 1966, MS 1968, Univ. of Neb.; PhD 1971, Purdue Univ.
- FREDERICK, HOBART W.**, Instr.; Economist in Farm Management (1941). BS 1941, Kan. St. Univ.
- GALLAHER, HAROLD G.**, Prof.; Asst. Department Head of Horticulture, Extension, and State Extension Forester (1951, 1965). BS 1949, Univ. of Mo.; MS 1959, Kan. St. Univ.
- GATES, DELL E.**, Prof.; Extension Specialist in Entomology (1948, 1971). BS 1948, MS 1952, Kan. St. Univ.
- GEISLER, JAMES E.**, Instr.; Area Extension Forester (1966). BS 1964, Univ. of Mo.
- GOULD, LEONARD K.**, Instr.; Area Extension Forester, Utilization and Marketing (1963). BS 1956, Colo. St. Univ.
- GRAHAM, RALF O.**, Assoc. Prof.; Assoc. St. Leader and Extension Editor, Special Projects (1961, 1967).
- GREENE, LAURENCE S.**, Instr.; Area Extension Economist in Farm Management (1952). BS 1950, Kan. St. Univ.
- GREY, GENE W.**, Assoc. Prof.; Asst. St. Extension Forester (1962, 1971). BS 1956, Univ. of Mo.; MS 1969, Mich. St. Univ.
- GRIFFITH, PAUL W.**, Prof.; Assoc. Director of Extension (1935, 1950). BS 1934, MS 1948, Kan. St. Univ.; PhD 1961, Univ. of Wis. (GF)
- GUTHRIE, GERSILDA**, Asst. Prof.; Area Extension Specialist in Home Management (1937, 1958). BS 1934, Kan. St. Univ.; MA 1949, Columbia Univ.
- GUY, WILLIAM D.**, Instr.; Area Extension Economist in Farm Management (1951). BS 1942, Kan. St. Univ.
- HACKLER, RAYMOND F.**, Instr.; Area Extension Economist in Farm Management (1960). BS 1952, MS 1966, Okla. St. Univ.
- HAGANS, FRANK A.**, Assoc. Prof. Emeritus; District Agricultural Agent (1930, 1956). BS 1925, Kan. St. Univ.
- HAGEMAN, CHARLES A.**, Instr. Emeritus; Extension Economist in Farm Management (1936). BS 1936, Kan. St. Univ.
- HALAZON, GEORGE C.**, Assoc. Prof.; Extension Specialist in Wildlife Management (1954, 1956). PhD 1943, Univ. of Wis.
- HANNA, JOHN B.**, Assoc. Prof.; Extension Specialist in 4-H and Youth (1934, 1960). BS 1932, MS 1954, Kan. St. Univ.
- HARPER, HAROLD B.**, Assoc. Prof.; Extension Specialist in Soil Conservation (1932, 1946). BS 1933, MS 1957, Kan. St. Univ.
- HAY, DELYNN R.**, Asst. Prof.; Area Extension Irrigation Engineer (1971). BS 1966, MS 1967, Univ. of Neb.
- HENDERSON, F. ROBERT**, Asst. Prof.; Extension Specialist, Wildlife Damage Control (1968). BS, MS 1956, Ft. Hays Kan. St. Col.
- HEROD, JON C.**, Instr.; Area Extension Economist in Farm Management (1957). BS 1957, Kan. St. Univ.
- HERPICH, RUSSELL L.**, Prof.; Extension Irrigation Engineer (1951, 1958). BS 1950, MS 1953, Kan. St. Univ.
- HOLMES, ELWYN S.**, Assoc. Prof.; Extension Agricultural Engineer (1966). BS 1943, MS 1953, Tex. A & M Univ.
- HONSTEAD, ARLISS E.**, Assoc. Prof.; Extension Specialist in 4-H and Youth (1946, 1961). BS 1936, Kan. St. Univ.; MS 1960, Columbia Univ.
- HOSS, RAY M.**, Assoc. Prof.; Area Extension Director (1935, 1958). BS 1930, Kan. St. Univ.
- HOWE, JERELDINE E.**, Instr.; Extension Specialist, Clothing and Textiles (1965). BS 1951, MS 1965, Kan. St. Univ.
- HYDE, ROBERT M.**, Assoc. Prof.; Extension Specialist Range Management (1966, 1970). BS 1959, MS 1961, Ft. Hays Kan. St. Col.; PhD 1963, Univ. of Wyo. (GF)
- JACCARD, CLARENCE R.**, Prof. Emeritus; Coordinator of Extension Program Planning (1922, 1957). BS 1914, Kan. St. Univ.
- JACKSON, MARION E.**, Assoc. Prof.; Extension Economist, Poultry Marketing and Production (1945). BS 1941, Purdue Univ.; MS 1955, Kan. St. Univ.
- JEPSEN, RICHARD L.**, Asst. Prof.; Extension Specialist, Rural Civil Defense (1953, 1962). BS 1950, MS 1963, Kan. St. Univ.
- JOHNSON, J. HAROLD**, Prof. Emeritus; State 4-H Club Leader (1927, 1958). BS 1927, Kan. St. Univ.; MS 1942, George Washington Univ.
- JOHNSON, NAOMI M.**, Assoc. Prof.; Extension Specialist, Clothing and Textiles (1938, 1950). BS 1932, MS 1949, Kan. St. Univ.
- JOHNSON, ROBERT L.**, Prof.; State Leader, Extension Studies and Staff Development (1965, 1972). BS 1951, Univ. of Neb.; MS 1956, PhD 1958, Univ. of Wis. (GF)
- JONES, HAROLD E.**, Prof.; Extension Specialist, Crops and Soils (1946, 1956). BS 1940, Kan. St. Univ.; MS 1942, PhD 1949, Purdue Univ. (GF)
- JONES, MILAM T.**, Instr.; Area Extension Specialist, Horticulture (1966). BS 1964, MS 1966, Kan. St. Univ.
- KEPLEY, LARRY R.**, Instr.; Area Extension Economist in Farm Management (1954). BS 1961, MS 1972, Kan. St. Univ.
- KILGORE, GARY L.**, Asst. Prof.; Area Extension Specialist, Crops and Soils (1972). BS 1964, MS 1966, Kan. St. Univ.
- KING, CLAUDE L.**, Prof.; Extension Specialist in Plant Pathology (1934, 1954). BS 1932, MS 1953, Kan. St. Univ.
- KING, JR., RICHARD F.**, Assoc. Prof.; Area Extension Director (1938, 1962). BS 1938, MS 1957, Kan. St. Univ.
- KINGSLEY, KENNETH E.**, Instr.; Assistant Extension Editor, Agriculture (1970). BS 1964, Kan. St. Univ.
- KOENIG, MARGARET A.**, Prof. Emeritus; Assoc. Home Economics Leader (1929, 1959). BS 1928, Kan. St. Univ.; MS 1958, Univ. of Wis.
- LANGEMEIER, LARRY N.**, Assoc. Prof.; Extension Specialist, Farm Management Studies (1968, 1972). BS 1963, Univ. of Neb.; MS 1965, PhD 1968, Univ. of Mo.
- LEUTHOLD, LARRY D.**, Asst. Prof.; Extension Specialist, Ornamental Horticulture (1966, 1972). BS 1959, MS 1966, Kan. St. Univ.
- LIND, RUEBEN C.**, Prof. Emeritus; Extension Specialist in Soil Conservation (1933, 1950). BS 1923, Kan. St. Univ.
- LINDSEY, STEVEN E.**, Asst. Prof.; Area Extension Forester (1972). BS 1968, MS 1970, Univ. of Mo.
- LOUCKS, WILLIAM L.**, Asst. Prof.; Area Extension Forester (1967, 1972). BS 1963, Colo. St. Univ.
- MCADAMS, VERL E.**, Assoc. Prof. Emeritus; Extension Specialist, Animal Science (1934, 1952). BS 1928, MS 1957, Kan. St. Univ.
