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# kansas state university bulletin

1975-1976 GENERAL CATALOG



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## KANSAS STATE UNIVERSITY BULLETIN

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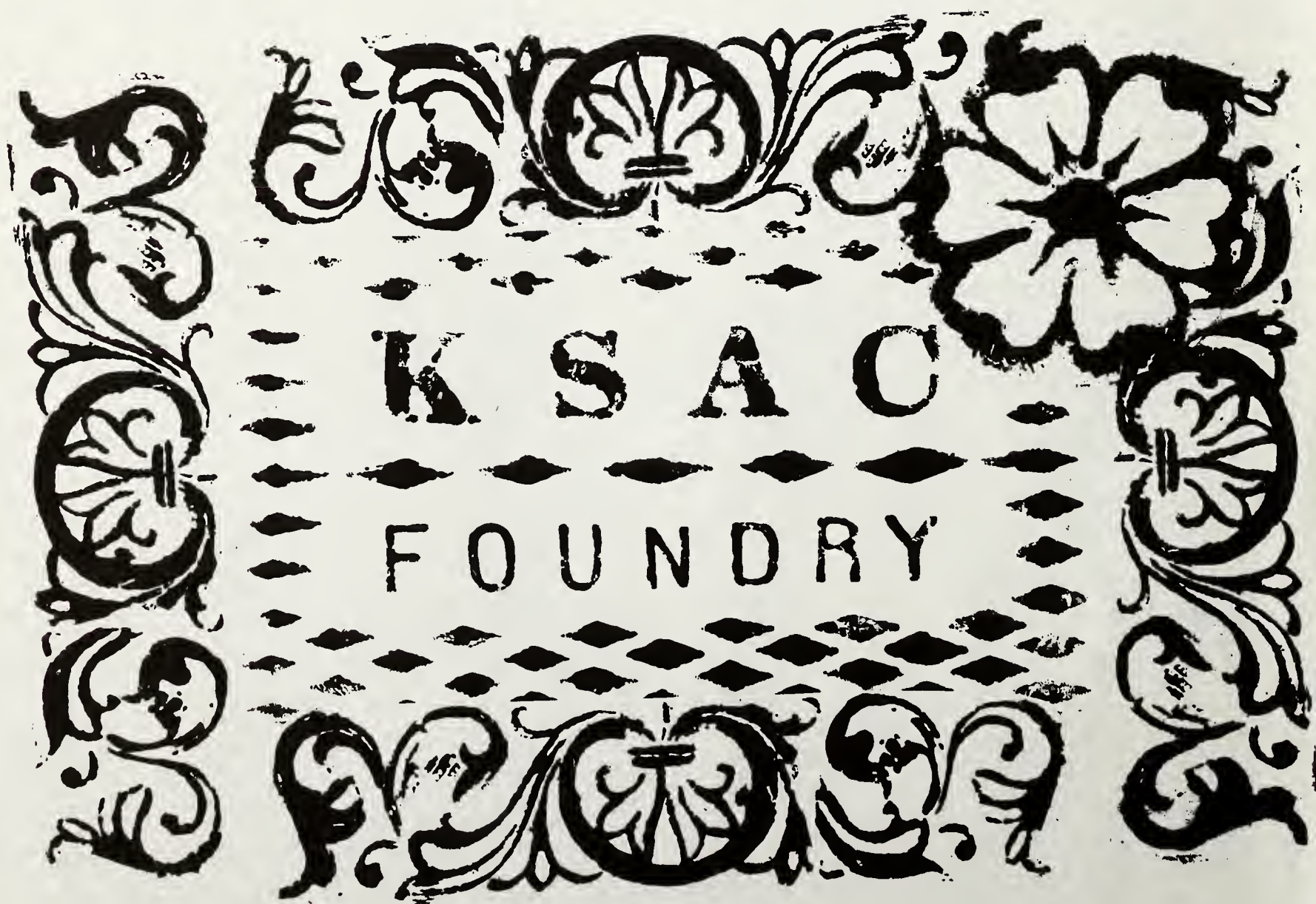
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K S A C

FOUNDRY



# administration

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## 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.

# 1975-1976 calendar

## FALL SEMESTER 1975

### August 21-22, Thursday-Friday

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

### August 25, Monday

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

### August 29, Friday

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

### September 1, Monday

Labor Day. No classes.

### September 5, Friday

Last day to enroll without dean's permission.

### September 9-20, Monday-Friday

Sign-up for credit, no-credit grading option.

### October 3, Friday

Last day to withdraw and receive a partial refund.

### October 6, 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 10, Friday

Mid-semester grade reports due in Admissions and Records.

### October 14, 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 24, Friday

Last day for new undergraduates to drop course without a WP or WF being recorded.

### October 29, Wednesday

Dissertation approval forms due in graduate dean's office.

### November 5, Wednesday

Masters' approval forms due in graduate office. Non-thesis, non-report approval forms due on the same date as thesis and report approval forms.

### November 6, Thursday

Final date of doctors' oral examinations.

### November 10-21, Monday-Friday

Early enrollment for Spring Semester.

### November 12, Wednesday

Final date of masters' oral examinations for candidates writing a thesis or report.

### November 17, Monday

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

### November 24, Monday

Final date of masters' orals for candidates on non-thesis, non-report plan.

### November 25, Tuesday

10 p.m. Thanksgiving student recess begins.

Last day course may be dropped before end of semester.

### December 1, Monday

Classes resume.

### December 3, Tuesday

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

### December 15-19, Monday-Friday

Semester examinations for all students.

### December 22, Monday Noon

Deadline for grades to Admissions and Records.

## INTERSESSION

### January 2-20

Three-week January Intersession.



**SPRING SEMESTER 1976****January 19-20, Monday-Tuesday**

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

**January 21, Wednesday**

Classes begin. Late fee \$2.50 for enrollment.

**January 23, Friday**

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

**January 30, Friday**

Last day to enroll without dean's permission.

**February 2-13, Monday-Friday**

Sign-up for credit, no-credit grading option.

**February 27, Friday**

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

**March 5, Friday**

Mid-semester grade reports due in Admissions and Records.

**March 10, Wednesday**

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

**March 13, Saturday Noon**

Spring break begins.

**March 22, Monday**

Classes resume.

Tentative copies of masters' theses and reports, with abstracts, due in major professor's office.

**March 26, Friday**

Last day for new undergraduates to drop course without a WP or WF being recorded.

**April 2-3, Friday-Saturday**

All-University Open House. Classes dismissed Friday afternoon.

**April 8, Thursday**

Dissertation approval forms due in graduate dean's office.

**April 14, Wednesday**

Masters' approval forms due in graduate office for masters candidates. Non-thesis, non-report approval forms due on the same date as thesis and report approval forms.

**April 16, Friday**

Final date of doctors' oral examinations.

**April 19, Monday**

Holiday. No classes. Easter is April 18.

**April 21, Wednesday**

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

**April 23, Friday**

Final date of masters' oral examinations for candidates writing a thesis or report.

**April 26-May 7, Monday-Friday**

Early enrollment for Fall Semester.

**April 28, Wednesday**

Final date of orals for candidates on the non-thesis, non-report plan.

**April 29, Thursday**

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

**April 30, Friday**

Last day a course may be dropped before end of semester.

**May 17-21, Monday-Friday**

Semester examinations for all students.

**May 21, Friday**

Commencement.

**May 24, Monday Noon**

Deadline for grades to Admissions and Records.

**INTERSESSION****May 24-June 4**

Two-week May Intersession.

**SUMMER TERM 1976****June 7-July 30**

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











# general

## 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 315-acre campus is in northern Manhattan, convenient to both business and residential sections. 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 individuals capable of applying an enlightened judgment in their professional, personal, and social lives.

To that end the University program is designed:

- I. To provide full and efficient counseling and guidance to students while at the University. Specifically, this means to:



# information

1. Learn and make known to students before they enroll all that is possible and useful about their interests, aptitudes, and abilities.
  2. Apply that knowledge to the students' choice of courses and curriculums as fully as possible without encroaching harmfully on their initiative and feeling of self-responsibility.
  3. Provide continuing guidance for students according to their needs.
- II. To prepare students adequately in a technical sense for an occupation or a profession which includes an organized body of information and theory so that they may realize their creative potentialities in the field of their choice. More specifically this means that students should acquire:**
1. The ability to recognize and master fundamental principles in their fields of specialization.
  2. The knowledge basic to their special fields of study.
  3. The ability to reason critically from facts and recognized assumptions to useful technical conclusions.
  4. The basic skills associated with their fields of study.
  5. A professional attitude in their chosen work.
- III. To provide all students 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 students to:**
1. Develop 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 personal responsibilities as effective citizens 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 well-adjusted personalities, good character traits, and sound philosophy of life.
  7. Prepare for effective participation in family life.
  8. Utilize actively and fully the 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

## 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 and Sundays.

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 curriculum as listed below. The capital letters correspond to the section on undergraduate degrees. See pages 15-16.

- (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.
- (D) One unit of algebra and one unit of geometry, or approved substitute for home economics.
- (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 two months prior to the term they wish to enter.

## AMERICAN COLLEGE TEST (ACT)

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

## ADVANCED PLACEMENT EXAMINATIONS

Students who have completed one of the College Entrance Examination Board Advanced Placement Tests should have a report of their 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.

## 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 the 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.



# 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 of each year. Students are scheduled in groups of approximately 200 for enrollment sessions in June.

## NEW STUDENT ADVISEMENT

All new students are assigned faculty advisers at the beginning of the school year. These advisers are available to them any time they need 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.

## PHYSICAL EXAMINATIONS

Board of Regents' regulations require all new students to submit a medical history form prior to registration.

## 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 students must have the recommendation of their 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 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/no credit policy.

## 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

Students are responsible for fulfilling all requirements of the curriculum in which they are enrolled. They should consult with their adviser or their dean in planning their work. Students 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 the 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 the 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.

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 the 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 the 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 WP or WF being recorded is at the end of the ninth week of classes. During the last two weeks of classes, 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**

All students are encouraged to attend the classes to which they have 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 the dean.

If a student withdraws during the first nine weeks of the semester, no mark shall be reported to the Director of Records. If he withdraws thereafter, a mark of WP is reported in all courses in which he is passing, and WF is reported for courses in which he is not doing satisfactory work.

### **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, employees, and full-time students. 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)

WP, for withdrawn passing

WF, for withdrawn failing.

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 a student who has enrolled at KSU, and credit earned is considered resident credit.

### **REPORT OF GRADES**

As shown on the academic calendar, mid-semester grade reports for freshmen are sent to deans' offices and to students 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 drops a subject after the ninth week of classes, a mark of either WP or WF 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 a mark of I for Incomplete. If the student's absence is not excused by the 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 grades 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. Students with less than 60 hours are placed on probation whenever they have more than five grade points less than needed for a 2.0 (C) overall or semester grade-point average.

Students are automatically taken off probation when their overall grade-point average reaches the required level.

Students on academic probation, who have completed 20 or more graded hours at Kansas State University, will be dismissed when their total resident grade points are not within 18 points of a 2.0 (C) overall average on the resident work.

Students who neglect their academic responsibility may be dismissed at any time on recommendation of the 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. The student's scholastic status does not change as a result of work taken in summer session.

**Reinstatement.** Dismissed students will be readmitted only when approved for readmission by the academic standards committee of the college they are attempting to enter. Normally students must wait at least one semester before they 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.

Students who earn a "C" (2.0) or better average on 12 or more credits during the semester they are 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.

## STUDENT RECORDS

Students and former students are entitled to inspect and copy all education records relating to them subject to certain exceptions. They may also challenge the content of such records at a hearing. Personal records or information regarding K-State students will not be released without their written consent, except in specified cases. See page 302 for a detailed statement.

## 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, Concert Pep, etc.) .....	1	4
University Chorus .....	1	4
Concert Choir .....	1	4
Collegiate Chorale .....	1	4
K-State Singers .....	1	4
Concert Jazz Ensemble & Jazz labs .....	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
Opera Workshop .....	1	4
Debate .....	2	4
Kansas State Collegian journalism .....	1	4
K-State Agriculturist journalism .....	1	4
K-State Engineer journalism .....	1	4
Royal Purple journalism .....	1	4

Credits may be counted as electives in the student's curriculum. A student may use no more than eight semester hours in these subjects toward graduation and enroll for not more than two in a semester.

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

### MILITARY TRAINING

Reserve Officer Training is offered by both the Air Force and the US Army. Students who qualify can enter the program during their freshman year and compete for a commission as a 2nd Lieutenant upon graduation. Junior and senior students who qualify for the advanced ROTC program are paid \$100 per month subsistence. Advanced ROTC includes summer training at a military base.

Scholarships are awarded on a competitive basis to entering freshmen, sophomores, and juniors. Military scholarships pay all university fees, lab fees, books, plus a monthly subsistence of \$100.

Academic credit may be applied to requirements for a degree. The Colleges of Engineering and Architecture and Design recognize only 4 hours toward their degree requirements. The other colleges recognize the full 16 hours of the 4-year ROTC program.

### COURSE DESCRIPTION KEY

Courses carrying no credit 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, means 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
30	60	90	120

### UNDERGRADUATE DEGREE REQUIREMENTS

To be graduated, a student must complete a prescribed curriculum. Under special conditions substitutions are allowed as the interests of the student warrant. The total credit requirement for bachelor's degrees ranges from 120 to 160 hours, according to the curriculum taken. To be awarded an undergraduate degree a student must have earned a grade-point average of at least 2.0 (C) on all Kansas State University courses taken for resident graded credit and applied toward the degree. 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 the last 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 the 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.

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 below. It is recommended that entering freshmen complete the prerequisite mathematics courses.

(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.

(D) One unit of algebra and one unit of geometry (or approved substitute for Home Economics).

(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.

## COLLEGE OF AGRICULTURE

- (E) Agriculture, BS in Agriculture.
  - Agricultural Economics major, page 46.
  - Agricultural Journalism major, page 49.
  - Agricultural Mechanization major, page 49.
  - Agronomy major, page 50.
  - Animal Science and Industry major, page 53.
  - Crop Protection major, page 55.
  - Dairy Production major, page 56.
  - Food Science and Industry major, page 61.
  - Horticulture major, page 67.
  - Natural Resources Management major, page 72.
  - Poultry Science major, page 57.
  - Pre-Veterinary Medicine major, page 45.
- (E) Agricultural Education (Teachers), BS in Agriculture, page 48.
- (E) Bakery Science and Management, BS in Bakery Science and Management, page 63.
  - Administration option.
  - Chemistry option.
  - Operations option.
- (E) Feed Science and Management, BS in Feed Science and Management, page 63.
  - Administration option.
  - Chemistry option.
  - Operations option.
- (E) Horticultural Therapy, BS in Agriculture, page 68.
- (E) Milling Science and Management, BS in Milling Science and Management, page 63.
  - Administration option.
  - Chemistry option.
  - Operations option.

## COLLEGE OF ARCHITECTURE AND DESIGN

- (F) Architecture (five years), Bachelor of Architecture, page 76.
- (F) Bachelor of Interior Architecture, page 76.
- (F) Landscape Architecture (five years), Bachelor of Landscape Architecture, page 76.

## COLLEGE OF ARTS AND SCIENCES

### Bachelor of Arts, page 84.

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 84.

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 86.

AB

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

BS

- (E) Medical Technology
- (E) 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 85.
- (A) Bachelor of Music, page 85.
- (A) Bachelor of Science in Music Education, page 85.

### COLLEGE OF BUSINESS ADMINISTRATION

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

### COLLEGE OF EDUCATION

- (A) Elementary Education, BS in Elementary Education, page 185.
- (A) Secondary Education, BS, page 186.

### COLLEGE OF ENGINEERING

- (F) Agricultural Engineering, BS in Agricultural Engineering, page 205.
- (F) Architectural Engineering/Construction Science, pages 205-206.
- (F) Chemical Engineering, BS in Chemical Engineering, page 206.
- (F) Civil Engineering, BS in Civil Engineering, page 207.
- (F) Electrical Engineering, BS in Electrical Engineering, page 207.
- (F) Industrial Engineering, BS in Industrial Engineering, page 208.
- (F) Mechanical Engineering, BS in Mechanical Engineering, page 209.
- (F) Nuclear Engineering, BS in Nuclear Engineering, page 209.
- Dual degree programs in Engineering, page 218.

### COLLEGE OF HOME ECONOMICS

- (C) Home Economics with options, BS in Home Economics, page 240.
- Home Economics Education-Vocational Teaching, page 245.
- Extension, page 278.
- Textile Research, page 241.
- Fashion Design, page 241.
- Interior Design, page 242.
- Community Services, page 242.
- Early Childhood Education, page 250.
- Consumer Interest, page 242.
- Foods and Nutrition in Business, page 243.
- Foods and Nutrition Science, page 243.
- Dietetics and Institutional Management, page 244.
- (C) Home Economics and Mass Communications, BS in Home Economics and Journalism, page 245.
- (C) Home Economics with Liberal Arts, BS in Home Economics, page 246.
- (C) Restaurant Management, BS in Restaurant Management, page 247.

### COLLEGE OF VETERINARY MEDICINE

Veterinary Medicine, Doctor of Veterinary Medicine, page 258.  
 (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 the semester or summer session fees on the day of registration, either by cash or by check. Late registration fees are assessed those who register after the regular registration period. 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.