- MCCLELLAND, EVERETT L.**, Instr. Emeritus; Extension Economist in Farm Management (1936). BS 1928, Kan. St. Univ.
- MCDANIEL, GARY L.**, Asst. Prof.; Extension Specialist, Landscape and Environmental Horticulture (1971). BS 1967, PhD 1971, Iowa St. Univ.
- MCREYNOLDS, KENNETH L.**, Asst. Prof.; Extension Economist in Farm Management (1949, 1960). BS 1950, MS 1954, Kan. St. Univ.
- MANN, RAY H.**, Assoc. Prof.; Area Extension Director (1956, 1969). BS 1951, Okla. St. Univ.; MS 1965, Kan. St. Univ.
- MARR, CHARLES W.**, Asst. Prof.; Extension Specialist, Vegetable Crops (1970). BS 1963, MS 1967, Southern Ill. Univ.; PhD 1971, Univ. of Tenn.
- MEANS, EARL T.**, Instr. Emeritus; Extension Economist in Farm Management (1944). BS 1948, Kan. St. Univ.
- MEDLIN, ROGER C.**, Asst. Prof.; Asst. Extension Editor (1967). BS 1948, MS 1969, Kan. St. Univ.
- MEYER, ELLA M.**, Asst. Prof. Emeritus; District Home Economics Agent (1925, 1956). BS 1907, Kan. St. Univ.
- MEYER, KATHERINE K.**, Instr.; Extension Specialist, Home Furnishings (1970). BS 1958, Kan. St. Univ.
- MILLER, ELSIE LEE**, Asst. Prof.; Extension Specialist, Foods and Nutrition (1941, 1962). BS 1934, MS 1942, Kan. St. Univ.
- MORRISON, FRANK D.**, Assoc. Prof.; Extension Specialist, Horticulture (1966). BS 1951, MS 1959, Univ. of Idaho; PhD 1966, Mich. St. Univ. (GF)
- MOYER, WENDELL A.**, Prof.; Section Leader and Extension Specialist, Animal Science (1941, 1956). BS 1941, MS 1955, Kan. St. Univ.
- MOYER, WILLIAM J.**, Asst. Prof.; Area Extension Forester (1969). BS 1964, Okla. St. Univ.; MA 1968, Ball St. Univ.
- MULLEN, W. GALE**, Instr.; Area Extension Economist in Farm Management (1961). BS 1950, Kan. St. Univ.
- MYERS, GLADYS**, Assoc. Prof. Emeritus; Extension Specialist in Home Management (1930, 1947). BS 1923, Kan. St. Univ.; MS 1939, Cornell Univ.
- NAGEL, JOHN C.**, Instr.; Extension Television Producer (1967). BS 1959, Kan. St. Univ.
- NAUGHTON, GARY G.**, Asst. Prof.; Asst. State Extension Forester (1966, 1969). BS 1959, Utah St. Univ.; MS 1968, Univ. of Mo.
- NEELY, MARGERY A.**, Assoc. Prof.; Extension Specialist, 4-H Child and Youth Development (1971). AB 1955, Southwest Mo. St. Col.; MEd 1968, PhD 1971, Univ. of Mo.
- NEFF, LEONARD F.**, Assoc. Prof. Emeritus; Coordinator of Extension Personnel Training (1924, 1958). BS 1922, Purdue Univ.
- NELSON, VAUGHN L.**, Instr.; Area Extension Economist, Farm Management (1972). BS 1967, MS 1970, Kan. St. Univ.
- NEUFELD, DOROTHY H.**, Asst. Prof.; Area Extension Home Economist (1957, 1965). BS 1950, Tex. Technological Col.; MS 1964, Kan. St. Univ.
- NIGHSWONGER, JAMES J.**, Asst. Prof.; Extension Specialist, Environmental Forestry (1961, 1970). BS 1960, MS 1970, Kan. St. Univ.
- NILSON, ERICK B.**, Assoc. Prof.; Extension Specialist, Herbicides (1965). BS 1950, MS 1955, Univ. of Neb.; PhD 1963, Kan. St. Univ.
- NORBY, OSCAR W.**, Prof.; Asst. Dir., Community Resource Development and Economic Programs (1942, 1973). BS 1942, Kan. St. Univ.; MS 1959, PhD 1961, Univ. of Wis. (GF)
- NUTTELMAN, ROBERT F.**, Asst. Prof.; Area Extension Specialist, Crops and Soils (1972). BS 1938, Kan. St. Univ.; MEd 1960, Colo. St. Univ.
- OLSEN, DUANE A.**, Asst. Prof.; Area Extension Economist, Resource Development (1963, 1966). BS 1961, Univ. of Minn.; MS 1964, Purdue Univ.
- OLSON, ROSS A.**, Instr.; Area Extension Economist in Farm Management (1968). BS 1965, MS 1968, Kan. St. Univ.
- OSBURN, MELVIN W.**, Assoc. Prof. Emeritus; Extension Specialist, Veterinary Medicine (1952, 1954). DVM 1934, Iowa St. Univ.
- OVERLEY, FRANK L.**, Asst. Prof.; Area Extension Economist (1960). BS 1950, Kan. St. Univ.; MS 1957, Mich. St. Univ.
- PARKER, LEONARD C.**, Instr.; Area Extension Economist in Farm Management (1956). BS 1952, Kan. St. Univ.
- PARRIS, FRED M.**, Assoc. Prof.; Associate State Leader and Extension Editor, News (1963, 1972). BS 1942, Kan. St. Univ.; MA 1951, Iowa St. Univ.
- PATRICK, ABIGAIL K.**, Asst. Prof.; Extension Specialist, Environmental Housing (1971). BS 1969, Calif. St. Polytechnic Col.; MA 1971, Calif. St. Col.
- PECK, ERNEST G.**, Asst. Prof.; Extension Specialist, Visual Aids (1955, 1967). BS 1950, MS 1965, Kan. St. Univ.
- PETERSON, EDMUND J.**, Administrative Asst. (1966). BS 1959, Kan. St. Univ.
- PETERSON, VERLIN H.**, Assoc. Prof.; Extension Specialist, Crops and Soils (1948, 1965). BS 1948, MS 1949, Kan. St. Univ.
- PINKERTON, LESTER R.**, Asst. Prof.; Area Extension Forester (1964, 1967). BS 1963, MS 1967, Colo. St. Univ.
- POPE, DAVID L.**, Asst. Prof.; Extension Irrigation Engineer (1971). BS 1970, MS 1971, Okla. St. Univ.
- PRAWL, WARREN L.**, Prof.; Extension Specialist, Personnel Training (1952, 1969). BS 1954, Kan. St. Univ.; MS 1958, EdD 1962, Cornell Univ.
- PRETZER, DON D.**, Asst. Prof.; Section Leader and Extension Economist, Farm Management (1958). BS 1955, MS 1970, Kan. St. Univ.; PhD 1971, Univ. of Mo.
- REDEKER, NORMA J.**, Assoc. Prof.; Assoc. State Leader, Extension Home Economics (1964, 1972). BS 1961, Emporia Kan. St. Teachers Col.; MS 1964, Kan. St. Univ.
- REGNIER, ROGER E.**, Prof. Emeritus; Extension Specialist, Resource Development (1934, 1966). BS 1924, MS 1932, Kan. St. Univ.
- REIMER, ERVIN C.**, Instr.; Area Extension Economist in Farm Management (1965). BS 1964, Kan. St. Univ.
- RINGLER, WILBER E.**, Prof.; Asst. Director of Extension (1957). BS 1948, MS 1949, Univ. of Neb.; PhD 1958, Univ. of Wis. (GF)
- ROWLAND, JACK J.**, Asst. Prof.; Area Extension Forester (1969). BS 1968, MS 1970, Univ. of Mo.

**SCHINDLER, DALE E.**, Assoc. Prof.; Extension Architect (1955, 1961). BArch 1953, MS 1960, Kan. St. Univ. Registered Architect, MA 1960, Kan. St. Univ.

**SCHLENDER, JOHN R.**, Assoc. Prof.; Extension Economist in Farm Management (1951, 1971). BS 1951, Kan. St. Univ.; MS 1960, Oregon St. Univ.; PhD 1969, Purdue Univ.

**SCHOEFF, ROBERT W.**, Prof.; Section Leader and Extension Economist, Formula Feeds Marketing (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, Kan. St. Univ.

**SELBY, WALTER E.**, Assoc. Prof.; Extension Agricultural Engineer (1944, 1947). BS 1929, Kan. St. Univ.; MS 1957, Univ. of Neb.

**SELF, ETHEL W.**, Assoc. Prof. Emeritus; Extension Specialist, Home Management (1929, 1953). BS 1926, MS 1952, Kan. St. 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 Va. Univ.; MS 1967, Kan. St. Univ.

**SLINKMAN, ZOE E.**, Asst. Prof.; Extension Specialist, Cultural Resources Development (1967). BS 1947, Greeley Colo. St. Col.; MS 1970, Kan. St. Univ.

**SMURTHWAITE, GEORGIANA H.**, Prof. Emeritus; Extension Specialist, Home Economics Program Development (1924, 1954). BS 1911, Utah St. Col.; MS 1931, Kan. St. Univ.