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

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

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

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

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

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

**Student Activities Fee.** The student activities fee is used for 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.

### FEES FOR FALL AND SPRING 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:

Fees	Resident	Non-resident
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)	19.25	19.25



Totals — All except Veterinary Medicine students .....	\$266.00	\$661.00
Totals — Veterinary Medicine students .....	\$316.00	\$736.00

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

Fees	Resident	Non-resident
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 ..... total fee	25.00*	25.00*
Student Union Annex I ..... total fee	1.50	1.50
Student Union Annex II ..... total fee	6.50	6.50
Stadium Bonds ..... total fee	.50	.50
Student Activities (including Union operations) ..... total fee	5.50**	5.50**

**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	19.25
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	5.50**

**FEES FOR SUMMER SESSIONS**

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

Fees	Resident	Non-resident
Incidental Fee (per credit hour) .....	\$14.00	\$40.00
Special Fees (per credit hour) .....	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 em-

ployees of universities or colleges under the Kansas Board of Regents (other than hourly student employees) 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 except military personnel assigned to Kansas State University as full-time students.

**5. Dependents.** Dependents (as defined for federal income tax purposes) of staff members, federal employees and military personnel defined 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.** (Applies to semester, summer session, field geology, music lessons and music practice facility fees only.) Refunds will not be made until sufficient

\*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.

\*\*\*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. Includes Student Health, Union Bonds, Stadium Bonds, Student Activities and Parking Fees.



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 fees is not refunded if the student does not return the 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 the sixth academic week . . . . .	no refund	no refund

**Late Registration, Including Re-registering After Withdrawal.** A late registration fee of \$2.50 shall be assessed and collected from each person registering after the regular scheduled registration period. A larger late registration fee of \$5 shall be assessed and collected from each person registering, re-registering 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 registration, or re-registration. Late registration fees shall not be subject to refund, and payment thereof shall be considered a part of the registration process.

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

**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.** A person who is neither an enrollee paying full incidental fee nor a staff member is assessed \$1 per semester credit hour 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.

**Loans, Misuse Fees and Other Charges.** Kansas State University is authorized to approve loans to students as appropriate and to collect such loans and related interest and charges; and further, to collect library misuse fees, parking misuse fees, rental and use fees for recreational equipment furnished by the Department of Recreational Services, and charges for ROTC property and student health services when such fees and charges are authorized. All such loans, fees and charges are deemed to be part of this fee schedule.

**Correspondence Study.** Information about

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

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

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

**Other Expenses.** In addition to the applicable fees, students are required to purchase textbooks, drawing instruments, slide rules, gym suits and other personal equipment and supplies when needed for courses in the curriculum chosen. Costs will vary each semester, but are estimated to approximate the following:

Enrollment fees for a Kansas resident . . . . .	\$266*
Books and supplies, about . . . . .	50
Room and board in University housing . . . . .	560
Clothing, laundry, postage, travel, extra meals & social activities (varies with the individual) . . . . .	230

Total estimated expenses  
(half of academic year) . . . . . \$1,106

## Housing

Thomas J. Frith, Director

Jean M. Riggs, Associate 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 Director of Housing.

**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

\* Non-resident fees are \$661 per semester and Veterinary Medicine students pay an additional \$50 to \$75.



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 Director of Housing.

The following services and facilities are furnished in residence halls: sheets and pillowcases—laundered weekly; free washers and driers, areas for hand laundry; pleasant rooms with beds, mattresses, mattress covers, chests of drawers, closet facilities and study tables. 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 Department of Housing, 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 \$560 or (B) Payment schedule (if not paid in full) below:

Fall Semester		Spring Semester	
Payment with		January 10	\$143
contract	\$143	February 10	143
September 10	143	March 10	143
October 10	143	April 10	143
November 10	143		

Rates are subject to change.

Applications and further detailed information are available through the Department of Housing.

**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 \$88 a month for a one-bedroom apartment and \$104.50 a month for a two-bedroom apartment. A limited number of unfurnished apartments are available; one-bedroom \$82.50 per month, two-bedroom \$96.00. The trailer parking lot rental is \$25 a month. For the apartments the rental includes utilities such as gas and water. The rental for the trailer parking lot includes sewer and water. Rates are subject to change.

Applications are available at the Department of Housing, 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 \$88 a month for a one-bedroom and \$104.50 a month for a two-bedroom. These are furnished and water and heat are furnished. Applications are available from the Department of Housing.

**Off-Campus Housing.** The Department of Housing, 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 freshmen 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 \$600 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 \$600 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.

**Clovia.** 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.

## Research Resources

### PARTICLE ACCELERATORS

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 6 MV Heavy Ion tandem Van de Graaff with an "on line" PDP 15 computer for data acquisition and analysis. Also, there are several smaller accelerators which together with the tandem accelerator provide the University and the State of Kansas with particle accelerator capabilities over an unusually large range of projectiles and energies up to 55 MeV.

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.

### NUCLEAR REACTOR

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.

### KONZA PRAIRIE

The Division of Biology has developed extensive ecological research facilities. Long-term studies on the 916-acre Konza Prairie Research Natural Area provide a basic understanding of the prairie and baseline information to assess the nature and magnitude of ecological changes resulting from human activity.

A floating laboratory on the 15,000-acre Tuttle Creek Reservoir is used for limnological and fisheries studies. Also associated with the reservoir is the Tuttle Creek Fisheries Research Laboratory. This laboratory has 28 quarter-acre plastic-lined ponds for research on fish nutrition, growth, and population dynamics.

Other facilities include the Kansas State University Herbarium with a complete monographic library, a research and reference collection of insects in the Department of Entomology, greenhouses, aquatic and terrestrial research laboratories, animal quarters, controlled environmental chambers and many pieces of specialized field and laboratory research equipment.

### OTHER RESEARCH FACILITIES

A wide variety of specialized facilities is maintained to support research and scholarly work in the



humanities, natural sciences, applied sciences, social sciences, and professional areas. Although an exhaustive listing is prohibitive, the following represent a selection of such supporting resources:

Editorial offices of major journals in history, English, economics, horticulture, and education

Scanning electron microscope

Transmission electron microscope

Nuclear magnetic resonance spectrometers

Recording Raman spectrometer

X-ray diffractometers

Mass spectrometric laboratory

Population and demographic laboratory

Statistical laboratory

Wind and soil erosion laboratory

Controlled environment test facility

Audio visual materials center

Experimental animal facilities

Data banks of the Consortium for Political Research

Arp electronic music synthesizer

Laboratory for physiology of exercise

Glassblowing and instrument shops

## 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 System/370 Model 158 computer, peripheral equipment and supporting services are intended for the research and instructional computer needs of the faculty, staff, and students. In addition, the Computing Center participates in the coordination of computing efforts among the State Board of Regents Institutions.

The IBM S/370 Model 158 has one megabyte of main core with 500 million bytes of associated direct access storage; this machine and other support services allow the Computing Center to meet a wide variety of research and instructional needs. This machine, installed in December 1973, supplants an IBM S/360 Model 50. Other equipment includes tape and disk drives, remote-job-entry stations, card readers, a card punch, line printers, low-speed interactive terminals, and supportive card-processing equipment. During high usage hours the remote-job-entry stations are directly available to users for fast turnaround batch jobs.

The Computing Center is located on the ground floor of Cardwell Hall, and two Remote Computing Laboratories—where the data preparation equipment, several interactive terminals, and a remote-job-entry station are housed—are located on the lower levels of Fairchild and Seaton Halls. The professional staff provides assistance in the use of the hardware and software. A collection of manuals, texts, publications, program listings, and other reference material is available in the Computing Center User Information Center in Cardwell Hall. Additionally, manual racks are maintained in several convenient locations on campus.

FORTRAN, COBOL, PL/I, RPG, APL, Coursewriter III, WATBOL, WATFIV, PLC, ASSIST, LISP, and Assembler are among the programming languages on the system.

A wide variety of application packages including SPSS, SAS, OSIRIS III, BMD, TPSS, and CSMP are also available. CMS is an interactive operation system that provides BASIC, BAL, and WATFIV at interactive terminals. Also accessible is a program to produce computer output in Braille. Computer-Aided Instruction (CAI) developmental work is being pursued jointly by the Computing Center and faculty members in several areas. Non-credit seminars and classes are held through the year to acquaint users with the services available through the Computing Center.

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

## LIBRARY SYSTEM

G. Jay Rausch, Dean

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 700,000 cataloged volumes. Growth is at 30 to 40 thousand 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 space for over a million volumes. One hundred locked study carrels are provided for doctoral candidates. Five hundred additional individual study spaces are available to graduate and undergraduate students.

Except for the rare book room, reserve collection, and the phono record collection, the library is entirely open shelf. Collections are organized into four subject areas: Humanities, Social Science, Education and Science. These departments are supplemented by a general reference and bibliography department, a documents department, a special collections department, and a minorities center.

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 subject areas.

To take advantage of the library resources in the region, the Library operates a courier service that travels twice 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.

## Services and Facilities

### POSTAL SERVICE

All mail for students must be addressed to their Manhattan residences, not the University.

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.

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. A self-service postal center is located in the K-State Union.

An inter-office campus mail delivery service is operated by the Physical Plant Department. Since this service is operated with state funds, it may be used only for official University business.

Inquiries regarding specific use of the campus mail service should be addressed to the Vice President for University Development, while inquiries regarding U.S. Postal Service should be addressed to the University Comptroller.

### THE SPEECH AND HEARING CLINIC

The clinical facilities and services of the Speech and Hearing Clinic, Room 107, Leasure 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.

### DATA PROCESSING CENTER

Melvin 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 directly 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.

### KANSAS STATE UNIVERSITY PUBLICATIONS

#### University Publications

General Catalog Bulletin  
Student Catalog Bulletin  
(information for prospective students)  
Summer School Bulletin  
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

### 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 United States to be operated on a statewide level under the specific sponsorship of all the state's universities.

Administrative control of the Press rests with a board of trustees composed of the academic vice-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.

### 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. 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 divisions comprising the Student Personnel Program: Aids, Awards, and Veterans Services; Career Planning and Placement Center; Center for Student Development; Housing; Recreational Services; K-State Union; and Lafene Student Health Center and University Hospital.

The Vice Presidents for Academic and Student Affairs have a special assistant, an Associate Dean for Minority Affairs, who is responsible for counseling and programs with minority groups.

## CENTER FOR STUDENT DEVELOPMENT

Earl Nolting, 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, group life seminars, discussion groups in study skills instruction, vocational and occupational information, or 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 group life 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 Faiths—which are available for student religious services and private meditation.

**Minority and Cultural Programs.** The primary thrust of this area is to assist low-income and minority students in maximizing their educational development at Kansas State University. There are several components within this area.

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

The Cultural Enrichment Program encourages minority students to seek leadership roles on campus, advises minority student organizations including the Black Student Union, MECHA (a Chicano student organization), and the American Indian student organization, and assists student organizations in sponsoring programs and lectures which bring minority leaders to KSU and heighten multi-racial awareness within the community.

**TRIO Program—Upward Bound/Special Services.** This federally funded program's primary mission is to provide services for low-income and culturally different students which will enhance their chances of academic success. The Upward Bound Program is designed to generate functional skills and motivation in young people with inadequate secondary school preparation and of low-income backgrounds. It focuses on students completing the 10th, 11th and 12th grades of Manhattan and Junction City high school communities. The Special Services Program is geared for students admitted and enrolled at K-State. Services include counseling (personal, vocational and financial), academic advising, tutorial assistance and a variety of referral services. Student eligibility is determined by income criteria established by federal guidelines.

**Counseling Center.** Counseling is an educational process in which students learn methods of understanding themselves and others, acquire skills,

attitudes and processes which facilitate creative interpersonal relationships, and develop a working knowledge of their environment that will enable them to meet present and future demands and responsibilities.

Counseling is not a matter of getting a counselor's solution for an immediate question. It is a partnership designed to contribute to student maturity and independence.

A variety of learning options is available. Students may choose to meet individually with an experienced counselor to discuss questions ranging from educational-vocational decisions to personal concerns. They also may choose to meet in small self-study groups led by counseling center staff.

Topics available for individual and group exploration include assertiveness training, biofeedback training, career life planning, communication skills, consciousness raising, couples' conferences, leadership training, marriage counseling, peer sex education, pregnancy counseling, study skills and value clarification. Special self awareness training via videotape replay also is available. In addition, students are invited to work with the staff to initiate other seminars or mini-courses on various aspects of their college life.

Counselors also consult with individuals (students, staff and faculty) and groups about program planning and development, leadership skills, group goals and processes, interpersonal communication and organizational development. Counselors often participate in implementation of these programs.

At most hours of the day, a counselor is available to see immediately anyone coming to the Counseling Center. High school seniors may use the service before entering college by writing for an appointment. The Counseling Center is located in the West Lobby of Holtz Hall.

**Foreign Student Office.** The Foreign Student Office 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 Foreign Student Office 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. Research is published on student development and related topics in **Studies in Student Personnel**.

Staff development and leadership training workshops or programs will, upon request, be designed



to assist student organizations, student personnel staffs, or volunteers, in enhancing organizational effectiveness.

**CLEP Testing Center.** The Center for Student Development is the service agency on campus for the College Level Examinations Program. As an open center, it will give examinations once a month to anyone properly registered with the College Entrance Examination Board. Center for Student Development staff will provide special testing during orientation periods and will assist with utility studies.

**Coordinator of Student Activities.** This office, which is located in the K-State Union, provides coordination of the University judicial system, advises the University Learning Network (ULN) and the Student Governing Association (SGA), and assists individuals and groups who wish to organize and register their activities on the K-State campus.

**Women's Resource Center.** Located in Holtz Hall, this center serves as a focal point for inquiries and information about women and women's programs at Kansas State University. Special features include assertive training, rape prevention, and referral resources. One of the center's major goals is to raise the level of awareness of both men and women to the impact of changing opportunities for women in today's society and to help students meet these new challenges more effectively.

## 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 priority date for submitting completed applications is February 15 prior to the fall semester in which the student intends to enroll.

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

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.

### **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 26-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 clinic 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 covers payable claims for medical expenses if the student requires care away from the campus. The student may purchase this insurance at the time of class enrollment.

Kansas State University requires a complete medical history on all new students or transfer students. This history must be accomplished on the Kansas State University Medical History Form. A physical examination is not required, but highly suggested, and a copy of this examination would assist the staff in evaluating any illness while at K-State. If a student has a continuing medical problem, a summary from the attending physician would be helpful for future treatment. Students receiving allergy injections must furnish instructions from their allergist before injections can be administered at the Health Center.

Since certain diseases are more prevalent in some areas of the world, all new international students are required to have a physician complete the Kansas State University Medical Certificate prior to admission.

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 center for social, recreational and cultural activities on the KSU campus.

The 5.5-million-dollar building features an open space concept of architecture highlighted by a three-story courtyard in the center of the building.

Built entirely by student fees, the Union features a cafeteria-snack bar, 576-seat auditorium, 280-seat Little Theatre, full-service bookstore, recreational facilities (bowling, billiards, table tennis, etc.), art gallery, central information desk, lounges, banquet rooms, Activities Center and Student Governing Association offices.

In operation since 1956, the Union operates on a self-supporting basis with income from eight operating units and student fees.

The K-State Union director and staff operate the building under the guidelines and policies established by the Union Governing Board. The board consists of students, faculty and alumni and acts as a board of directors for the operation of the Union.

The Union Program Council, a 250-member organization, provides programs for the cultural, educational and personal growth of students. All students are welcome to participate in the Union Governing Board or the Union Program Council.

### **RECREATIONAL SERVICES**

Raydon H. Robel, Director

It is the desire of the Recreational Services Department to provide every student in the University the



opportunity to participate in some recreation activity. No activity is compulsory, but an attempt has been made to make activities appealing and desirable.

Recreation is a renewal of the mental, emotional, and physical state of mind and body for the continuance of personal and professional well-being. As such, it has a vital function in any university community. The philosophy of the Recreational Services Department is that students should have freedom of choice, equality of opportunity, and responsibility for sharing in planning, supervising, administering, and participating in the recreational programs and services.

The department offers three areas for physical recreation programs. These three areas are emphasized in the following preferential order: (1) free time recreation, (2) competitive intramurals, and (3) sports clubs and special programs.

The department attempts to sponsor as much free play and recreational use as is possible of all the facilities for the students, faculty, staff, and their families. Free time recreation is unstructured, set up for a time to recreate at your own convenience, and is away from schedules and academic pressures. This area includes free time use of all facilities and a variety of fitness and special programs.

Intramural sports are the scheduled competitive activities of the university's recreation program. Teams are organized from fraternities, sororities, residence hall floors, independent groups, co-rec, and faculty groups. Participants number in the thousands each year in the varied activities regardless of the skill level of those participating in both team and individual sports. The department offers a total of 30 different activities on the competitive level.

Sports clubs exist primarily as an outlet for special interests rather than for outside competition. The purpose in establishing a sports club program is (1) to offer sports activity to interested students which goes beyond intramural and classroom competition, (2) to help students learn and develop special skills in sports areas, and (3) to encourage the growth and expansion of local competition. Clubs presently operating under the department are Fencing, Ju Jitsu, Canoe-Kayak, and Power Volleyball.