**SPOON, DARRELL D.**, Asst. Prof.; Extension Specialist, Family Life (1970). BA 1965, Univ. of Iowa; MS 1969, Kan. St. Univ.

**SPRINGER, DONALD M.**, Assoc. Prof.; Section Leader, Television Production (1957, 1972). BS 1957, MS 1966, Kan. St. Univ.; PhD 1971, Ohio Univ.

**STARKEY, WINONA M.**, Asst. Prof. Emeritus; Extension Specialist, Home Furnishings (1944, 1956). BS 1947, MS 1954, Kan. St. Univ.

**STIEGLER, JAMES H.**, Asst. Prof.; Extension Specialist, Land Utilization (1971). BS 1964, Tex. A & I Col.; MS 1967, Okla. St. Univ.; PhD 1970, Va. Polytechnic Institute.

**STIELOW, KENNETH L.**, Instr.; Area Extension Economist in Farm Management (1969). BS 1967, MS 1969, Kan. St. Univ.

**STOCKARD, JOHN R.**, Asst. Prof.; Extension Motion Picture Producer (1966). BS 1955, Univ. of N.C.; MS 1969, Kan. St. Univ.

**STOVER, HAROLD E.**, Prof. Emeritus; Extension Agricultural Engineer (1936, 1954). BS 1929, Kan. St. Univ.

**STRICKLER, JOHN K.**, Assoc. Prof.; Assoc. State Extension Forester (1961, 1969). BS 1957, Univ. of Mo.; MS 1967, Kan. St. Univ.

**TEAGARDEN, EARL H.**, Prof. Emeritus; Coordinator, Extension Studies (1929, 1952). BS 1920, Kan. St. Univ.

**TENNANT, MARJORIE A.**, Asst. Prof.; Asst. Extension Editor (1947, 1952). BS 1946, MS 1957, Kan. St. Univ.

**THOMAS, KENNETH E.**, Prof.; Head, Department of Extension Information (1951, 1963). AB 1951, Southwestern Col.; MS 1952, Kan. St. Univ.; PhD 1961, Univ. of Wis. (GF)

**THOMAS, WILTON B.**, Assoc. Prof.; Section Leader and Extension Economist, Farm Management (1946, 1966). BS 1937, MS 1960, Kan. St. Univ.

**TITUS, RALPH S.**, Assoc. Prof.; Asst. Manager, Radio Station KSAC (1951, 1965). BS 1955, Kan. St. Univ.

**TRAYER, DANNY D.**, Instr.; Area Extension Economist in Farm Management (1950). BS 1951, MS 1967, Kan. St. Univ.

**TREAT, JAY L.**, Asst. Prof.; Area Extension Economist (1960). BS 1949, Univ. of Ark.; MA 1952, Univ. of Mo.

**UNRUH, CHESTER R.**, Assoc. Prof.; Assoc. St. Leader and Extension Editor, Publications (1961, 1972). AB 1940, Bethel Col.; MS 1956, Kan. St. Univ.

**URBAN, KENNETH E.**, Instr.; Area Extension Economist in Farm Management (1954). BS 1952, MS 1957, Kan. St. Univ.

**VACIN, GARY L.**, Asst. Prof.; Asst. Extension Editor, Agricultural Economics (1966). BS 1960, MS 1964, Kan. St. Univ.; PhD 1972, Iowa St. Univ.

**WALKER, MILDRED L.**, Assoc. Prof.; Extension Economist, Consumer Marketing (1956, 1970). BS 1952, Kan. St. Univ.; MS 1960, Pa. St. Univ.

**WARNER, EUGENE D.**, Prof. Emeritus; Extension Editor (1935, 1947). BS 1934, Kan. St. Univ.

**WELLS, RUTH I.**, Assoc. Prof.; Extension Specialist, Limited Resources Program (1953, 1971). BS 1943, Central Mo. St. Col.; MS 1948, Kan. St. Univ.

**WENDLING, LEOT.**, Prof.; St. Leader, Extension Engineering (1947, 1965). BS 1947, MS 1956, Kan. St. Univ.

**WESTMEYER, HERMAN W.**, Asst. Prof.; Extension Specialist, Animal Science (1936, 1961). BS 1936, Univ. of Mo.; MS 1965, Kan. St. Univ.

**WHIPPS, LOREN E.**, Asst. Prof.; Area Extension Specialist, 4-H and Youth (1946, 1972). BS 1938, Kan. St. Univ.; MS 1953, Colo. St. Univ.

**WHITEHAIR, NORMAN V.**, Prof.; Asst. Head, Department of Economics and St. Leader of Extension Marketing, Management and Public Affairs (1946, 1961). BS 1943, MS 1953, Kan. St. Univ.; PhD 1964, Purdue Univ. (GF)

**WHITNEY, DAVID A.**, Assoc. Prof.; Extension Specialist, Soil Testing (1966). BS 1961, MS 1963, Univ. of Neb.; PhD 1966, Iowa St. Univ. (GF)

**WIGGINS, M. CHRISTINE**, Assoc. Prof. Emeritus; Extension Specialist, Clothing and Textiles (1930, 1947). BS 1929, Kan. St. Univ.; MA 1938, Columbia Univ.

**WILCOX, ROBERT W.**, Prof.; Extension Specialist, Formula Feed Quality Control (1965). BS 1945, MS 1949, PhD 1960, S.D. St. Univ.

**WILLIS, WILLIAM G.**, Assoc. Prof.; Extension Specialist, Plant Pathology (1951, 1962). BS 1951, MS 1964, PhD 1967, Kan. St. Univ. (GF)

**WRIGHT, DEANNE D.**, Instr.; Extension Specialist, Radio and TV (1970). BS 1959, Univ. of Kan.; MS 1970, Kan. St. Univ.

**ZIMMERMAN, ZELDA**, Asst. Prof.; Extension Specialist, Clothing and Textiles (1972). BS 1968, N.D. St. Univ.; MS 1972, Kan. St. Univ.

**ZOELLNER, KEITH O.**, Assoc. Prof.; Extension Specialist, Animal Science and Industry (1962). BS 1953, MS 1957, S.D. St. Univ.; PhD 1962, Univ. of Mo.

## COUNTY EXTENSION DIRECTORS

**BULK, HERBERT W.**, Shawnee County (1949). Topeka.  
**COX, WILLIAM E.**, Sedgwick County (1957). Wichita.  
**DUCKERS, JR., HARRY G.**, Wyandotte County (1943). Kansas City.  
**GOTTSCHE, A. HAROLD**, Reno County (1954). Hutchinson.  
**HALL, C. T.**, Johnson County (1934). Olathe.  
**NEWSOME, B.W.**, Riley County (1955). Manhattan.  
**SISK, ENSLEY J.**, Saline County (1960). Salina.  
**VAN METER, EARL L.**, Douglas County (1960). Lawrence.

## COUNTY EXTENSION AGRICULTURAL AGENTS

**ADAMS, JAMES P.**, Atchison County (1971). Effingham.  
**BARNES, JOHN D.**, Harvey County (1953). Newton.  
**BATES, GEORGE A.**, Clark County (1971). Ashland.  
**BIBY, VIRGIL H.**, Butler County (1966). El Dorado.  
**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.  
**BURKHART, PEYTON H.**, Nemaha County (1962). Seneca.  
**BUSBY, W. DARREL**, Sherman County (1971). Goodland.  
**BYARLAY, LOWELL H.**, Osborne County (1959). Osborne.  
**CARLSON, VIRGIL P.**, Ellsworth County (1954). Ellsworth.  
**CARSON, JAMES D.**, Stevens County (1967). Hugoton.  
**CHISAM, DONALD L.**, Labette County (1968). Altamont.  
**DAUBER, DONALD D.**, Hodgeman County (1959). Jetmore.  
**DAVIS, DEAN L.**, Riley County (1968). Manhattan.  
**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.  
**GILBERT, ROBERT W.**, Republic County (1970). Belleville.  
**GOLLADAY, RICHARD E.**, Hamilton County (1957). Syracuse.  
**GOSCH, JAY W.**, Clay County (1971). Clay Center.  
**GRIFFITH, LESTER E.**, Marion County (1949). Marion.  
**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.  
**HUNDLEY, JR. WILLIAM C.**, Rice County (1965). Lyons.  
**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.**, Seward County (1957). Liberal.  
**KRAINBILL, MILTON J.**, Woodson County (1972). Yates Center.  
**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.**, Kearney 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.  
**MCWILLIAMS, DONALD D.**, Wallace County (1956). Sharon Springs.  
**MADDUX, ALBERT G.**, Scott County (1972). Scott City.  
**MALEY, ALVIN E.**, Lyon County (1953). Emporia.  
**MANNY, E. CLIFFORD**, Pawnee County (1940). Larned.  
**MARLOW, DAROLD D.**, Wabaunsee County (1950). Alma.  
**MAXWELL, THOMAS R.**, Allen County (1954). Iola.  
**MCCAMMON, RONALD W.**, Ellis County (1968). Hays.  
**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.  
**NYHART, SYLVESTER**, Phillips County (1959). Phillipsburg.  
**OLTMANN, 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.  
**RADKE, JOHN E.**, Haskell County (1971). Sublette.  
**REINHARDT, LESLIE R.**, Ness County (1972). Ness City.  
**REINHARDT, N. KENT**, Decatur County (1972). Oberlin.  
**ROBERTSON, JOHN F.**, Comanche County (1956). Coldwater.  
**ROWE, JR., SAMUEL S.**, Sumner County (1965). Wellington.  
**RUTHERFORD, ROBERT E.**, Reno County (1969). Hutchinson.  
**SCOTT, JAMES M.**, Graham County (1969). Hill City.  
**SEILER, ARDEN L.**, Cheyenne County (1972). St. Francis.  
**SMITH, CHARLES W.**, Cowley County (1955). Winfield.  
**SMITH, JOHN F.**, Leavenworth County (1956). Leavenworth.  
**SMITH, JOSEPH M.**, Montgomery County (1967). Independence.  
**SPENCER, ALBERT E.**, Pottawatomie County (1960). Westmoreland.