Kansas State University ranks in the top 20 universities in the country in terms of outdoor facilities and is always striving to increase them. The outdoor facilities are located at the L. P. Washburn Recreational area north of the campus and include lighted tennis and handball courts, outdoor basketball, multi-purpose fields for games and sports activities of all kinds, a golf driving area, and an archery range. Also in this area is an equipment check-out center for various types of sports equipment, plus outdoor recreation equipment

for canoeing and camping on a rental basis. The regular sports equipment is loaned to all university-connected people.

The indoor facilities at KSU have been greatly improved with the opening of the new natatorium. It features two 25-yard swimming pools, one diving pool with two 1-meter and two 3-meter boards, and a sun deck area. The remainder of the indoor facilities are in Ahearn Gymnasium and Fieldhouse. Facilities include basketball, volleyball, and badminton courts, a weight lifting room, men's and women's locker rooms, and a tartan jogging track.

For students interested in a unique learning experience this department provides student employment as lifeguards, sports officials, supervisors, and office assistants.

## 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

There is something for everyone. Over 200 clubs, interest groups and professional societies offer students a nearly unlimited scope of extracurricular activities.

There are recreation clubs for those interested in skiing, sailing, horseshoes, judo, sports cars, flying and fencing. Dance clubs, literary clubs and a whole score of music ensembles and choirs offer cultural expression and appreciation.

A great number of professional societies exist to promote interest in subjects from nuclear engineering to photojournalism to geography.

There are also environmental interest groups, political clubs and service organizations which encourage social participation and responsibility.

Many of the college departments have organizations which permit students to take an active role in curriculum selection and course evaluation.

All these groups have an important place in student life providing opportunities for recreation and a chance to make new friends, besides broadening knowledge and raising awareness of issues.







# academics at k-state

Kansas State University has eight academic colleges in addition to the Graduate School.

The programs of the Graduate School and of the eight colleges are described in this section as well as requirements for degrees, typical class schedules, and course descriptions. The colleges are as follows:

<b>Graduate School</b> .....	<b>30</b>
<b>College of Agriculture</b> .....	<b>41</b>
<b>College of Architecture and Design</b> .....	<b>75</b>
<b>College of Arts and Sciences</b> .....	<b>83</b>
<b>College of Business Administration</b> .....	<b>176</b>
<b>College of Education</b> .....	<b>183</b>
<b>College of Engineering</b> .....	<b>204</b>
<b>College of Home Economics</b> .....	<b>239</b>
<b>College of Veterinary Medicine</b> .....	<b>258</b>

# 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 1931 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 units not supported by the experiment stations.

## 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. Applicants should see that each undergraduate or graduate institution 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 must submit a health certificate as part of their application and 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 undergo the full review process. 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 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 101, 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.

Students enrolled in short courses or workshops during the summer session may take regularly scheduled courses as long as they are able to attend all sessions of both. The 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 the

bachelor's degree may enroll for one or more courses for graduate credit, **provided he or she has at least a B average on his prior work at the junior-senior level.** The 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.

## Degrees

### REQUIREMENTS

**Student Responsibility.** Graduate students are held responsible for knowing the academic policies and degree requirements set forth in this Bulletin. They are likewise held responsible for knowing the regulations concerning the degree they plan to take and any special requirements within the department or academic unit. In addition, it is the student's responsibility to be informed regarding the University's policies as to the standard of work required for continued enrollment in the Graduate School. The Graduate Office should be consulted if additional information is needed.

**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 at KSU (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.

**Academic Probation and Dismissal.** Admission to and continuation in the Graduate School depends upon a high level of achievement. Accordingly, students who do not maintain satisfactory progress in their studies are subject to being placed on probation or denied the privilege of continued enrollment in the University or in a specific graduate curriculum and, in either case, will be so notified by the Dean of the Graduate School. No student on probation may receive a graduate degree. A graduate student may be denied continued enrollment in the University or in his graduate curriculum in the case of a) failure to satisfy conditions necessary for removal from probationary status, b) the accumulation of nine or more semester hours of work with grades of less than "B", exclusive of problems courses, practicums, internships, research, or other individualized study, c) failure to meet published departmental requirements or failure in qualifying examinations, preliminary examinations, or final degree examinations, d) demonstrable lack of diligence in removal of assigned deficiency courses, in meeting



published degree requirements or in maintaining normal progress toward a graduate degree, and e) failure to acquire mastery of the methodology and content of one's field sufficient to complete a successful thesis or dissertation. A student denied the privilege of continued enrollment may petition for reinstatement to the same curriculum or for admission to a different curriculum.

**Non-Graded Work.** At the discretion of the Graduate Faculty of the department\* 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.). Students admitted to doctoral programs must complete a year of full-time study in residence at Kansas State University as a degree requirement. Furthermore, a minimum registration of 30 hours in research is required for the doctoral degree, not including work done toward a master's degree. Each candidate also must have completed at least 24 hours of regular degree credit in course work at Kansas State University. 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 sciences, economics, education, food science, foods and nutrition, genetics, grain science, home economics, horticulture, pathology, plant pathology, sociology, 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 would have a significant body of literature relevant to the field. Required foreign language examinations are administered by the Department of Modern Languages.

\*As used in the Graduate School the term, department, refers to interdepartmental graduate groups as well as to departmental faculties in the usual sense.



The language requirement must be satisfied before the student is admitted to candidacy.

During the first year of study beyond the master's degree or its equivalent, a supervisory committee is formed for each student. Committee members are proposed by the student and major advisor, subject to approval by the department head, and are appointed by the Dean of the Graduate School. The committee consists of at least four members of the Graduate Faculty, one of whom is the major advisor who serves as chairperson, and at least one member shall be from a department different from that of the major advisor. The committee aids the student in the preparation of the 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 Office. 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. The written approval of the major professor should be filed in the Graduate Office in the case of any student seeking to copyright his dissertation.

## 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. Students are eligible for resident fees during each term in which they hold 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
- Agricultural Mechanization
- Agronomy
- Animal Sciences
- Biochemistry
- Biology
- Chemical Engineering
- Chemistry
- Civil Engineering
- Clothing, Textiles and Interior Design
- Computer Science
- Crop Protection



Education  
Electrical Engineering  
Entomology  
Family and Child Development  
Family Economics  
Food Science  
Foods and Nutrition  
General Home Economics  
Genetics  
Geology  
Grain Science  
Health, Physical Education and Recreation  
Home Economics Education  
Horticulture  
Industrial Engineering  
Infectious Diseases  
Institutional Management  
Journalism and Mass Communication  
Mathematics  
Mechanical Engineering  
Microbiology  
Nuclear Engineering  
Parasitology  
Pathology  
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 Sciences  
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  
Home Economics  
Horticulture  
Industrial Engineering  
Mathematics  
Mechanical Engineering  
Microbiology  
Nuclear Engineering  
Parasitology  
Pathology  
Physics  
Physiology  
Plant Pathology  
Psychology  
Sociology  
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 SCIENCES

Don L. Good and Charles L. Norton, Faculty Co-chairmen

The interdepartmental graduate program in Animal Sciences is offered by faculty members in the departments of animal science and industry, dairy and poultry science, biochemistry, statistics, biology, physiology, and grain science and industry.

Candidates for the Master of Science or Doctor of Philosophy degrees in Animal Sciences may specialize in Animal Breeding, Animal Nutrition, Animal Production and Management, Animal Reproduction, or

Meat and Animal Products. The following general requirements will be adhered to:

1. Chairman of the student's supervisory committee will be a member of the animal sciences subdivision in which the student wishes to specialize.
2. The student's undergraduate background will include adequate basic courses in animal agriculture, biological and physical sciences. Students may be required to complete additional undergraduate courses in preparation for graduate study when the student's supervisory committee believes it is necessary.
3. The student's supervisory committee will be responsible for development of a program of study which meets any specific requirements established for the subdivision in which the student specializes.
4. The chairman of the supervisory committee will direct and advise the student in planning and executing research.
5. There will be no foreign language requirement.
6. All requirements of the Graduate School will be met.

Facilities for both basic and applied research include large and small experimental animals, modern laboratories, pilot plants for dairy, poultry, and meat products, and adequate library resources.

Students desiring to specialize in any subdivision should consult the appropriate chairman.

### Animal Breeding

R. R. Schalles, Chairman

Professors Craig, Huston and Wheat; Associate Professors Dayton, Kemp, Schalles and W. Smith.

The major in Animal Breeding is designed to equip candidates for careers in animal genetics and breeding.

Degree candidates are expected to acquire training in genetics, animal breeding and statistics. Additional courses may be required from other fields of biological and physical sciences. A typical program of study will include some of the following graduate level courses: Statistical and Population Genetics; Poultry Genetics; Dairy Cattle Genetics; Population Genetics; Animal Breeding; Statistics and Experimental Design; Physiology; Anatomy; and Computer Sciences.

### Animal Nutrition

B. A. Koch, Chairman

Professors Bartley, Deyoe, Koch, Parrish, Richardson, Sanford, Smith, and Ward; Associate Professors Adams, Ames, Brent, Frey, Harbers, Hines, Morrill, and Riley; Assistant Professors Allee and Bolsen.

Course work for candidates specializing in Animal Nutrition will include graduate level work in areas such as nutrition, biochemistry, physiology, histology, microbiology, statistics, computer science, grain science and others necessary to meet the specific needs of individual candidates.

### Animal Production and Management

A. W. Adams, Chairman

Professors Bartley, Craig, Farmer, Good, Koch, Norton, E. Smith, Ward, and Wheat; Associate Professors Adams, Allen, Ames, Hines, Kiracofe, Morrill, Riley, Schalles and W. Smith; Assistant Professors Allee, Bolsen, and Dikeman.

Graduate programs in this area are planned to qualify candidates for public or private careers in research, teaching, or extension. Major emphasis is on development of expertise necessary for decision making in modern animal industries.

Candidates will acquire proficiency in statistics and in two of the following areas: animal nutrition, animal breeding, and animal physiology.

Courses to complete the program of study may be selected from the following suggested areas (departments) in accord with the interests of the student and upon approval of the student's supervisory committee: animal science and industry, agricultural engineering, agronomy, animal behavior, biology, business administration, communications, mathematics, computer science, dairy and poultry sciences, economics, education, food sciences and grain science.

### Animal Products

Ross Mickelsen, Chairman

Professor Kropf; Associate Professors Allen, Bassette, Cunningham, and Mickelsen; Assistant Professor Dikeman.

The faculty offers a specialization in meat, dairy, and poultry products as related to their production. Course work will be required to meet the specific needs of students as determined by supervisory committees.

### Animal Reproduction

G. H. Kiracofe, Chairman

Professors Farmer and Gier; Associate Professors Able, Ames, and Kiracofe.

Degrees are designed to equip students for vocations in general animal reproduction. Study will be in the areas of reproductive endocrinology, developmental reproductive anatomy, environmental effects on reproduction, milk secretion, and applied use of reproductive control techniques.

Degree candidates will acquire training in physiology, biochemistry, and statistics. Additional course work may be required to meet specific needs of individual candidates.

### BIOCHEMISTRY

R. E. Clegg, Chairman

Professors Bode, Burkhard, Clegg, Cox, Lineback, H. L. Mitchell, Nordin, Parrish, Ruliffson, and Tsen; Associate Professors Clarenburg, B. Cunningham, Hedgcoth, Klopfenstein and Seib; Assistant Professors Center, K. Kramer, Mueller, Reeck, Roche, 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.

## CROP PROTECTION

O. J. Dickerson, Chairman

Professors Dickerson\*, Greig, and Murphy; Associate Professors Miles\*, Pitts\*, Stuteville, and Wilde; Assistant Professors Ehler\*, Long, Partida, and Tillman.

Graduate work leading to a Master of Science degree in Crop Protection is offered through an interdepartmental program. It is administered by the Crop Protection Steering Committee composed of faculty of the Departments of Agronomy, Entomology, Horticulture and Forestry, and Plant Pathology.

The curriculum is designed to train students to become professional crop protection specialists. Graduates may find employment with Federal and State agencies, with industries serving agriculture, as private practitioners, and with individuals and organizations engaged in crop production. A program of study will be developed to meet the needs of each student by a supervisory committee drawn from the Crop Protection Graduate Faculty. Course work is concentrated in the areas of crop protection, entomology, plant pathology, nematology, and weed science. Students will generally complete the non-thesis option of the Master of Science degree. Those interested in a research-oriented degree should investigate programs offered in the various cooperating departments.

In addition to meeting the general entrance requirements set by the Graduate School, students must have or complete introductory course work in biology, crops, entomology, plant pathology, and weed management.

## FOOD SCIENCE

Howard Mitchell, Chairman

Professors Bowers, Caul\*, Claydon\*, Clegg, Deyoe, Erickson\*, Fan, Farrell, Finkelstein, Greig\*, Harrison\*, Hoover, J. Johnson, Kropf, Kyle, Lineback, H. L. Mitchell\*, P. Nordin, Parrish, Pfost, Ruliffson, Schruben, Shugart, Tsen, Wakefield, and Ward; Associate Professors Allen, Bassette, Brent, Chung, B. Cunningham, F. Cunningham, B. Fryer, Hosenev, Klopfenstein, Mickelsen, Paulsen, Robinson, and Seib; Assistant Professors Dikeman\*, Iandolo and Mugler.

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, food chemistry, and a course in food processing if these courses are not included in previous preparation. Course requirements will be evaluated by the student's advisory committee, but must include one credit of Food Science Colloquium for the M.S. degree and two credits of Food Science Colloquium for the Ph.D. degree. 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 food processing, sensory evaluation of food, 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

\*Current members of the Food Science Coordinating Committee.

\*Crop Protection Curriculum Steering Committee.



Advanced Biochemistry Laboratory  
 Enzyme Chemistry  
 Enzyme Laboratory  
 Physical Biochemistry

#### **Chemical Engineering**

Transport Phenomena  
 Chemical Reaction Engineering  
 Biochemical Engineering  
 Biotransport Phenomena  
 Selected Topics in Biochemical Engineering

#### **Dairy and Poultry Science**

Fundamentals of Milk Processing  
 Poultry Products Technology  
 Chemistry of Foods  
 Principles of Dairy Foods Processing  
 Food Plant Management  
 Lipids in Food Systems  
 Practical Quality Control of Dairy  
 and Food Products  
 Dairy Bacteriology

#### **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  
 Fundamentals of Meat Processing and  
 Preparation  
 Proteins in Food Systems  
 Food Systems  
 Advanced Foods  
 Research Methods in Foods and Nutrition  
 Food Science Colloquium  
 Principles of Food Product Development  
 and Control  
 Nutrition and Aging  
 Nutrition Needs Throughout the Life Cycle  
 Diet Therapy  
 Advances in Nutrition  
 Child Nutrition

#### **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

#### **Horticulture**

Handling and Processing Fruits  
 and Vegetables  
 Vegetable Crop Physiology

#### **Institutional Management**

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

## **GENETICS**

E. G. Heyne, Chairman

Professors Bode, Casady, Craig\*, Heyne\*, Huston\*, Pittenger\*, Sorenson, and Wheat\*; Associate Professors Barnett, Liang, T.R. Manney, Nassar\*, Nickell, Smith, Schalles, and Wassom; Assistant Professors L. Bates, R. Denell, Rodkey, Slesinski, 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.

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 and Forestry**

Plant Breeding  
 Plant Genetics

#### **Statistics**

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

\*Members of the Genetics Coordinating Committee.



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, Grain Science and Industry, 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.

## HOME ECONOMICS

Professors Hoeflin, Hoffman, Kennedy, McCord, Morse, and Stith; Associate Professors Bollman, Davis, Perenich, and St. John; Assistant Professors Annis, Bergen, Jurich, Poresky, Roach, and Vaden.

The College of Home Economics plans to initiate a new Ph.D. program in Home Economics effective fall semester, 1975. The program is interdepartmental and is designed for advanced study of the family—its development, its effective utilization of resources, and its critical role as determinant of future generations. Subject matter will be integrated from those home economics fields based largely on social sciences along with related fields outside the College. A home economics emphasis will be developed for each student relative to a family concern such as: effective utilization of family resources; family decision making; family interaction and development throughout the family life cycle; cultural, economic and socio-psychological influences of clothing, textiles, equipment and housing of families; and effectiveness of institutions serving families.

The Ph.D. program is to be offered by the graduate faculty members of the Departments of Clothing, Textiles and Interior Design; Family and Child Development; Family Economics; and Institutional Management. Programs of study will include a minimum of 90 credit hours beyond the bachelor's degree—with at least 30 hours course work in the major area, 30 hours in dissertation research, and the remainder in supporting courses. Students entering the program will be required to show evidence of a broad background in home economics including course work in four of the five departmental areas in the College of Home Economics.

The Ph.D. program will be administered by a Coordinating Committee of the five graduate faculty members elected from the participating departments. The Coordinating Committee shall be responsible for implementation of policy regarding admission to the doctoral program, approval of major professor and supervisory committee members and review of guidelines for development of programs of study.

Inquiries should be directed: Chairperson, Coordinating Committee, Ph.D. in Home Economics Program, Justin Hall.

## PARASITOLOGY

C. W. Pitts, Chairman

Professors Elzinga, Hansen, Harvey, Knutson, Leland, and Lindquist; Associate Professors Dickerson, 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

H. W. Leipold, Chairman

Professors Anthony, Coles, Cook, Dennis, Kelley, Leland, and Lindquist; Associate Professors Burroughs, Leipold, McGavin, Minocha, Smith, and Strafuss; Assistant Professors Moore and West.

Graduate programs are offered by the Departments of Pathology and Infectious Diseases in the College of Veterinary Medicine leading to the degrees 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 approval of the interdepartmental graduate faculty.

There are no requirements for a reading knowledge of a foreign language.

## PHYSIOLOGY

Thomas Chapman, Chairman

Professors Bartley, Besch, Butler, 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.

Graduate work leading to the degree Doctor of Philosophy in Physiology is supervised by members of

\* Members of the Steering Committee, Graduate Group in Physiology.

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.

#### **INTERDISCIPLINARY PROGRAM IN REGIONAL AND COMMUNITY PLANNING**

Graduate study leading to the two-year professional degree, Master of Regional and Community Planning, is offered through the faculty in the Department of Regional and Community Planning. The program is strongly interdisciplinary in scope, and it benefits from the participation of a number of related departments such as Sociology, Economics, Political Science, Architecture, Geography, and so on. A Coordinating Committee consisting of faculty from these departments assists in planning the program. The program is designed to prepare its graduates for professional careers as planners for cities, regions and states, schools, colleges and universities, businesses, industrial plants, military installations and other organizations. Students with backgrounds in planning or in related areas are encouraged to undertake graduate work leading to the MRCP.



# 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 and 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 students are directed toward the mastery of one or more important areas of scientific agriculture. They gain understanding of supporting areas so that they can reason and grasp new technological developments, and assist in solving practical problems.

**2. Professional attitudes and orientation.** This phase of the students' education helps them 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 the 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 or she needs to develop and understand a

philosophy of life and values and develop 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, economic 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.

The honors program is a method of intensive self-directed study, not a method of search. The student wishing to enter the program should have fairly definite educational goals.

### Objectives:

1. To expose academically successful freshmen to:
  - a. various areas of interest with an emphasis on agriculture.
  - b. The honors program in the College of Agriculture.
2. To provide the academically successful student with an opportunity for greater curriculum flexibility.
3. To encourage undergraduate research.

### Eligibility:

Students in the College of Agriculture may petition to enter the honors program when they have completed 15 or more hours with a cumulative GPA of 3.0 or more at Kansas State University.

## STUDENT SELECTION OF A MAJOR

Students usually select a curriculum or major at the time they enter the College. They are provided an academic adviser in their major field. Students enroll in General Agriculture if they want to enter some part of professional agriculture but are not yet ready to identify a particular major. They are 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 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 an adviser in developing an academic program most effective and valuable. One who wants to write for a flower and garden magazine might major in agricultural journalism and minor in horticulture, or vice versa.

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

## GENERAL AGRICULTURE

Students who are undecided regarding the selection of a major in Agriculture may want to enroll in General Agriculture. Courses taken while in this area are selected with the help of an adviser to be applicable to any major in Agriculture and to most other programs offered at the University. Examples of course selections for first semester follow:

### Semester Course Load:

#### Example I:

English Composition I .....	3
Ag Orientation .....	1
Principles of Animal Science .....	3
College Algebra .....	3
Plant Science .....	4
Concepts in Phys. Ed. ....	0
—	—
	14

#### Example II:

Principles of Ag. Economics .....	3
Ag Orientation .....	1
Chemistry I or General Chemistry .....	5
Intermediate Algebra .....	3
Home Horticulture .....	2
A Lifetime Sport .....	0
—	—
	14

#### Example III:

Oral Communications I .....	2
Ag Orientation .....	1
Economics I .....	3
Agricultural Mechanics Practices .....	2
Graphic Communications I .....	2
Introductory Food Science .....	3
—	—
	13

## PROFESSIONAL PROGRAMS IN AGRICULTURE

1. Agricultural Economics; B.S., M.S., Ph.D., page 46.
2. Agricultural Education (teaching); B.S., M.S., page 48.
3. Agricultural Journalism; B.S., page 49.
4. Agricultural Mechanization; B.S., page 49.



5. Agronomy (Crops and Soils); B.S., M.S., Ph.D., page 50.
6. Animal Breeding; Ph.D., page 53.
7. Animal Nutrition; Ph.D., page 53.
8. Animal Science & Industry; B.S., M.S., page 53.
9. Bakery Science & Mgmt.; B.S., page 63.
10. Crop Protection; B.S., page 55.
11. Dairy Production; B.S., M.S., page 56.
12. Entomology; M.S., Ph.D., page 59.
13. Feed Science & Mgmt.; B.S., page 63.
14. Food Science; M.S., Ph.D., page 61.
15. Food Science & Industry; B.S., page 61.

16. Genetics; M.S., Ph.D., page 38.
17. Grain Science; M.S., Ph.D., page 63.
18. Horticulture; B.S., M.S., Ph.D., page 67.
19. Horticultural Therapy; B.S., page 68.
20. Milling Science & Mgmt.; B.S., page 63.
21. Natural Resource Management; B.S., page 72.
22. Plant Pathology; B.S., Ph.D., page 73.
23. Poultry Science; B.S., M.S., page 57.
24. Pre-Forestry (2 years); page 69.
25. Pre-Veterinary Medicine (2 years); page 45.
26. Retail Floriculture (2 years); page 69.

### OPTIONS AND COURSES REQUIRED IN AGRICULTURAL JOURNALISM, AGRICULTURAL MECHANIZATION, AGRONOMY, ANIMAL SCIENCE & INDUSTRY, DAIRY PRODUCTION, AND POULTRY SCIENCE

Courses	Science Option	Business and Industries Option	Production Option	Communications Option
<b>Agriculture:</b>				
Soils Plant Sci. or Crop Sci. Prin. An. Sci. Prin. Ag. Econ. A course in Ag. Engineering Econ. Entomology or Lvst. Entomology Plant Pathology or Int. Plant Pest Control Natural Resources and Man Int. Food Science and Technology	Five of the courses listed	Prin. Ag. Econ. <sup>1</sup> & second Ag. Econ. course plus three other courses listed <sup>2</sup>	Five of the courses listed	Four of the courses listed <sup>2</sup>
<b>Biological Science:</b>				
Gen. Botany <sup>3</sup> Organismic Biology Genetics Microbiol. Envlr. Biol.	Gen. Botany plus two other courses listed	Gen. Botany plus one other course listed	Gen. Botany 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 I <sup>4</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.	One course from each of three of the four groups	One of the courses listed	Two of courses listed, including one Org. Chem. course or the course intro. to Org. & Biochem.	One physical science listed
Elem. Org. Chem. Gen. Org. Chem. Org. Chem. I				
Intro. Org. Chem. & Biochem. Elem. Biochem. Gen. Biochem.				
<b>Business Administration and Agricultural Economics:</b>				
Small Business Operations Managerial & Cost Controls Business Law I Management Concepts Marketing Sales Management Money & Banking Labor Economics Economic Principles of Agricultural Business Firms Prin. of Transportation All other courses in Ag. Econ. with a 500 or higher course number	Fund. of Accounting	Fund. of Accounting plus 4 courses listed	Fund. of Accounting plus 1 course listed	Fund. of Accounting plus 1 course listed

1. Econ. II may substitute.

2. Plants and soils for Crop Production may be taken in lieu of either Soils or Crop Science in the Business and Industries and the Communications Options.

3. Principles of Biology may substitute.

4. Stat. Meth. I may substitute.

**SCIENCE OPTION**

(Preparation for Research &amp; 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, zoology, 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 30 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), Reporting II (3) and Editing I (3) plus six 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 Media .....	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**

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
Fundamentals of Radio-Television Production .....	3
Fundamentals of Radio-Television Performance .....	3
Radio-Television Continuity .....	3
Reporting II (Radio-Television) .....	3

**Suggested Humanities and  
Social Science Electives**

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

**Suggested Additional Communications Courses**

035 410 Agricultural Student Magazine (1-2)
229 200 English Composition III (3)
281 226 Argumentation and Debate (3)
281 220 Oral Communications II (2)
281 726 Persuasion (3)
281 727 Group Discussion Methods (3)
289 235 Survey of Mass Media
289 275 Reporting I (3)
289 250 Agricultural Journalism (3)
290 240 Fundamentals of Radio-Television Production (3)
290 250 Fundamentals of Radio-Television Performance (3)
305 391 Administrative Communications (3)
305 543 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 page 179) 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 page 178) 5 academic years.
3. A Bachelor of Science degree in some discipline within the College of Agriculture, including in the degree program a group of courses in Business Administration (see options and areas of study on page 178) 4 academic years.
4. A Bachelor of Science degree in Business Administration, including in the degree program a group of elective courses in some discipline within Agriculture.
5. A Bachelor of Science degree in Business Administration, followed by a B.S. or a master's degree in some discipline within Agriculture. 5 or 6 academic years.

To take advantage of one of these programs, students would enroll in the College of Agriculture or the College of Business Administration. The 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 the academic adviser and dean. If they pursue a second B.S. or a master's degree, they would transfer to the second college following receipt of the 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.

### Professional B.S. 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.

Course	Semester Hours
English I & II .....	6
Speech .....	2
Other communications such as Journalism or a second speech course .....	3
(For Bakery Science and Management, Food Science and Management, or Milling Science and Management, replace with a semester of inorganic chemistry or organic chemistry, or engineering graphics.)	
College Algebra .....	3
Trigonometry .....	3
(Required only in Professional Programs number 4, 7, 8, 10, 11, 14 and 15.)	
Calculus .....	5
(Required only in chemistry and operations options of 7, 10 and 14.)	
Chemistry (Inorganic) .....	8
(Eight hours required in all except that only five hours are required in 1, 2, 3, 4, 6, 8, 9, 12, 13 and 16.)	
Organic Chemistry .....	3
(Not required in 1, 3, 4, 12, 13, 16 and option "B" of 15.)	
Economics I .....	3
General Physics .....	5
(Required only in 4, 7, 8, 10, 11 and 15.)	
Humanities & Social Sciences .....	9
Biological Science .....	10
(Required in all except that only five hours are needed in 1, 7, 13, 14 and 15. None required in 4.)	
Electives .....	3
	<hr/> 63

### DUAL DEGREES

Students desiring a B.S. degree in some discipline in Agriculture and a B.S. degree in some other college at K-State will need to complete the requirements for each degree and a minimum of 150 semester hours.

### PRE-VETERINARY MEDICINE PROGRAM\*,\*\*

<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
	<hr/> 14
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
	<hr/> 17
<b>Sophomore</b>	
Physics I .....	4
General Organic Chemistry .....	5
Humanities or Social Science Elec. ....	6
Oral Communications I .....	2
	<hr/> 17
Physics II .....	4
Genetics .....	3
Humanities or Social Science Elec. ....	3
Chemical Analysis .....	4
General Elective .....	2
	<hr/> 16

\*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.

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

## Departments and Course Offerings

### AGRICULTURAL ECONOMICS

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 Biere,\* Buller,\* Erickson,\* Knight,\* Koudele,\* Langemeier,\* Norman,\* Schlender, and Walker; Assistant Professors Fenwick, Figurski, Flinchbaugh, Fredrick, Kropf, McReynolds, Overley, Pretzer, Riley, Treat, and Vacin; Emeritus: President Farrell,\* Dean Howe,\* Professors Coolidge, Montgomery,\* 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 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 adviser to develop a program of study meeting the interests, needs and career objectives of each student. Transfer students from junior colleges, from other majors and from the general agriculture program should find this flexibility well-suited to their needs.

The curriculum in agricultural economics has three options for specialization: (1) agricultural business (including both farm and agribusiness management), (2) agricultural programs and (3) professional agricultural economics.

**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 techniques of economic analysis. 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:

#### Department Requirements

229 100	English Composition I .....	3
229 120	English Composition II .....	3
281 105	Oral Communications I .....	2
245 100	College Algebra .....	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

#### Major Courses

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> .....	18

#### Supporting Courses

	Two communications courses <sup>1</sup> .....	6
273 110	General Psychology .....	3
305 260	Fundamentals of Accounting .....	4
245 500	Introduction to Analytical Processes .....	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 .....

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

#### 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,

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, 015 305 Soils, 035 301 Introductory Food Science & Technology, 005 500 Genetics.

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



agricultural policy, international development, agricultural business and industry and in other areas.

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

### Courses in Agricultural Economics

#### UNDERGRADUATE CREDIT (no prerequisite — open to all university students)

**010 100. Principles of Agricultural Economics.** (3) I, II. A course suggested for all students interested in the agricultural economy. A study of economic principles, with emphasis on their application to the solution of farm, agribusiness, and agricultural industry problems in relationship to other sectors of the United States economy and foreign countries. No prerequisite. Three hours lecture a week. 010-100-0-0111

**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. 010-101-0-0111

**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. 010-102-0-0111

#### UNDERGRADUATE CREDIT

**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. 010-441-0-0111

**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. 010-519-1-0111

#### 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. 505 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. 010-500-0-0111

**010 505. Agricultural Market Structures.** (3) I, II. Continuation of Ag. Econ. 500. 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. 010-505-0-0111

**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. 010-510-0-0111

**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 analysis related to problems of agriculture. Three hours recitation a week. Pr.: Econ. 110. 010-511-0-0111

**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. 010-512-1-0111

**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. 010-513-0-0111

**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. 010-514-0-0111

**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, intergeneration property transfers, water law, fence law, federal and state regulatory power, insurance, income tax and social security. Three hours recitation a week. Pr.: Econ. 110 and junior standing. 010-516-0-0111

**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 to 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. 010-517-1-0111

**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. 010-518-0-0111

**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. 010-520-0-0111

**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. 010-521-0-0111

**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. 010-522-0-0111



**UNDERGRADUATE AND GRADUATE CREDIT**

**010 600. Bargaining and Cooperation in Agriculture.** (3) I. A study of collective bargaining and cooperative activity in agriculture. Other marketing institutions such as marketing orders, marketing agreements, and agricultural marketing boards will be included. Emphasis is placed upon assessing the potential of these marketing techniques to strengthen the economic position of farmers in the economy. Three hours recitation a week. Pr.: Junior standing. 010-600-0-0111

**010 615. 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. 101-615-0-0111

**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 analysis; public and private ownership and control over natural resources; particular attention given to recreational use 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. 010-625-0-0111

**010 630. Rural Human Resource Development.** (3) II. Study of the nature of community development, the problems facing rural communities, and alternative solutions. Emphasis is placed on identifying problems, studying background materials such as public decision making, property rights, taxation, zoning, etc., and developing communities through industrialization, recreation, agricultural businesses and the creation of new employment centers. Three hours of recitation and field work a week. Pr.: Junior standing. 010-630-0-0111

**010 631. 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. 010-631-0-0111

**010 641. Agricultural Economics Seminar.** Credit arranged. S. Seminars of special interest will be offered upon sufficient demand in the areas of (a) Farm Management, (b) Agricultural Finance, (c) Marketing, (d) Land Economics, (e) Policy, (f) other selected areas. Pr.: Consent of instructor. 010-641-0-0111

**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. 480 and 500. 010-705-1-0111

**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. 010-710-1-0111

**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. 010-712-0-0111

**010 750. Agricultural Economics Problems.** Credit arranged. I, II, S. Pr.: Consent of instructor. 010-750-3-0111

**GRADUATE CREDIT**

**010 811. Seminar in Agricultural Policy.** (3) I. An analysis of the relation of government to the economic aspects of farm-

ing as individual enterprise and agriculture as an industry, including the international aspects of United States agriculture. Pr.: Consent of instructor. 010-811-0-0111

**010 823. Production Economics II.** (3) I. 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. 010-823-0-0111

**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. 010-829-0-0111

**010 831. Agricultural Marketing Management and Analysis.** (3) I, II, S. Marketing problems of firms that market or process farm products or handle farm supplies, with special emphasis on tools of analysis for solving marketing problems. Supervision of students' internship programs. Pr.: Consent of instructor. 010-831-0-0111

**010 832. Agricultural Marketing Organization and Institutions.** (3) I. 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. 010-832-0-0111

**010 898. Agricultural Economics Master's Report.** Credit arranged. I, II, S. Master's Report. 010-898-4-0111

**010 899. Agricultural Economics Master's Research.** Credit arranged. I, II, S. Research for master's thesis. 010-899-4-0111

**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. 010-901-0-0111

**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. 010-922-0-0111

**010 940. Seminar in Agricultural Economics.** (3) Offered on sufficient demand. Problems and current developments in agricultural economics. Pr.: Consent of instructor. 010-940-0-0111

**010 999. Agricultural Economics Ph.D. Research.** Credit arranged. I, II, S. Research for Ph.D. thesis. 010-999-4-0111

**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
		Concepts In Phys. Ed. ....	0
Physical Education	261 011		



<b>Spring Semester</b>		
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
		<b>15</b>

## 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	281 106	Oral Communications IA ..... 3
		<b>15</b>

<b>Spring Semester</b>		
Biochemistry	211 120	Intro. Bio. & Org. Chem. .... 5
Agronomy	015 305	Soils ..... 4
Ag. Engg.	506 351	Elective Agricultural Science 3
		Farm Power ..... 3
		General Elective ..... 1
		<b>16</b>

## JUNIOR

<b>Fall Semester</b>		
Ag. Ec.	010 100	Prin. of Ag. Econ. .... 3
Education	405 315	Educational Psychology II ... 3
		Literature or Language ..... 3
		Elective Agricultural Science 3
		Elective Social Science ..... 3
		<b>15</b>

<b>Spring Semester</b>		
Education	410 620	Prin. & Phil. of Voc. Ed. .... 3
Journalism	289 250	Agricultural Journalism ..... 3
		Elective Agricultural Science 3
		Elective Ag. or Ag. Engg. .... 3
		General Elective ..... 3
		<b>15</b>

## 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
		<b>19</b>

<b>Spring Semester</b>		
		Elective Ag. or Ag. Engg. .... 2
		General Elective ..... 3
		Elective Social Science ..... 3
		Elective Ag. Science ..... 8
		<b>16</b>

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 full-time student teaching. On-campus courses meet extra periods while the student is on campus, so he has no other academic responsibilities while teaching. When student teaching is taken in the spring, 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.