SPRINGER, KENTON B., Sheridan County (1972). Hoxie.  
 STAGG, BEVERLY R., McPherson County (1940). McPherson.  
 STROADE, RICHARD D., Lane County (1959). Dighton.  
 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.  
 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., Thomas County (1971). Colby.  
 BIEHL, FLORENCE F., Johnson County (1952). Olathe.  
 BLEVINS, OLETHA L., Douglas County (1959). Lawrence.  
 BRANDEN, ELSIE P., Finney County (1955). Garden City.  
 BROWN, JANICE L., Stevens County (1969). Hugoton.  
 BUSH, SHARON W., Harvey County (1969). Newton.  
 BUSSMAN, DERINDA G., Barton County (1971). Great Bend.  
 CARLSON, KAREN S., Morton County (1972). Elkhart.  
 CARLSON, LOIS O., Neosho County (1964). Erie.  
 CARR, LINDA J., Montgomery County (1963). Independence.  
 CLARKSON, JEAN K., Pratt County (1970). Pratt.  
 CLINE, LUCILE G., Pawnee County (1951). Larned.  
 CONLEY, JOSEPHINE, Johnson County (1955). Olathe.  
 CRESS, JEANICE A., Allen County (1955). Iola.  
 CURRIE, TRELLE, Cloud County (1955). Concordia.  
 DAVISON, ALVERA M., Ness County (1973). Ness City.  
 DEGEER, KATHERINE A., Comanche County (1966). Coldwater.  
 DIERKS, NANCY E., Anderson County (1973). Garnett.  
 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.  
 FELBUSH, LINDA K., Wabaunsee County (1971). Alma.  
 FISHER, SHARON G., Meade County (1969). Meade.  
 FRANKENBERRY, JANET K., Greenwood County (1971). Eureka.  
 FRANKENBERRY, SHARON L., Wilson County (1969). Fredonia.  
 FREY, ALICE L., Grant County (1968). Ulysses.  
 FUNK, DONNA K., Doniphan County (1972). Troy.  
 GAFFORD, NANCY M., Nemaha County (1958). Seneca.  
 GASTON, GLORIA J., Marshall County (1960). Marysville.  
 GIBBS, MARY LOU, Pottawatomie County (1966). Westmoreland.  
 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.  
 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.  
 HOUBLER, 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.  
 JOHNS, MARGARET T., Brown County (1971). Hiawatha.  
 JOHNSON, JUANITA B., Crawford County (1948). Girard.  
 KANDT, BETTY L., Geary County (1964). Junction City.  
 KELLOGG, KAROLYN K., Clay County (1969). Clay Center.  
 KENT, NANCY JO, Ford County (1958). Dodge City.  
 KERN, GAIL A., Lyon County (1971). Ottawa.  
 KINDLER, BEVERLY L., Norton County (1951). Norton.  
 KORTHANKE, MARSHA S., Republic County (1973). Belleville.  
 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.  
 LEEPER, GEORGIANA L., Woodson County (1973). Yates Center.  
 McFALL, MARGENE H., Barber County (1969). Medicine Lodge.  
 MAHONEY, LORITA M., Rooks County (1969). Stockton.  
 MANVILLE, ARLETA, Jefferson County (1970). Oskaloosa.  
 MEIER, VIVIAN L., Lincoln County (1964). Lincoln.  
 MERRIMAN, SCHARON S., Reno County (1971). Hutchinson.  
 MITCHELL, MARY Z., Russell County (1971). Russell.  
 MOLZ, DIXIE E., 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, 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.

PHILLIPS, SUSAN K., Mitchell County (1973). Beloit.  
 PITTS, SUSAN C., Chautauqua County (1972). Sedan.  
 PRICE, MARJORIE E., Coffey County (1957). Burlington.  
 REDIKER, JANET B., Morris County (1966). Council Grove.  
 REIMER, CRYSTAL F., Harper County (1972). Anthony.  
 ROBBINS, EMILY R., Leavenworth County (1964). Leavenworth.  
 ROBINSON, ELSIE C., Decatur County (1969). Oberlin.  
 RUNFT, DONNA M., Elk County (1971). Howard.  
 SCHROEDER, DOROTHEA A., Wyandotte County (1942). Kansas City.  
 SHAPLAND, CONNIE L., Haskell County (1973). Sublette.  
 SHIELDS, SANDRA A., Cowley County (1966). Winfield.  
 SHOWERS, JANE A., Wallace County (1969). Sharon Springs.  
 SMITH, BEVERLY B., Saline County (1961). Salina.  
 SMITH, JENELL M., Ellsworth County (1972). Ellsworth.  
 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, Seward County (1966). Liberal.  
 TRUAX, RUBY C., Sedgwick County (1959). Wichita.  
 VICE, FAYE E., Labette County (1946). Altamont.  
 WARD, TRANDA J., Gove County (1973). Gove.  
 WARRINGTON, E. EVON, Cherokee County (1971). Columbus.  
 WEAVER, MAE E., Barton County (1952). Great Bend.  
 WESSEL, STELLA P., Atchinson 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., Butler County (1971). El Dorado.  
 CLAWSON, ELDON L., Shawnee County (1965). Topeka.  
 DAVIS, ROBERT J., Reno County (1967). Hutchinson.  
 DROGE, DENNIS L., Riley County (1971). Manhattan.  
 FAULDS, JAMES R., Finney County (1971). Garden City.  
 FULTZ, WILLIAM E., Sedgwick County (1962). Wichita.  
 GOFF, HOWARD R., Lyon County (1971). Emporia.  
 HENSLEY, DALE, Montgomery County (1957). Independence.  
 KUECK, DON L., Kingman County (1968). Kingman.  
 LUNHAM, K. EUGENE, Wyandotte County (1971). Kansas City.  
 MCGINNESS, KENNETH E., Johnson County (1954). Olathe.  
 MERHOFF, BILLY R., Douglas County (1968). Lawrence.  
 MILLER, TRUDY K., Sedgwick County (1972). Wichita.  
 OLSON, CAROLYN D., Marion County (1970). Marion.  
 PRESTON, LINDA R., Saline County (1970). Salina.  
 RECTOR, RALPH B., Leavenworth County (1949). Leavenworth.  
 REED, JERRY D., Sumner County (1973). Wellington.  
 RIAT, LARRY D., Dickinson County (1961). Abilene.  
 ROBBINS, BENNY S., Harvey County (1969). Newton.  
 SMITH, DAVID R., Franklin County (1970). Ottawa.  
 SNAPP, GERALD E., Seward County (1972). Liberal.  
 STEPHENS, DONALD J., Rice County (1972). Lyons.  
 STUDER, RAYMOND L., McPherson County (1966). McPherson.  
 TITTEL, RONALD L., Miami County (1972). Paola.  
 VAN SKIKE, WILLIAM V., Barton County (1950). Great Bend.  
 WEAVER, ELDON R., Cowley County (1969). Winfield.