Man's race against hunger in many parts of the world has transformed agricultural reports into front page news. Agricultural journalists throughout the world are busy interpreting new developments — not only to farm people, but also to city people, just now beginning to realize that the strength of the land is their strength.

Rapid changes in agricultural science, production, and marketing must be relayed quickly and accurately to people who need to know. Today that's almost everyone.

The demand continues strong for trained agricultural journalists who understand and can interpret and report vital agricultural news. Graduates can take their pick of newspapers, magazines, radio or television stations, or government and university information staffs.

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 page 44)	9
Communications (see page 44)	2 or 3

Other general requirements are based on the production option on page 44. A faculty adviser assists students in the selection of non-major and elective courses.

### Journalism and Mass Communications Requirements (30-33 hours)

<b>Core (Required of all)</b>	
Reporting I	3
Reporting II (Print)	3
Editing I	3
Fundamentals of Radio-TV Production OR	3
Fundamentals of Radio-TV Performance	3
<b>12</b>	

Remaining 18-21 hours are elected by the student in consultation with the faculty adviser. NOTE: The course Agricultural Journalism (289 250) is not open to majors in agricultural journalism.

### 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 courses are concerned with the application of power units, machines, buildings, equipment and engineered production systems for agriculture and with making productive use of and conserving our soil, water and energy resources. Courses stress learning how to acquire and use in-

formation needed for problem solving and developing independent and logical thought processes. They aim to cultivate the student's confidence in being able to apply familiar concepts from the agricultural and mechanical sciences to a broad range of agri-mechanical and agribusiness problems. A background in production agriculture is useful but not essential.

Academic programs may be planned to emphasize soil and water management, irrigation, animal production facilities or power and machinery related areas such as tillage, planting and harvesting. Students enrolled in this major are required to select a minor area in one of the agricultural sciences. Additional electives may be used to enhance mechanical skills or to concentrate further in some area of production agriculture or business administration.

Agricultural Mechanization is administered through the Department of Agricultural Engineering. See page 205 for "Courses for Students in Agriculture." Students specializing in other fields may elect one or more of these courses to complement their academic programs. The courses are directed toward engineering applications, planning, servicing and management rather than toward engineering design.

### 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
Concepts in P.E. ....	0
Lifetime Sports .....	0
Communications .....	2 or 3
Social Sciences and Humanities .....	9

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 Option, include Economic Entomology and Plant Pathology as electives). Options listed on page 43.

### Department Requirements

<b>Major Courses</b>	
Farm Power .....	3
Agricultural Machinery Management .....	3
Planning and Management of Ag. Buildings .....	3
Conservation Surveying and Planning .....	3
Farmstead Utilities .....	3
Three or more of the following courses in Ag. Engg.—151, 352, 552, 560, 651, 653.	

Total credits of 24 hours required in Agricultural Engineering series 506 courses.

<b>Supporting Courses</b>	
Graphic Comm., Anal. & Des. I 560 212 .....	2
General Physics I .....	4
General Physics II .....	4
Plane Trigonometry .....	3
Principles of Biology .....	5

<b>Professional Agriculture Courses</b>	
Principles of Animal Science .....	3
Plant Science or Crop 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	

Specialization in irrigation includes the following four courses:	
010 500	Production Economics
or	
010 512	Farm Management
015 625	Management of Irrigated Soils
050 655	Integrated Pest Management
506 653	Irrigation Practices

## 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,\* Murphy,\* Olson,\* Sorensen,\* Withee,\* and Woodruff,\* Associate Professors Atkinson, Barnett,\* Dicken, Edelblute, Follett, Kanemasu,\* Liang,\* Lyles, Nickell,\* Nilson, Overley, Owensby,\* Paulsen,\* Peterson, Posler, Powers,\* Russ,\* Sloan, Skidmore,\* Teare,\* Vanderlip,\* Wassom,\* and Whitney,\* Assistant Professors Burchett, Ehler,\* Humburg, Lundquist, Moore, Raney, Stone,\* Swallow, Thien,\* and Walter; Instructors Armbrust, Bonne, Dickerson, Disrud, Hagan, and Knight; Emeritus: Professors Anderson,\* Axelton, Clapp, Cleavinger, Lind, Throckmorton,\* and Zahnley.\* Emeritus Associate Professor Harper.

### Undergraduate Study

Agronomy is the science of crops and soils. It attracts students with interests ranging from soil management to the physics and chemistry of soils and from crop production to the study of photosynthesis, crop physiology and genetics.

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

	Hrs.
229 100 English Composition I .....	3
229 120 English Composition II .....	3
281 105 Oral Communications .....	2
035 101 Ag Orientation .....	1
245 100 College Algebra .....	3
225 110 Economics I .....	3
221 210 Chemistry I .....	5
Concepts in Phys. Ed. ....	0
Lifetime Sports .....	0
Humanities and/or Social Sciences (see page 44) .....	9
Communications (see page 44) .....	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 72, or the crop protection curriculum, see page 55. 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 015 305 Soils. Other courses taken in agronomy depend upon student interest and the option selected. Minimum requirements for the various options are given on page 43.

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 are 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, soil-water-plant relations, 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. 015-150-1-0102

**015 200. Plant Science.** (4) I, II. Study of the principles of the production of economic plants, including morphology, taxonomy, physiology, ecology, propagation, preservation, storage, and utilization. Three hours lec. and one two-hour lab. a week. Taught in cooperation with the Department of Horticulture and Forestry. 015-200-1-0102

**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 rec. and two hours lab. a week. 015-220-1-0102

**015 230. Weed Management.** (2) II. An introductory lecture course for people interested in areas of crop production, crop protection, and agricultural education. Consideration of control systems emphasizing cultural practices and herbicides and legal implications. Includes identification of common mature and seedling weeds. 015-230-0-0102

**015 305. Soils.** (4) I, II. Fundamental chemical, physical and biological properties of soils; their formation, fertility and management. Two hours lec., one two-hour lab. a week, and self-programmed audiotutorial instruction. Pr.: Chem. 110 or 210 or credit in high school chemistry with grade of A or B. 015-305-1-0102

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

**015 350. Crop and Seed Quality.** (2) II. Identification, grading and evaluation of seeds for planting and commercial use. Visual appearance as an indication of quality of seeds, grain crops, hay silage and crop displays. Two two-hour rec. and labs per week. 015-350-1-0102

**015 360. 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. 015-360-1-0102

**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. 305 and 200 or 220. 015-365-0-0102

## UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**015 500. Range Management I.** (3) II. Presents fundamental ecological principles of production, conservation, and utilization of grasslands. Applies these fundamental principles to range management. Three hours rec. a week. 015-500-0-0102

**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. 305 or consent of instructor. 015-505-0-0102

**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 or 220. 015-510-0-0102

**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. 305. 015-525-0-0102

**015 535. Soil Conservation.** (3) I. Mechanics of wind and water erosion and practices used to control erosion. Land capability classes and conservation planning. Operation of conservation programs. Pr.: Agron. 305. 015-535-0-0102

**015 540. Forage Utilization.** (2) II. Utilization of forages in livestock production. Consideration of harvest methods, storage and handling, quality and animal use. Two hours rec. per week. Pr.: Junior standing. 015-540-0-0102

**015 591. Microclimatology.** (3) I, II. 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.) 015-591-0-0102

## 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. 015-600-3-0102

**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 interdependency of these factors. Pr.: Agron. 200 or 220 and 305 or consent of instructor. 015-610-1-0102

**015 615. Soil Problems.** Credit arranged. I, II, S. Studies may be chosen in the fields of: Chemistry, Physics, Conservation, Fertility, Genesis, Morphology and Classification. 015-615-3-0102

**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. 015-620-0-0102

**015 625. Management of Irrigated Soils.** (2) II. Principles of soil moisture retention, movement and measurement; reclamation and management of saline and alkaline soils; water quality; management. Two hours rec. a week. Pr.: Agron. 200 or 220 and 305. 015-625-0-0102

**015 655. Integrated Pest Management.** (3) II. Offered in cooperation with Entomology and Plant Pathology. See course description, 050 655. 015-655-0-0102

**015 670. Range Management Problems.** Credit arranged. I, II, S. 015-670-3-0102

**015 675. Soil Interpretations for Land-use Planning.** (3) II. The effect of the physical land resource on land use and land-



use planning. Three hours rec. a week and several Saturday field trips. Pr.: 235 220 or a course in Regional and Community Planning or Landscape Architectural Design or consent of instructor. 015-675-0-0102

**015 680. Range Management II.** (3) II. Offered 1975-76 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. 500, Biol. 530. 015-680-1-0102

**015 690. Agricultural Climatology.** (2) I. Concepts and applications of basic atmospheric principles governing the climate near the ground and the interrelationships between the physical environment and living organisms. Includes discussions on the implications of modifying the microclimate by management practices, plant-water relations, and remote sensing. Two hours rec. a week. Pr.: Phys. 193 or consent of instructor. 015-690-0-0102

**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. 305, Geol. 100. 015-705-0-0102

**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. 015-710-0-0102

**015 725. Soil and Plant Analysis Applications.** (3) I. Offered 1975-76 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. 305, Chem. 271. 015-725-1-0102

**015 735. 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, 305 and 365 or consent of the instructor. 015-735-1-0102

**015 745. 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. 305. 015-745-1-0102

**015 755. Soil Fertility.** (3) I. Advanced study of the relationship of soil chemistry to plant nutrition; interactions of nutrients and roles of nutrients in plant nutrition; soil reactions to fertilizer materials; diagnosis of soil fertility problems and formulation of recommendations. Three hours recitation a week. Pr.: Agron. 200 or 220, 305 and 365 or consent of instructor. 015-755-0-0102

**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. 500, Biol. 530. Suitable field experience may be substituted for these prerequisites with consent of instructor. 015-760-1-0102

**015 761. Identification of Range and Pasture Plants.** (2) II. Offered 1975-76 and alt. years. Field and laboratory study of range and pasture plants, with special emphasis on grasses and their distinguishing characteristics. One hour rec. and two hours lab. a week. Pr.: Biol. 198. 015-761-1-0102

**015 770. Plant Genetics.** (3) I. Concepts and application of

basic genetic principles in higher plants. Measurement of linkage, mapping, aneuploidy analysis, gene transfer, and estimation of genetic parameters for quantitative characters. Three hours rec. a week. Pr.: A.S.I. 500. 015-770-0-0102

**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. 015-780-1-0102

**015 810. Agronomy Seminar.** (1) I, II. A discussion of agronomic developments. Pr.: Graduate standing. 015-810-0-0102

**015 870. Agronomic Plant Breeding.** (3) II. Offered in 1975-76 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. 015-870-1-0102

**015 898. Masters' Report.** (2) I, II, S. Preparation of a written report either of research or of problem work on a topic in the major field. 015-898-4-0102

**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. 015-899-4-0102

**015 905. Soil Physical Chemistry.** (3) I. Offered 1976-77 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. 705, 745 and Chem. 585. 015-905-1-0102

**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.) 015-910-0-0102

**015 915. Soil Physics.** (3) I. Offered 1975-76 and alt. years. An advanced study of prominent theories concerning the physical behavior of soils. Three hours rec. a week. Pr.: Agron. 745, Math. 222, Phys. 211. 015-915-0-0102

**015 925. Soil Genesis.** (2) II. Offered 1976-77 and alt. years. Theories of soil formation processes. Two hours rec. a week. Pr.: Agron. 505. 015-925-0-0102

**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.) 015-930-0-0102

**015 935. Topics in Soils.** Credit arranged. I, II, S. Discussion and lectures on important papers and contributions in this field. Pr.: Consent of instructor. 015-935-0-0102

**015 950. Advanced Crop Ecology.** (3) I. Offered 1976-77 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. 015-950-0-0102

**015 960. Topics in Crop Physiology and Ecology.** Credit arranged. I, II, S. Discussion and lectures on important papers and contributions in this field. Pr.: Consent of instructor.

**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. 015-999-4-0102



## 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 Able,\* Allen,\* Ames,\* Brent,\* Francis, Harbers,\* Hines,\* Kiracofe,\* McKee,\* Riley,\* Schalles,\* W. Smith,\* and Zoellner; Assistant Professors Allee,\* Bolsen,\* Corah, Dikeman,\* Hoover,\* Orwig, Schafer, Schwartz, Spaeth, and Westmeyer; 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 horses and all classes of meat animals.

The animal science and industry buildings, lots and pastures are devoted to the maintenance of herds and flocks of cattle, sheep, hogs and horses for the purpose of teaching and research.

The department offers the Animal Science & Industry major with options in Production, Business & Industries, Science & Communications, page 43. In addition the department helps administer and advise students enrolled in the new curriculum in Food Science & Industry, see page 61.

### Graduate Study

Major work leading to the M.S. and Ph.D. degrees in Animal Sciences is offered in the fields of Animal Breeding, Animal Production and Management, Animal Products, Animal Reproduction and Animal Nutrition, as well as 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 Animal Science and Industry. 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.

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
Lifetime Sports .....	0
Humanities and / or Social Sciences (see page 44) .....	9
Communications (see page 44) .....	2 or 3

Other general requirements depend upon the option selected (see page 43). 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
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
Patterns of Farm Animal Reproduction .....	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). 005-102-0-0104

**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. Two hours lab. per week. A companion course to A.S.I. 102 and Dy. and Pl. Sc. 102. 005-103-1-0104

**005 200. Fundamentals of Nutrition.** (3) I, II. 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. 005-200-0-0104

**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.: A.S.I. 102 and 103 or consent of instructor. 005-250-0-0104

**005 261. Meat Processing.** (2) I, II. Converting meat animals into carcasses, and processing techniques for meat products. To include slaughtering, inspection, by-product handling, carcass grading, meat cutting, retail cut identification, preservation, meat cookery, meat specifications, and product control. Three hours lab. and one hour rec. per week. Pr.: A.S.I. 102 and 103, 250 or concurrent assignment. 005-261-1-0104

**005 270. 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 hours rec. and lab. per week. Pr.: A.S.I. 250, 261, or conc. enrollment (or consent of instructor) and sophomore standing. 005-270-1-0104

**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. 005-300-0-0104



**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. 005-305-0-0104

**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 hour lec. and two hours lab per week. Pr.: A.S.I. 102 and 103 or consent of instructor. 005-315-1-0104

**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 two hours lab a week. Pr.: Fundamentals of Nutrition or equivalent. 005-320-1-0104

**005 330. Patterns in Farm Animal Reproduction.** (3) II. Elementary anatomical and physiological principles as related to the patterns of reproduction in the bovine, equine, porcine, and ovine. Demonstrations of current techniques such as artificial insemination and semen collection and handling are provided in the recitation section. Pr.: A.S.I. 102. 005-330-0-0104

**005 340. Animal Science and Industry Practicums.** (2) II. Practical manual phases of livestock management are practiced by students. Four hours lab. per week. Pr.: A.S.I. 102 and 103. 005-340-1-0104

**005 385. Wool Grading and Classification.** (1) I. A study of factors determining the commercial classes and grades of wool and the desired fleece qualities of the breeds of sheep; practice in judging, grading and scoring wool. Three hours lab. a week. Pr.: A.S.I. 102. 005-385-1-0104

**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, 261. 005-395-1-0104

**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, A.S.I. 103 and 315. 005-450-1-0104

**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. 005-470-1-0104

#### 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. 005-500-0-0104

**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. 005-510-0-0104

**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 attachment, growth and parturition of the fetus. The laboratory provides practical training in following the development of the bovine fetus. Pr.: Senior standing and consent of instructor. 005-512-2-0104

**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. 005-515-0-0104

**005 521. Horse Science.** (3) I. A study of the light horse industry in the U.S. Structure, types and breeds of horses, selection, nutrition, management, performance, breeding, and health. Three hours lec. a week. Pr.: A.S.I. 200 or consent of instructor. 005-521-0-0104

**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. 005-525-0-0104

**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. 005-535-0-0104

**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.) 005-555-0-0104

**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. 005-580-0-0104

#### UNDERGRADUATE AND GRADUATE CREDIT

**005 605. Commercial Cattle Feedlot Management.** (2 to 4) I, S. 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 four weeks of supervised work-study at an approved commercial cattle feedlot. Pr.: A.S.I. 515. 005-605-3-0104