## Degrees Conferred in 1972

College of Agriculture			Graduate School			Master of Science (Cont.)					
Men	Women	Total	Men	Women	Total	Men	Women	Total			
Agriculture	280	7	287	Master of Architecture	5	2	7	Home Economics Education	0	5	5
Bakery Sci. & Mgmt	7		7	Master of Regional &				Horticulture	4	1	5
Biochemistry	1		1	Comm. Planning	8	0	8	Industrial Engineering	20	0	20
Feo Sci. & Mgmt	11		11	Master of Landscape				Institutional Management	1	9	10
Milling Sci. & Mgmt	6		6	Architecture	2	0	2	Mathematics	9	1	10
College of Architecture			Master of Arts			Mechanical Engineering					
Architecture	69	1	70	Art	3	1	4	Microbiology	1	1	2
Interior Architecture	4		4	Economics	4	0	4	Nuclear Engineering	6	0	6
Bachelor of Landscape				English	2	2	4	Parasitology	1	1	2
Arch.	18		18	Geography	4	0	4	Pathology	2	0	2
Bach. of Sci. in Arch Engg.	1		1	History	5	5	10	Physical Education	21	6	27
Bach. of Sci. in Bldg. Constr.	21		21	Modern Languages	1	4	5	Physical Science Teaching	1	0	1
College of Arts & Sciences			Political Science			Physics					
Bachelor of Arts	48	81	129	Radio & TV	1	0	1	Physiology	2	1	3
Bachelor of Fine Arts	6	1	7	Sociology	4	2	6	Plant Pathology	2	0	2
Bachelor of Sciences	444	197	641	Speech	6	13	19	Poultry Science	1	0	1
Bachelor of Music				Master of Business Ad-			Psychology				
Physical Education	42	26	68	ministration	11	1	12	Statistics	0	1	1
Music Education	8	8	16	Master of Music			Surgery & Medicine				
College of Business			Master of Science			Technical Journalism					
Administration	209	28	237	Agricultural Economics	9	0	9	Doctor of Philosophy			
College of Education			Agricultural Education			Agronomy					
Bachelor of Science	31	66	97	Agricultural Engineering	15	0	15	Animal Nutrition	6	0	6
Elementary Education	9	240	249	Agronomy	8	0	8	Biochemistry	3	0	3
College of Engineering			Animal Science			Biology					
Agricultural Engineering	11		11	Applied Mechanics	2	0	2	Chemical Engineering	7	0	7
Chemical Engineering	19		19	Biochemistry	1	0	1	Chemistry	8	0	8
Civil Engineering	39		39	Biology	11	2	13	Economics (Arts & Sci.)	22	0	22
Electrical Engineering	68		68	Chemical Engineering	5	0	5	Economics (Agriculture)	6	0	6
Industrial Engineering	23		23	Chemistry	1	1	2	Education	2	0	2
Mechanical Engineering	65		65	Civil Engineering	16	0	16	Electrical Engineering	13	1	14
Nuclear Engineering	17		17	Clothing & Textiles			English				
College of Home Economics			Computer Science			Entomology					
Home Economics	6	277	283	Dairy Production	7	1	8	Food Science	1	0	1
Home Economics &				Education (Elementary)	3	0	3	Foods & Nutrition	5	2	7
Journalism				Education (Elem. Admin.)	5	28	33	Genetics	2	0	2
Restaurant Management	3	9	12	Education (Guidance)	1	2	3	Horticulture	2	0	2
College of Veterinary			Education (Secondary)			Industrial Engineering					
Medicine	73	2	75	Education (Secondary	11	15	26	Mathematics	2	0	2
			Admin.			Mechanical Engineering					
			Electrical Engineering			Microbiology					
			Entomology			Nuclear Engineering					
			Extension Education			Parasitology					
			Family & Child Devlpmt			Pathology					
			Family Economics			Physics					
			Food Science			Physiology					
			Foods & Nutrition			Plant Pathology					
			General Home Economics			Psychology					
			Genetics			Statistics					
			Geology			GRAND TOTAL					
			Grain Science			2,000					

## Enrollment Summary — Fall Semester 1972

### UNITED STATES

Alabama	10	Montana	5
Alaska	5	Nebraska	131
Arizona	11	Nevada	2
Arkansas	20	New Hampshire	5
California	77	New Jersey	93
Colorado	42	New Mexico	21
Connecticut	36	New York	130
Delaware	3	North Carolina	9
District of Columbia	1	North Dakota	17
Florida	38	Ohio	41
Georgia	12	Oklahoma	49
Hawaii	4	Oregon	6
Idaho	3	Pennsylvania	43
Illinois	135	Rhode Island	7
Indiana	57	South Carolina	6
Iowa	25	South Dakota	35
Kansas	12935	Tennessee	22
Kentucky	8	Texas	49
Louisiana	42	Utah	8
Maine	6	Vermont	2
Maryland	39	Virginia	23
Massachusetts	33	Washington	15
Michigan	27	West Virginia	6
Minnesota	25	Wisconsin	41
Mississippi	17	Wyoming	11
Missouri	338	TOTAL	14728

### INTERNATIONAL

Afghanistan	2	Japan	4
Argentina	2	Jordan	1
Bolivia	2	Kenya	2
Brazil	1	Korea	17
Canada	2	Lebanon	1
China	109	Libya	5
Colombia	15	Malaysia	1
Cyprus	1	Mexico	3
Denmark	1	Morocco	1
Dominican Rep.	1	Netherlands	6
Egypt (U.A.R.)	9	New South Wales	1
England	2	Nigeria	27
Ethiopia	3	Norway	1
Germany	12	Pakistan	10
Ghana	3	Philippines	8
Greece	1	Saudi Arabia	3
Guam	1	Sudan	2
Guyana	1	Thailand	19
Hong Kong	8	Turkey	2
India	87	Uganda	2
Indonesia	1	Venezuela	5
Iran	28	Vietnam	5
Iraq	6	West Indies	2
Ireland	1	Yugoslavia	1
Israel	1	TOTAL	430
Bangladesh	1		



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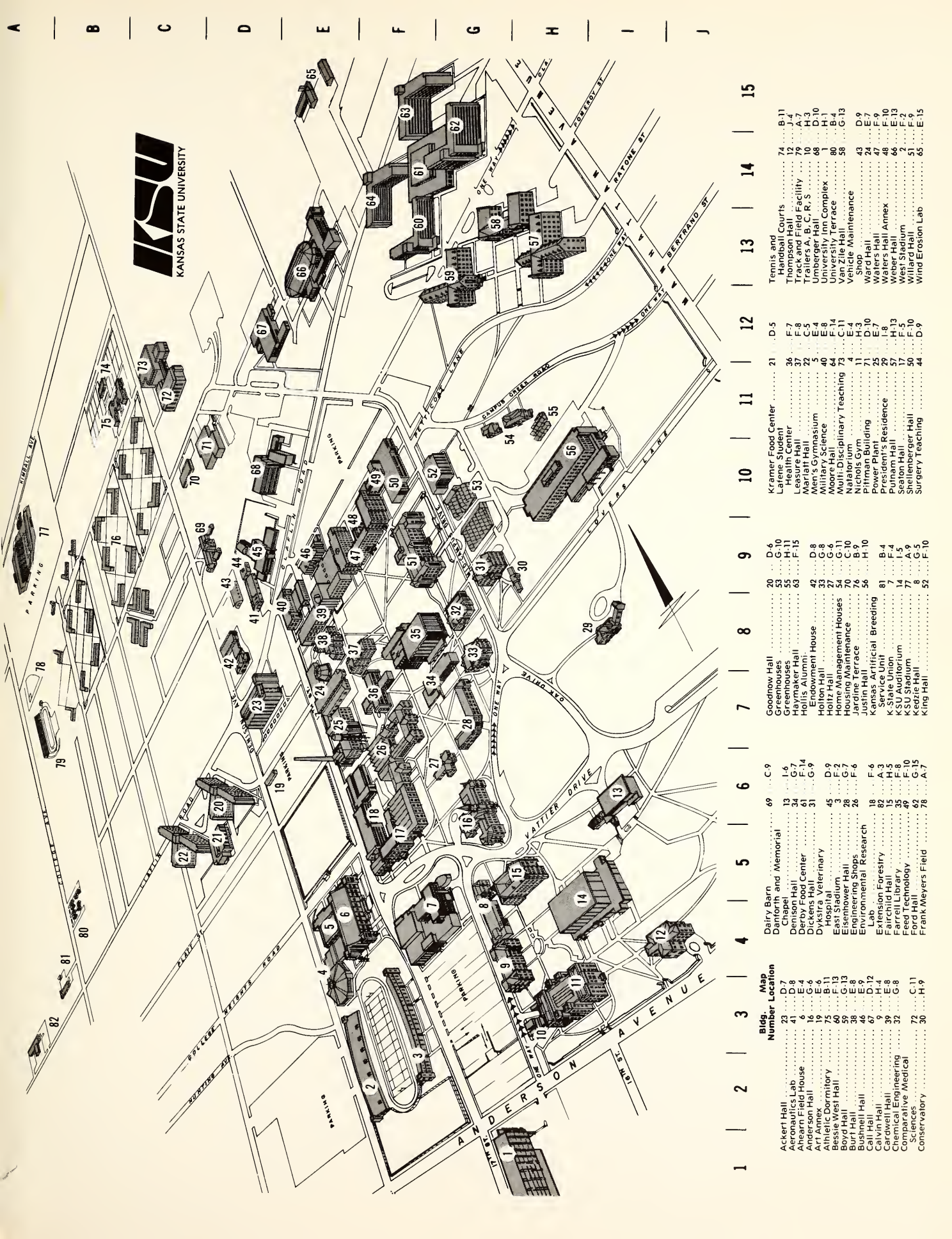
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Larry Perrine, Editor

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E	6	Athletic Center	18	E-2	East Stadium	45	D-9	Holmes Hall	33	F-15	Moore Hall	40	E-8	University Inn Complex	1	H-1
F	7	Bessie West Hall	60	F-13	Eisenhower Hall	28	G-7	Holmes Hall	33	F-15	Multi-Disciplinary Teaching	73	C-11	University Terrace	80	B-4
G	8	Boyd Hall	59	G-13	Engineering Shops	26	F-6	Holmes Hall	33	F-15	National Gym	71	D-10	Van Zile Hall	58	G-13
H	9	Burt Hall	38	E-8	Environmental Research	18	F-6	Holmes Hall	33	F-15	Pittman Building	71	D-10	Vehicle Maintenance	43	D-9
I	10	Bushnell Hall	46	E-9	Lab	82	F-6	Holmes Hall	33	F-15	President's Residence	25	E-7	Ward Hall	43	D-9
J	11	Calvin Hall	67	D-12	Laurel Hall	27	C-8	Holmes Hall	33	F-15	Shelton Hall	57	H-13	Walters Hall	48	F-9
	12	Cardwell Hall	39	E-8	Laurel Hall	27	C-8	Holmes Hall	33	F-15	Shelton Hall	57	H-13	Walters Hall Annex	48	F-9
	13	Chemical Engineering	32	G-8	Laurel Hall	27	C-8	Holmes Hall	33	F-15	Shelton Hall	57	H-13	Weber Hall	66	E-13
	14	Comparative Medical Sciences	70	C-11	Laurel Hall	27	C-8	Holmes Hall	33	F-15	Shelton Hall	57	H-13	West Stadium	2	F-2
	15	Conservatory	32	H-9	Laurel Hall	27	C-8	Holmes Hall	33	F-15	Shelton Hall	57	H-13	Wind Erosion Lab	65	E-15