**005 615. Swine Production Unit Operation.** (2-4) I, S. A maximum of two hours credit for each four weeks of supervised work-study at an approved commercial swine production unit. Pr.: A.S.I. 535. 005-615-3-0104

**005 625. Beef Cow Herd Unit Operation.** (2-4) I, S. 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. 005-625-3-0104

**005 660. 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. 005-660-3-0104

**005 671. Meat Selection and Utilization.** (3) I. Emphasis on meat cut identification, muscle and bone anatomy, grades, fabricated meat, institutional cuts, specification writing, processing, meat preparation and shrinkage costs. Two-hour period weekly of lecture-recitation and two hours laboratory. Pr.: 640 400 or 640 601 or 660 440. 005-671-1-0104

**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 rec. per week. Pr.: Biochemistry 521 or equivalent. 005-700-0-0104



**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. 005-720-3-0104

**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 lec. per week with frequent laboratory demonstrations. Pr.: Physiol. 530 or consent of instructor. 005-735-0-0104

**005 741. Population Genetics.** (4) II. Application of genetic principles to livestock improvement, selection methods, mating systems, heritability estimates and methods of analyzing genetic data. Three hours lec. and one hour rec. a week. Pr.: A.S.I. 500 and three hours in statistics. 005-741-0-0104

**005 777. Meat Technology.** (4) II. Meat composition, meat product safety and spoilage, quality assurance, meat processing techniques, sausage and formed products, color, packaging, plant planning and organization, field trip. Three hours lec. and three hours lab. a week. Pr.: A.S.I. 250 and 261; senior or graduate standing. 005-777-1-0104

**005 818. Fundamentals of Meat Processing and Preparation.** (1-2) I, II, S. 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. 005-818-1-0104

#### 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. 005-835-0-0104

**005 850. Analytical Techniques in Animal Science and Industry.** (3) I, II. Principles of analytical procedures used in research in Animal Science and Industries. One hour rec. and six hours lab. a week. Pr.: Consent of instructor. 005-850-1-0104

**005 886. Comparative Animal Nutrition.** (5) I. A study of the veterinary medical aspects of nutrition, including principles of feeding and nutrition of common domestic species of food producing and companion animals; consideration of material relative to therapeutic nutrition as related to clinical management of diseased and convalescent animals. Pr.: Third year Veterinary Medicine or A.S.I. 005 700. 005-886-0-0104

**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. 005-890-0-0104

**005 898. Master's Report.** (2) II. Pr.: Consult major professor. 005-898-4-0104

**005 899. Research in Animal Science and Industry** (M.S. degree). Credit arranged. I, II, S. Pr.: Consult instructor. 005-899-4-0104

**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 Dy. and Pl. 820. 005-900-0-0104

**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. 005-901-0-0104

**005 906. Animal Breeding Seminar.** (1) II. Evaluation of animal experimentation as related to reproduction and breeding. Pr.: Consent of instructor. 005-906-0-0104

**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. 777 or equivalent and Biochem. or consent of instructor. 005-930-0-0104

**005 999. Research in Animal Science and Industry.** (Ph.D. degree). Credit arranged. I, II, S. Pr.: Consult instructor. 005-999-4-0104

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#### CROP PROTECTION

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

Advisers: Dickerson, Plant Pathology; Ehler, Agronomy; Miles, Horticulture and Forestry; Pitts, Entomology; Tillman, Plant Pathology.

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 59 for the Entomology Science Option and page 73 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 (or equiv. 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 44)	9

Other requirements depend upon the option selected.

### PEST MANAGEMENT OPTION

#### Curriculum Requirements

050 210	Intro. to Plant Protection	2
030 312	General Entomology	2
030 313	General Entomology Lab.	1
030 666	Insect Pest Mgmt.	3
030 780	Insects Attacking Field Crops, Grasslands, Livest.	3
050 420	Plant Nematology	2
050 501	Plant Pathology	3
050 615	Diseases of Field Crops	3
015 620	Weed Science	3
050 635	Properties of Pesticides	2
030 645	Federal and State Regulations of Pesticides	1
050 610	Plant Disease Diagnosis	1
or		
030 410	Plant Pest Diagnosis	1
050 655	Integrated Pest Management	3
050 651	Internship in Crop Protection	1-2
040 680	Plant Protection	3

#### Supporting Courses — Agriculture and Biol. Sci.

015 200	Plant Science	4
015 305	Soils	4
215 198	Principles of Biology	4
215 201	Organismic Biology	4
215 530	Ecology	3

#### Four or more of the following suggested

005 102	Principles of Animal Science	3
005 500	Genetics	3
015 365	Soil-Plant Relationships	3
015 500	Range Management	3
015 505	Soils as a Natural Resource	3
015 525	Crop and Soil Management	3
015 610	Crop Ecology	3
030 710	Insect Taxonomy	3
030 745	Insect Control by Host Plant Resistance	2
040 281	Forest Conservation	2
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
211 201 and 211 202	Elementary Biochemistry Lec. and Lab.	5
285 340	Biometrics I	3

### BUSINESS AND INDUSTRIES OPTION

#### Curriculum Requirements

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

#### Supporting Courses — Biological Sciences

015 200	Plant Science	4
015 305	Soils	4
215 198	Principles of Biology	4
215 530	Ecology	3

#### Two or more of the following suggested

005 102	Principles of Animal Science	3
015 365	Soil-Plant Relationships	3
015 500	Range Management	3

015 505	Soils as a Natural Resource	3
015 525	Crop and Soil Management	3
015 610	Crop Ecology	3
040 281	Forest Conservation	2
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

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
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#### Four or more of the following suggested:

305 202	Small Business Operations	3
305 270	Managerial and Cost Controls	3
305 292	Business Law I	3
305 420	Management Concepts	3
305 440	Marketing	3
305 542	Sales Management	3
225 530	Money and Banking	3
225 620	Labor Economics	3
225 631	Principles of Transportation	3
010 518	Economic Principles of Agricultural Business Firms	3

All other courses in Ag. Econ. with a 500 or higher course number.

## DAIRY AND POULTRY SCIENCE

C. L. Norton,\* Head of Department

Professors Bartley,\* Craig,\* Farmer,\* Norton,\* Sanford,\* and Ward,\* Associate Professors Adams,\* Bassette,\* Bonewitz,\* Call,\* Cunningham,\* Mickelsen,\* Morrill,\* Assistant Professor Roberts; Instructor Kahr; Emeritus: Professors Claydon\* and 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, and Communications, page 43. In addition the department helps administer and advise students enrolled in the new curriculum in Food Science & Industry, see page 61.

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 page 44)	9
Communications (see page 44)	2 or 3

Other general requirements depend upon the option selected (see page 43).



**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:

Other general requirements depend upon the option selected (see page 43).

**Required major courses include:**

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 page 44) .....	9
Communications (see page 44) .....	2 or 3

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 and Industry curriculum. See page 43.

**Graduate Study**

Major work in both dairy and poultry leading to the degrees Master of Science and Doctor of Philosophy is offered in the fields of animal sciences and food science which are interdepartmental programs. Subdivisions of the animal sciences program include animal breeding, animal nutrition, animal production and management, animal products, and animal reproduction.

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.) 025-102-0-0105

**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. 102 or consent of instructor. 025-103-1-0105

**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. 102 or consent of instructor. 026-104-1-0106

**025 196. Dairy Cattle Judging.** (2) II. Six hours lab. a week. Pr.: Dy. and Pl. Sc. 102 and 103. 025-196-1-0105

**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. 025-200-0-0105

**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. 025-305-0-0105

**026 310. 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. 026-310-1-0106

**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 lec., two hours lab. a week. Pr.: Biochem. 120 or equivalent. 025-311-1-0105

**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 two-hour lab. Pr.: One course in microbiology or consent of instructor. 025-401-1-0105

**025 420. Advanced Dairy Cattle Judging.** (1) Three hours lab. a week. Pr.: Dy. and Pl. Sc. 196. 025-420-1-0105

**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. 025-500-0-0105

**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. 025-501-0-0105

**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. 025-505-0-0105

**025 520. Dairy Products Evaluation.** (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. 025-520-1-0105

**025 550. 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 lec. and two two-hour labs per week. Pr.: Biochem. 120 or equiv. 025-550-1-0105

**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. 026-555-0-0106

#### UNDERGRADUATE AND GRADUATE CREDIT

**025 601. Milk Secretion.** (3) II. Offered in 1976-77 and alt. 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. 025-601-1-0105

**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. 025-610-1-0105

**025 621. Dairy Cattle Management.** (3) II. Offered in 1975-76. Dairy farm layout planning and analysis, interpretation 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. 025-621-1-0105

**026 630. Poultry Problems.** (1-3) I, II, S. 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. 026-630-3-0106

**025 637. Dairy Cattle Genetics.** (3) II. 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 value of sires and dams through pedigree analysis. Two hours rec. and three hours lab. a week. Pr.: One semester each of elementary genetics and statistics or consent of instructor. 025-637-1-0105

**026 640. Management of Domesticated Poultry and Game Birds.** (3) II. Offered in odd years. A detailed study of the production and management practices involved in commercial poultry and game bird enterprises. Two hours rec. and three hours of lab. a week. Pr.: Dy. and Pl. Sci. 102 and 104, senior or graduate standing, or consent of instructor. 026-640-1-0106

**025 665. Dairy Production Problems.** (1-3) I, II, S. Pr.: Junior standing. 025-665-3-0105

**025 675. Dairy Manufacturing Problems.** (1-3) I, II, S. Pr.: Junior standing in dairy manufacturing. 025-675-3-0105

**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. 025-690-1-0105

**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.: Junior standing or consent of instructor. 025-694-0-0105

**026 700. Poultry Products Technology.** (3) I. Offered in 1975-76 and alt. 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. 026-700-1-0106

**025 705. Reproduction in Farm Animals.** (4) I. Introduction to anatomical and physiological aspects of reproduction in farm animals. Laboratories provide orientation and participation in techniques and procedures in artificial breeding. Pr.: A.S.I. 102 or Dy. and Pl. Sc. 102 or equiv. and junior standing. 025-705-1-0105

**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. 026-712-1-0106

**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. 025-715-0-0105

**026 720. Avian Metabolism.** (3) I. Offered in 1976-77 and alt. 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. 026-720-0-0106

**026 746. Quantitative Genetics and Poultry Improvement.** (3) II. Offered 1977 and odd years. Major concepts, experimental verification and applications of quantitative genetics to improvement by breeding. Special emphasis on evaluation of genetic gains, genotypic-environmental interactions, selection plateaus, heterosis, selection for combing ability and special techniques in relation to poultry breeding. Discussion, three lectures a week. Pr.: One semester each of genetics and statistics. 026-746-0-0106

**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. 026-750-0-0106

#### 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. 025-810-0-0105

**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. Three one-hour recitations a week. Pr.: Dy. and Pl.



Sc. 200; Biochem. 521 or 755, or consent of instructor. 025-820-1-0105

**025 886. Comparative Animal Nutrition.** (5) I. A study of the veterinary medical aspects of nutrition, including principles of feeding and nutrition of common domestic species of food producing and companion animals; consideration of material relative to therapeutic nutrition as related to clinical management of diseased and convalescent animals. Pr.: Third year Veterinary Medicine or A.S.I. 005 700. 025-886-0-0105

**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. 026-899-4-0106

**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. 025-899-4-0105

**025 905. Lipids in Food Systems.** (2) I. Offered in 1976-77 and alt. years. Processing, analysis and physical and chemical characteristics of lipids with emphasis on their behavior and function in food systems. One hour rec. and three hours lab. Pr.: Biochem. 521 and F&N 601 or Dy. and Pl. Sc. 715. 025-905-0-0105

**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. 025-999-4-0105

**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. 026-999-4-0106

## ENTOMOLOGY

B.S. in Agriculture under the Crop Protection Curriculum (see page 55) which includes the Entomology Science Option.

Herbert Knutson,\* Head of Department

Professors Knutson,\* Elzinga,\* Gates, Harvey,\* Hopkins,\* Horber,\* Associate Professors Blocker,\* Brooks, Mills,\* Pitts,\* Thompson,\* and Wilde,\* Assistant Professors Boles,\* DePew, Eshbaugh, Kadoum,\* McGaughey,\* Partida,\* and Stone,\* 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. 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 Option of the Crop Protection Curriculum (page 55).

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 (page 43) the following:

Entomology Courses		
030 312	General Entomology .....	2
030 313	General Entomology Lab. ....	1
030 660	External Insect Morphology .....	3
030 710	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
215 555	Microbiology .....	4
215 530	Environmental Biology .....	3
Physical Sciences and Mathematics		
245 150	Plane Trigonometry .....	3
285 340	Biometrics I .....	3
221 230	Chemistry II and .....	3
221 250	Chemistry II Laboratory* .....	2
221 190	Elementary Organic Chem. and .....	3
221 191	Elementary Organic Chem. Lab. ....	2
	OR	
221 531	Organic Chemistry I and .....	3
221 532	Organic Chemistry Lab. ....	2
	OR	
221 350	General Organic Chem. and .....	3
221 351	General Organic Chem. Lab. ....	2
221 510	General Plant Biochemistry .....	4
	OR	
211 521	General Biochemistry and .....	3
211 522	General Biochemistry Lab. ....	2
	OR	
211 201	Elementary Biochemistry and .....	3
211 202	Elementary Biochemistry Lab. ....	2
245 220	Analytical Geom. and Calc. I .....	4
	OR	
286 200	Fundamentals of Computer Prog. ....	3
265 113	General Physics I and .....	4
265 114	General Physics II .....	4
	OR	
265 115	Descriptive Physics .....	4

### 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.

\* To be taken if Chem. I is selected from General requirements.

OR

\* Not required if Gen. Chem. is chosen from General requirements.



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

#### UNDERGRADUATE CREDIT

**030 300. Economic Entomology.** (3) I, II. Classification, life histories, habits, and principles of control of important economic insects. For agriculture majors. Two hours lec. and two hours lab. a week. 030-300-1-0421

**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. 030-305-0-0421

**030 312 General Entomology.** (2) I, II, S. A basic study of insects and related arthropods, their structure, physiology, behavior, and relations to plants and animals, including man. Two hours rec. a week. 030-312-0-0421

**030 313. General Entomology Laboratory.** (1) I, II, S. Identification, food preferences, and habitat preferences of the common insects. Two hours a week. 030-313-0-0421

**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 in horticulture and non-agriculture majors. Two hours lecture-demonstration a week. 030-325-0-0421

**030 326. Insects of Home, Lawn and Garden Laboratory.** (1) I, II. Laboratory exercises for recognition and control of many horticultural and household pests both for the home owner and advisers of home owners. Pr.: 030 325 or concurrent enrollment. Two hours laboratory a week. 030-326-1-0421

**030 410. Plant Pest Diagnosis.** (1) I. A practical experience in diagnosis of insects and insect damage as it occurs in the field, lawn and garden. Four hours combined lec. and lab. a week. Pr.: 030 312, 030 313, 030 300 or equiv. 030-410-1-0421

#### UNDERGRADUATE AND GRADUATE CREDIT

**030 645. Federal and State Regulation of Pesticides.** (1) II. 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. 030-645-

**030 655. Integrated Pest Management.** (3) II. Offered in cooperation with Agronomy and Plant Pathology. See course description, 050 655. 030-655-1-0421

**030 660. External Insect Morphology.** (3) I. 1975-76 and alt. years or on demand. External form, structure and anatomy; leading theories of form and structure from generalized to specialized conditions. One hour lec. and six hours lab. a week. Pr.: Entom. 300 or 312 and 313. 030-660-1-0421

**030 666. Insect Pest Management.** (3) I. Offered 1975-76 and alt. years. Insecticides, types and methods of application, biological control, its usefulness and limitations, cultural control. Two hours lec. and three hours lab. a week. Pr.: Entom. 300 or 312 and 313. 030-666-1-0421

**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. 300, or 312 and 313, or consent of instructor. Two hours lec. and three hours lab. a week. 030-705-1-0421

**030 710. Insect Taxonomy.** (3) II. 1975-76 and alt. years or on

demand. 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 hour lec. and six hours lab. a week. Pr.: Entom. 300 or 312 and 313; Entom. 660 recommended but not required; insect collection desirable. 030-710-1-0421

**030 721. Medical Entomology.** (2) I. Insects and other arthropods as parasites and disseminators of disease; life cycles, biology, and control of insect parasites of man and animals. Pr.: Entom. 300 or 312 and 313. 030-721-0-0421

**030 722. Medical Entomology Lab.** (1) I. Identification of arthropod pests and vectors, and current diagnostics in medical entomology. Pr.: Entom. 300 or 312 and 313. 030-722-1-0421

**030 730. Topics in General and Systematic Entomology.** Credit variable. I, II. Offered 1975-76 and alt. years. Principles of taxonomy; advanced taxonomy; taxonomy of immature insects; arachnology; and biological literature. Pr.: Entom. 300 or 312 and 313 and consent of instructor. 030-730-1-0421

**030 735. Insect Ecology.** (3) I. Offered 1976-77 and alt. years. Influence of biotic, physical and edaphic factors of environments on insects. Two hours lec. and three hours lab. a week. Pr.: Entom. 300 or 312 and 313, or equiv. in zoology and 215 530 Ecology or equiv. 030-735-1-0421

**030 740. Entomological Methods.** (1-3). Offered on demand. Methods, materials, and techniques used in entomological research. Pr.: Entom. 300 or 312 and 313 or equiv. 030-740-1-0421

**030 745. Insect Control by Host Plant Resistance.** (2) I. 1976-77 and alt. 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 312 and 313 and a course in either plant or animal genetics. 030-745-0-0421

**030 757. Toxicology and Properties of Insecticides.** (3) I. Physical, chemical and biological properties of insecticides; demonstrations in the laboratory of symptoms and antidote actions in mammals; formulations and residue analysis. Two hours lec. and two hours lab. a week. Pr.: 221 350, General Organic Chemistry, or consent of instructor. 030-757-1-0421

**030 765. Internal Insect Morphology.** (3) II. Offered 1976-77 and alt. years. Internal anatomy of representative insects; plan and structure of internal systems. One hour lec. and six hours lab. a week. Pr.: Entom. 660. 030-765-1-0421

**030 775. Insect Physiology.** (3) I. Offered 1975-76 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 three hours lab a week. Pr.: Entom. 765 or consent of instructor. 030-775-1-0421

**030 780. Insects Attacking Field Crops, Grasslands and Livestock.** (3) II. Offered 1975-76 and alt. years. Includes representative insect pests of corn, sorghum, soybeans, alfalfa, wheat, grasslands, livestock, and stored grain. Pr.: Entomology 300 or 312 and 313. 030-780-0-0421

**030 782. Insects Attacking Horticulture Crops and Forests.** (3) I. Offered 1976-77 and alt. years. Includes representative insect pests of fruits, vegetables, turf, ornamental plants, forest and shade trees. Two hours lec. and three hours lab. a week. Pr.: Entom. 300 or 312 and 313, Entom. 666 desirable. 030-782-0-0421

**030 795. Entomology Seminar.** (1) I, II, S. Pr.: Consult seminar committee. Required of all Ph.D. entomology graduate students once yearly. 030-795-0-0421

**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. 030-799-3-0421



**GRADUATE CREDIT**

**030 898. Report in Entomology (M.S.).** Credit arranged. I, II, S. Work in various fields of entomology. Pr.: Consent of instructor. 030-898-4-0421

**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. 030-899-4-0421

**030 930. Topics in Environmental and Physiological Entomology.** Credit variable. II. Selected topics for advanced study in insect behavior, ecology, physiology and pesticides in the environment. Pr.: Consent of instructor. 030-930-3-0421

**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. 030-999-4-0421

**FOOD SCIENCE AND INDUSTRY**

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

Advisers: Greig, Horticulture and Forestry; Kropf, Animal Science and Industry; Lineback, Grain Science and Industry; Mickelsen, Dairy and Poultry Science.

This curriculum leads toward careers 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. It deals 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 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: Processing, Business, or Science. This is an interdepartmental curriculum involving the Departments of Animal Science and Industry, Dairy and Poultry Science, Grain Science and Industry, and Horticulture and Forestry. The Science Option involves 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 247.

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 office of the Dean of Agriculture or the Dean of Home Economics for assignment of an adviser.

**Core Curriculum — Processing and Business Options**

Freshman (20-22 hrs.)

229 100	English Composition I	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

**Agriculture (12-14 hrs.)**

035 301	Intro. Food Science & Technology	3
005 200 or 025 200	Fundamentals of Nutrition	3

Plus any 2 of the following:

015 200	Plant Science	4
005 102 or 025 102	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.)**

025 550	Dairy Bacteriology	4
OR		
215 555	Microbiology	4
045 651	Food and Feed Plant Sanitation	4
OR		
025 690	Practical Quality Control of Dairy & Food Products	3
010 514	Economics of Food Marketing	3
025 311	Introductory Food Chemistry	3
005 305	Fundamentals of Food Processing	3
Course also numbered 025 305 and 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 hours)**

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		
211 201	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 Geom. & Calc. I	4
OR		
245 500	Intro. to Anal. Proc.	3
286 200	Fundamentals of Computer Prog.	3
285 320	Elements of Statistics	3
OR		
285 340	Biometrics I	3
OR		
285 703	Statistical Methods for Natural Scientists	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	
	Processing	Business
Core courses	84	81
Options	24	27
Electives	18	18
	126	126

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

\*\*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 Meats .....	2
	AND	
005 261	Meat Processing .....	2
005 720	Meat-Packing Plant Operations .....	2-6
025 401	Fundamentals of Milk Processing .....	3
005 777	Meat Technology .....	4
025 501	Principles of Dairy Foods Processing .....	3
025 505	Principles of Dairy Foods Proc. Lab. ....	1-3
026 700	Poultry Products Technology .....	3
040 792	Handling and Processing Fruits and Vegetables .....	3
045 120	Introductory Bakery Technology .....	2
045 635	Baking Science I .....	2
045 636	Baking Science I Lab. ....	2
045 637	Baking Science II .....	2
045 638	Baking Science II Lab. ....	1
045 715	Fund. of Processing Grains for Food .....	3
215 520	Microbiology of Foods .....	4
506 555	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 Agricultural 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 and Cost Controls .....	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
305 531	Personnel Wage 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 hours)**

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
215 555	Microbiology .....	4

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

A. Agriculture (4-7 hours)		
035 101	Ag Orientation .....	1

**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 hours)**

221 210	Chemistry I .....	5
221 230	Chemistry II .....	3
221 271	Chemical Analysis .....	4
221 350	Gen. Org. Chemistry .....	3
221 351	Gen. Org. Chemistry Lab. ....	2
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. & Calc. I .....	4

**Professional Courses (23-24 hrs.)**

035 301	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.)	
045 651	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 Meats .....	2
	AND	
005 261	Meat Processing .....	2
005 777	Meat Technology .....	4
005 720	Meat-Packing Plant Operation .....	2-6
025 401	Fund. of Milk Proc. ....	3
045 715	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
040 792	Handling and Processing Fruits and Vegetables .....	3
045 120	Intro. Bakery Technology .....	2
045 635	Baking Science I .....	2
045 636	Baking Science I Lab. ....	2

**Plus minimum 9 hours of the following**

010 514	Economics of Food Marketing .....	3
025 550	Dairy Bacteriology .....	4
025 715	Chemistry of Foods .....	3
045 300	Cereal and Feed Analysis .....	3
045 602	Cereal Science .....	3
045 661	Qualities of Feed & Food Ingredients .....	3
045 700	Adv. Cereal Chem. ....	3
045 711	Prin. of Food Analysis .....	3
215 201	Organismic Biol. ....	4
215 525	Human Physiology .....	4
285 340	Biometrics I .....	3
286 200	Fund. of Computer Programming .....	3
506 555	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

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



## 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 agriculture are presented. Required of freshmen in Agriculture. 035-101-0-0101

**035 290. Honors Program Orientation.** (1) I. Open to new students (freshmen and transfer students) who are likely candidates for admission to the Honors Program in Agriculture. Special meetings and seminars will be held to acquaint students with the objectives and functioning of the Honors Program in Agriculture. Optional for qualified students upon invitation by the Dean. 035-290-0-0101

**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. 035-298-2-0101

**035 301. 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. 035-301-0-0101

**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. 035-398-2-0101

**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. 035-410-3-0101

### UNDERGRADUATE AND GRADUATE CREDIT

**035 505. Comparative Agriculture.** (1-3) Intercession. The course is intended to acquaint students with agriculture of other countries and other parts of the U.S. and how it differs from Midwestern-Great Plains agriculture relative to climate, crops, soils, livestock practices, marketing, and cultural attitudes toward agriculture. Pr.: Consent of instructor. 035-505-0-0101

**035 510. Internship in Farm Broadcasting.** (3) S. For advanced students interested in practical application of mass media principles and techniques. May include public affairs reporting, field interviewing, and supervised production of mass media materials. Pr.: Junior standing. 035-510-0-0101

**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 reader's understanding and accepting content expressed. Junior standing. 035-610-3-0101

### 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. 035-988-0-0101

## GRAIN SCIENCE AND INDUSTRY

William Hoover,\* Head of Department

Professors Deyoe,\* Farrell,\* Finney,\* Hoover,\* Johnson,\* Lineback,\* Pfost,\* Schoeff,\* Tsen,\* Ward,\* and Wilcox; Associate Professors Eustace, Hosene,\* Robinson,\* Seib,\* and Wetzler,\* Assistant Professors Balding\* and Bates,\* Instructor Pedersen; Emeritus: Professors MacMasters and Shellenberger; Assistant Professor Miller.

### 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 and Industry curriculum, see page 61.

### BAKERY SCIENCE AND MANAGEMENT

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

#### FRESHMAN

Fall Semester	Course	Sem. Hrs.
Gen. Ag.	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
		<hr/> 15

#### Spring Semester

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

#### SOPHOMORE

Fall Semester	Course	Sem. Hrs.
Grain Science	045 120 Intro. Bakery Technology ....	2
Biology	215 198 Principles of Biology .....	4
	Option A, B or C .....	10
		<hr/> 16

#### Spring Semester

Biology	215 555 Microbiology .....	4
	Soc. Sci., Humanities Elec. ...	6
	Option A, B or C .....	6
		<hr/> 16

#### JUNIOR

Fall Semester	Course	Sem. Hrs.
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
		<hr/> 16

#### Spring Semester

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
		<hr/> 15



**SENIOR****Fall Semester**

Soc. Sci., Humanities Elec. ....	3
Option A, B or C .....	13
	<hr/> 16

**Spring Semester**

Grain Science	045 634
Grain Science	045 651

Bakery Technology .....	3
Food and Feed Plant Sanit. ..	4
Option A, B or C .....	9
	<hr/> 16

**Option A (Administration)**

Grain Science	045 300
Biochemistry	211 120
Chemistry	221 250
Economics	225 120
Com. Science	286 200
Physics	265 113
Statistics	285 320
Mathematics	245 500
Bus. Ad.	305 260
Bus. Ad.	305 292
Bus. Ad.	305 440
Bus. Ad.	305 450

Cereal and Feed Analysis ....	3
Intro. Org. & Biol. Chem. ....	5
Chemistry II Lab. ....	2
Economics II .....	3
Fund. Computer Prog. ....	3
General Physics I .....	4
Elements of Statistics .....	3
Intro. Analytic Processes ....	3
Fund. of Accounting .....	4
Business Law I .....	3
Marketing .....	3
Business Finance .....	3
Electives .....	7

And nine (9) hours from the following:

Economics	225 530
Bus. Ad.	305 270
Bus. Ad.	305 271
Bus. Ad.	305 420
Bus. Ad.	305 461
Bus. Ad.	305 531
Bus. Ad.	305 530
Bus. Ad.	305 540
Bus. Ad.	305 542
Bus. Ad.	305 551
Industrial Engg.	550 501

Money and Banking .....	3
Managerial and Cost Cont. ....	3
Cost Accounting .....	3
Management Concepts .....	3
Taxation I .....	3
Personnel and Wage Admin. ..	3
Labor Legislation .....	3
Consumer Behavior .....	3
Sales Management .....	3
Investment .....	3
Industrial Management .....	3

**Option B (Chemistry)**

Grain Science	045 300
Grain Science	045 625
Biochemistry	211 521
Biochemistry	211 522
Chemistry	221 271
Chemistry	221 531
Chemistry	221 532
Chemistry	221 550
Chemistry	221 551
Chemistry	221 500
Mathematics	245 220
Mathematics	245 221
Physics	265 213
Physics	265 214

Cereal and Feed Analysis ....	3
Flour and Dough Testing ....	3
General Biochemistry .....	3
General Biochemistry Lab. ....	2
Chemical Analysis .....	4
Organic Chemistry I .....	3
Organic Chemistry I Lab. ....	2
Organic Chemistry II .....	3
Organic Chemistry II Lab. ....	2
Desc. Physical Chemistry ....	3
Anal. Geom. & Calc. I .....	4
Anal. Geom. & Calc. II .....	4
Engg. Physics I .....	5
Engg. Physics II .....	5
Electives .....	9

**Option C (Operations)**

Biochemistry	211 120
Chemistry	221 250
Mathematics	245 220
Mathematics	245 221
Mathematics	245 222
Physics	265 213
Physics	265 214
Applied Mech.	510 350
Applied Mech.	510 306
Elect. Engg.	530 519
Industrial Engg.	550 501
Mechanical Engg.	560 217
Mechanical Engg.	560 513

Intro. Org. & Biol. Chemistry .....	5
Chemistry II Lab. ....	2
Anal. Geom. & Calc. I .....	4
Anal. Geom. & Calc. II .....	4
Anal. Geom. & Calc. III .....	4
Engg. Physics I .....	5
Engg. Physics II .....	5
Statics .....	3
Strength of Matls. ....	3
Elec. Cir. Control .....	4
Industrial Management .....	3
Graphical Communications II ..	3
Thermodynamics I .....	3
Electives .....	7

**Spring Semester**

Chemistry	221 230
English	229 120
Mathematics	245 150
Phys. Ed.	261
Speech	281 105
Mech. Engg.	560 212

Chemistry II .....	3
English Comp. II .....	3
Plane Trig. ....	3
Lifetime Sports .....	0
Oral Comm. I .....	2
Graphical Communications ..	2
Option A, B, or C .....	3
	<hr/> 16

**SOPHOMORE****Fall Semester**

Grain Science	045 110
Biology	215 198
Economics	225 110

Flow Sheets .....	2
Principles of Biology .....	4
Economics I .....	3
Option A, B, or C .....	7
	<hr/> 16

**Spring Semester**

Dairy Science	025 200
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Fundamentals of Nutrition ...	3
Social Science, Humanities	
Elective .....	6
Option A, B, or C .....	7
	<hr/> 16

**JUNIOR****Fall Semester**

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

**Spring Semester**

Grain Science	045 661
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Qualities of Feed and	
Food Ingredients .....	3
Option A, B, or C .....	12
	<hr/> 15

**SENIOR****Fall Semester**

Option A, B, or C .....	16
	<hr/> 16

**Spring Semester**

Grain Science	045 651
---------------	---------

Food and Feed Plant Sanit. ..	4
Option A, B, or C .....	12
	<hr/> 16

**Option A (Administration)**

Ag. Econ.	010 520
Grain Science	045 300
Grain Science	045 680
Biochemistry	211 120
Chemistry	221 250
Economics	225 120
Mathematics	245 500
Physics	265 113
Physics	265 114
Statistics	285 320
Computer Science	286 200

Grain Marketing .....	3
Cereal and Feed Analysis ....	3
Feed Tech. II .....	4
Intro. Org. & Bio. Chem. ....	5
Chemistry II Lab. ....	2
Economics II .....	3
Intro. Analytic Processes ....	3
General Physics I .....	4
General Physics II .....	4
Elements of Statistics .....	3
Fundamentals of Computer	
Programming .....	3
Fundamentals of Accounting .	4
Business Law I .....	3
Business Finance .....	3
Electives .....	7

Bus. Ad.	305 260
Bus. Ad.	305 292
Bus. Ad.	305 450

And twelve (12) hours from the following:

Bus. Ad.	305 270	Managerial and Cost Controls	3
Bus. Ad.	305 271	Cost Accounting .....	3
Bus. Ad.	305 420	Management Concepts .....	3
Bus. Ad.	305 461	Taxation I .....	3
Bus. Ad.	305 531	Personnel and Wage Admin. ..	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
Biochemistry	211 521
Biochemistry	211 522
Biology	215 201
Chemistry	221 271
Chemistry	221 500
Chemistry	221 531

Cereal and Feed Analysis ....	3
General Biochemistry .....	3
General Biochemistry Lab. ..	2
Organismic Biology .....	4
Chemical Analysis .....	4
Desc. Phys. Chem. ....	3
Organic Chemistry I .....	3

**FEED SCIENCE AND MANAGEMENT**

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

**FRESHMAN****Fall Semester**

Gen. Agr.	035 101
Grain Science	045 100
Chemistry	221 210
English	229 100
Mathematics	245 100
Phys. Ed.	261 001

Course	Sem. Hrs.
Ag Orientation .....	1
Principles of Milling .....	3
Chemistry I .....	5
English Composition I .....	3
College Algebra .....	3
Concepts in P.E. ....	0
	<hr/> 15



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	285 703	Statistical Methods for Natural Scientists .....	3
		Electives .....	12
<b>Option C (Operations)</b>			
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 Construction .....	3
Biochemistry	211 120	Introd. Org. & Biol Chemistry .....	5
Computer Science	286 200	Fund. of Computer Programming .....	3
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 Matls. ....	3
Applied Mech.	510 350	Statics .....	3
Elect. Engg.	530 519	Elec. Cir. Control .....	4
Statistics	285 320	Elements of Statistics .....	3
		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 .....	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		Course	Sem. Hrs.
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		Course	Sem. Hrs.
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		Course	Sem. Hrs.
Grain Science	045 500	Milling Tech. I .....	4
Biology	215 555	Microbiology .....	4
		Social Science, Humanities Electives .....	6
		Option A, B, or C .....	2
			16

### JUNIOR

Fall Semester		Course	Sem. Hrs.
Agronomy	015 340	Market Grading Cereals .....	2
		Social Science, Humanities Electives .....	3
		Option A, B, or C .....	11
			16

Spring Semester		Course	Sem. Hrs.
Grain Science	045 602	Cereal Science .....	3
		Option A, B, or C .....	12
			15

### SENIOR

Fall Semester		Course	Sem. Hrs.
Grain Science	045 635	Baking Science I .....	2
Grain Science	045 636	Baking Science I Lab. ....	2
		Option A, B, or C .....	12
			16

Spring Semester		Course	Sem. Hrs.
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. Chemistry .....	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 and Cost Controls	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.	305 531	Personnel and Wage Admin. ....	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 committee believes it necessary, students will be required to take additional undergraduate courses to prepare them more completely for their 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. 045-100-1-0199

**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. 045-110-1-0199

**045 120. Introductory Bakery Technology.** (2) I. An introduction to bakery science and technology. The processes used to produce baked goods on a large scale are emphasized. The products discussed include breads, dinner rolls, buns, sweet rolls, cakes, pastries, donuts, crackers, and cookies. Films and tours of bakeries are used to introduce students to the equipment and operations used to manufacture baked goods. Two hours lec. a week. Pr.: Math. 100. 045-120-1-0197

**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. 045-300-1-0198

**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. 045-305-0-0198

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**045 500. Milling Technology I.** (4) I. 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. 045-500-1-1099

**045 510. Feed Technology I.** (4) I. 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. 045-510-1-0198

**045 520. Feed Manufacturing Processes.** (3) II. 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. 045-520-1-0198

#### 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. 045-602-0-0198

**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. 045-625-1-0197

**045 634. Bakery Technology.** (3) II. Physical and engineering principles involved in baking processes. Study of materials handling, fluid flow, and heat transfer as related to the bakery operation. The layouts of facilities to produce baked goods are studied, and the students prepare their own bakery layout. Current problems of the baking industry are discussed. Three hours lec. a week. Pr.: Math. 100, Physics 113, and Gr. Sc. 638. 045-634-0-0197

**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. 045-635-0-0197

**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. 045-636-1-0197

**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. 045-637-0-0197

**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. 045-638-1-0197

**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. 045-640-1-0199

**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. 045-651-1-0198

**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. 045-655-1-0199

**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. 045-661-0-0198

**045 670. Milling Technology II.** (4) II. 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. 045-670-1-0199

**045 680. Feed Technology II.** (4) II. 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, and one course each in statistics and computer programming. 045-680-1-0198

**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. 045-685-1-0199

**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. 045-700-0-0198

**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. 045-710-0-0197

**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. 045-711-0-0198

**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. 045-715-1-0198

**045 790. Grain Science Problem.** Credit arranged. I, II, S. Pr.: Consent of staff. 045-790-3-0196

#### 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. 045-801-0-0196

**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. 045-899-4-0196

**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. 045-900-2-0196

**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. 045-999-4-0196

#### HORTICULTURE AND FORESTRY

R. W. Campbell, Head of Department

Professors Campbell,\* Callaher, Greig,\* Keen,\* and Morrison,\* Associate Professors Biswell, Clayberg,\* Grey, Miles,\* Odom,\* and Strickler; Assistant Professors Abmeyer, Dainello, Deneke, Deutsch, Gaylor, Geyer,\* Hadle, Leuthold, Long,\* Mahaffey,\* Marr,\* Mattson,\* Moyer, Naughton, Nighswonger, Pair, Pinkerton, Rowland, Still,\* van der Hoeven and Winzer; Instructors Atchison, Biles, Bratton, Geisler, Gould, Loucks and Shreve; Emeritus: Professors Amstein, Filing and Pickett; Assistant Professor Willis.

#### Undergraduate Study

The Department of Horticulture and Forestry offers two four-year curriculums (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 55, the Food Science and Industry Curriculum, page 61, and the Parks and Recreation Area Management option of the Curriculum in Natural Resource Management, page 72.

#### 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, magazines, newspapers, advertisers, etc; or conduct public relations 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

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
Elective in Entomology .....	3
Plant Pathology .....	3

\*Not required in Landscape Forestry.

### Horticultural Science Option

Animal Sc. & Ind. 005 500	Genetics .....	3
Biology 215	Biology Sci. Elective .....	3
Chemistry 221 230	Chemistry II .....	3
Chemistry 221 250	Chemistry II Lab. ....	2
Physics 265 115	Descriptive Physics .....	4
Chemistry 221 190	Elem. Org. Chem. ....	3
Mathematics 245 150	Trigonometry .....	3
Computer Sc. 266	Computer Sc. Elec. ....	3
Statistics 285	Statistics Elec. ....	3
Horticulture 040	Horticulture Elec. ....	9
	Free Electives .....	22

### Horticultural Industries Option

Business Ad. 305 260	Fund. of Accounting .....	4
	Business Electives .....	6
Biology 215	Bio. Sc. Elec. ....	3
	Phys. Sc. Elec. ....	6
	Math, Statistics, Computer Science Elec. ....	6
Horticulture 040	Hort. Elec. ....	12
	Free Elec. ....	21

### Urban Horticulture and Forestry Option

Bus. Ad. 305 260	Biol. Sc. Elec. ....	3
	Phys. Sc. Elec. ....	3-5
Landscape Arch. 110 200	Fund. of Accounting .....	4
Hort. & For. 040 400	Business Elec. ....	3
Hort. & For. 040 680	Landscape Design .....	3
Hort. & For. 040 281	Plant Propagation .....	3
	Plant Protection .....	3
	Forest Conservation .....	2
	Free Elec. ....	17-20
	Professional Elec. ....	17
	(to be selected from list below)	

### PROFESSIONAL ELECTIVES

(Select a minimum of 17 hours within one of the following three professional areas)

#### 1. Landscape Horticulture

Hort. & For. 040 361	Herbaceous Plant Matis. ....	3
Hort. & For. 040 371	Woody Plant Matis. ....	3
Landscape Arch. 110 300	Res. Landscape Des. ....	3
Hort. & For. 040 450	Landscape Development ....	2
Hort. & For. 040 551	Landscape Contracting .....	3
Hort. & For. 040 610	Turf Management .....	2
Hort. & For. 040 611	Turfgrass Mgmt. Lab. ....	1
Hort. & For. 040 620	Arboriculture .....	3
Architecture 105 301	Apprec. of Arch. ....	3
Ag. Engg. 506 558	Conservation Surveying and Planning .....	3
	OR	
Civil Engg. 525 212	Elementary Surveying Engineering .....	3
Architecture 104 207	Arch. Graphics I .....	2
	OR	
Mech. Engg. 560 212	Graphical Communications, Analysis & Design I .....	2

#### 2. Landscape Forestry

Hort. & For. 040 620	Arboriculture .....	3
Hort. & For. 040 795	Municipal Forestry .....	2

And 12 hours from following list:

Hort. & For. 040 361	Herbaceous Plant Matis. ....	3
Hort. & For. 040 371	Woody Plant Matis. ....	3
Hort. & For. 040 330	Dendrology I .....	2
Hort. & For. 040 610	Turf Management .....	2
Hort. & For. 040 611	Turfgrass Mgmt. Lab. ....	1
Reg. and Comm. 109 315	Intro. to Planning .....	3
Ag. Engg. 506 558	Conservation Surveying and Planning .....	3
	OR	
Civil Engg. 525 212	Elementary Surveying Engineering .....	3

Hort. & For. 040 560	Vegetable Crop Ecology .....	3
Hort. & For. 040 520	Fruit Production .....	3

### 3. Communications

Art 209 100	Design I .....	2
Art 209 205	Graphic Design Tech. ....	2
Speech 281 726	Persuasion .....	3
Journ. 289 320	Principles of Ad. ....	3
Journ. 289 310	Photojournalism .....	3
Journ. 289 250	Ag. Journ. ....	3
Journ. 289 630	Public Relations .....	3
Bus. & Acct. 305 543	Sales Communication .....	3
Bus. & Acct. 305 440	Marketing .....	3

### 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

#### Fall Semester

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
	Horticulture Elec. ....	2-3
		14-15

#### 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
Phys. Ed. 261	Lifetime Sports .....	0
	Electives .....	3
		17

### SOPHOMORE

#### Fall Semester

Biology 215 210	Gen. Botany I .....	4
	OR	
Biology 215 198	Principles of Biology .....	4
Hort. & For. 040 131	Floral Arrangement .....	3
Hort. & For. 040 361	Herbaceous Plant Matis. ....	3
	Electives .....	6
		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
F. C. Dev. 620	Family and Child Development Elective .....	3
		16

### JUNIOR

#### Fall Semester

Hort. & For. 040 520	Fruit Production .....	3
Hort. & For. 040 570	Greenhouse Management ....	3
Agronomy 015 305	Soils .....	4
Education 405 215	Ed. Psych. I .....	3
	Elective .....	3
		16



<b>Spring Semester</b>		
Hort. & For.	040 560	Vegetable Crop Ecol. .... 3
Art	209 100	Design I ..... 2
Hort. & For.	040 400	Plant Propagation ..... 3
Plant Path.	050 501	Plant Pathology ..... 3
Hort. & For.	040 360	Hort. Therapy Act. .... 2
Hort. & For.	040 371	Woody Plant Matls. .... 3
		15 or 16

**SENIOR**

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

<b>Either Semester</b>		
Hort. & For.	040 640	Hort. Problems ..... 1-3
Hort. & For.	040 661	Greenhouse and Clinical Practices ..... 3-6
Hort. & For.	040 662	Garden and Landscape Therapy ..... 3-6
		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**

Biology	215 210	General Botany ..... 4
English	229 100	English Comp. I ..... 3
Speech	281 105	Oral Comm. I ..... 2
Mathematics	245 100	College Algebra ..... 3 <sup>1</sup>
Hort. & For.	040 281	Forestry Cons. .... 2
Phys. Ed.	261 001	Concepts in Phys. Ed. .... 0
		14

Chemistry	221 110	General Chemistry OR
	221 210	Chemistry I ..... 5
English	229 120	English Comp. II ..... 3
Mathematics	245 150	Plane Trig. .... 3 <sup>1</sup>
Hort. & For.	040 330	Dendrology I ..... 2
Hort. & For.	040 210	Forestry Graphics ..... 2
Phys. Ed.	261	Lifetime Sports ..... 0
		Elective ..... 1-2
		16-17

**SOPHOMORE**

Agronomy	015 305	Soils ..... 4
Geology	234 100	Geology I ..... 3
Hort. & For.	040 340	Dendrology II ..... 2
Hort. & For.	040 310	Forestry Instruments ..... 1
Statistics	285 340	Biometrics I ..... 3
Hort. & For.	040 320	Forestry Seminar ..... 1
		Elective ..... 2-3
		16-17

Physics	265 115	Descriptive Physics ..... 4
Civil Engg.	525 212	Elem. Surveying Engg. .... 3
Computer Sci.	286 200	Fund. of Comp. Prog. and
Computer Sci.	286 201	FORTTRAN Lang. Lab. .... 3
Economics	225 110	Economics I ..... 3
		Electives ..... 2
		15

**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.

1. Students with proper mathematics background are encouraged to substitute Calculus for these courses.

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.

<b>Fall Semester</b>		
Hort. & For.	040 131	Floral Arrangement ..... 3
Landscape Arch.	110 200	Gen. Landscape Des. .... 3
Biology	215 210	Gen. Botany ..... 4
Bus. Ad.	305 101	Personal Finance ..... 2
Psychology	273 110	Gen. Psych. .... 3
		15

<b>Spring Semester</b>		
Hort. & For.	040 140	Advanced Floral Arrangement ..... 3
Hort. & For.	040 200	Plant Science ..... 4
Hort. & For.	040 150	Home Horticulture ..... 2
Clo., Text. & I. Des.	611 101	Design for Contemporary Living ..... 3
Speech	281 105	Oral Comm. I ..... 2
Art	209 100	Design I ..... 2
		16

<b>Summer School</b>		
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**

**040 131. 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. 040-131-1-0109

**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. 040-140-1-0109

**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. 040-150-0-0108



**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. 040-151-1-0108

**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. 040-200-1-0108

**040 210. Forestry Graphics.** (2) II. Construction and interpretation of maps, charts and graphs employed in forestry and related resources. One hour rec. and three hours lab. a week. No prerequisites. 040-210-1-0108

**040 281. Forest Conservation.** (2) I. An introduction to American forestry. Forestry heritage in the U.S., importance of forests in soil and water conservation, multiple use concepts, management practices, utilization and policy. Two hours rec. a week. No prerequisites. 040-281-0-0421

**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. 040-299-1-0109

**040 305. 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. Non-major. No prerequisites. 040-305-0-0108

**040 310. Forestry Instruments.** (1) I. Introduction to the use of instruments and applied measurements used in forestry practices. Three hours lab. a week. No prerequisites. 040-310-1-0114

**040 315. 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. 040-315-1-0109

**040 320. Forestry Seminar.** (1) I. Student presentation of ideas, practices and concepts in forestry or related areas. One hour rec. a week. 040-320-0-0114

**040 325. 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. Non-major. No prerequisites. 040-325-0-0109

**040 330. Dendrology I.** (2) I. Identification, classification, silvical characteristics, distribution and economic significance of important North American angiosperm trees. One hour rec. and three hours lab. a week. Pr.: Biol. 215 210 or equiv. 040-330-1-0114

**040 333. 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. Non-major. No prerequisites. 040-333-0-0108

**040 340. Dendrology II.** (2) II. Identification, classification, silvical characteristics, distribution, and economic significance of important North American gymnosperm trees. One hour rec. and three hours lab. a week. Pr.: Biol. 215 210 or equiv. 040-340-1-0114

**040 350. Park and Recreation Areas Field Studies.** (2) I, II, S. Required professional employment: a survey and application of the principles of park and recreation areas management and operations. Studies of selected aspects of natural resource management for recreation. Preparation and presentation of a comprehensive analysis of a specific assigned problem. Pr.: Sophomore in Park and RAM. 040-350-3-0114

**040 360. Horticulture Therapy Activities.** (2) I, II. Supervised training using plants as an activity therapy with geriatric,

mentally retarded, or handicapped individuals. Pr: Sophomore standing or consent of instructor. 040-360-2-0114

**040 361. Herbaceous Plant Materials.** (3) I. Annual and perennial flowers, ornamental and turf grasses, and tropical plants for ornamental planting. Pr.: 215 210 or equivalent. 040-361-0-0108

**040 370. 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. 040-370-0-0115

**040 371. Woody Plant Materials.** (3) II. Deciduous and evergreen trees, shrubs and vines for landscape use. Pr.: 215 210 or equivalent. 040-371-0-0108

**040 400. 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.: 215 210 or equivalent. 040-400-1-0108

**040 440. 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. 040-440-0-0108

**040 450. Landscape Development.** (3) I. The location and arrangement of plants and other permanent features of the landscape around homes and other similar areas. Three hours lab. and one hour rec. per week. Pr.: 040 371. 040-450-1-0109

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**040 508. Landscape Horticulture.** (3) I. 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. Non-major. Pr.: Biol 210 or Plant Science 200. 040-508-1-0109

**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 three hours lab. a week. Pr.: 040 200 or equiv. 040-520-1-0109

**040 551. Landscape Contracting.** (3) II. The use, interpretation and development of planting plans (including contracting, construction, and specifications) as applied to landscape Horticulture. Pr.: 040 450 or consent of instructor. 040-550-1-0109

**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 lec. and three hours lab. o: field trips per week. Pr. 040 200. 040-560-1-0109

**040 570. Greenhouse Management.** (3) I. Greenhouse construction, environmental control, crop scheduling and management. Two hours rec. and three hours lab. a week. Pr.: 040 200. 040-570-1-0109

**040 580. Park Operations.** (3) I. Required field trips at the expense of the student. Planning, execution and supervision of field maintenance and operations; also capital budgeting, job planning, personnel practices, equipment operation and maintenance. Two hours lec. and two hours lab. Pr.: Park and RAM Option, 040 699 or consent of instructor. 040-580-1-0109



**UNDERGRADUATE AND GRADUATE CREDIT**

**040 605. Nursery Management.** (3) II. A study of the various practices and methods of operating a commercial nursery for the production of ornamental woody plants used for landscaping purposes. Two hours rec. and three hours lab. a week. Pr.: Gen. Botany 215 210 or equiv., Plant Science 040 200 and Soils 015 305. 040-605-1-0109

**040 610. Turf Management.** (2) I. Methods and principles of establishing and maintaining special purpose turf. Pr.: Hort. and For. 200, Agron. 305 or consent of instructor. 040-610-0-0109

**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. 040-611-1-0109

**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. 305 or consent of instructor. 040-620-1-0109

**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.: 040 200. 040-625-0-0109

**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 synthesis and analysis 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 three hours lab. per week. Field trips required. Pr.: 040 440. Senior standing. 040-635-1-0109

**040 640. Horticultural Problems.** Credit arranged. I, II, S. Problems and reports in floriculture, olericulture, ornamental horticulture, and pomology. Pr.: Consent of instructor. 040-640-3-0109

**040 641. Forestry Problems.** Credit arranged. I, II, S. Work is offered in various fields of forestry. Pr.: Consent of instructor. 040-641-3-0114

**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. 040-642-3-0114

**040 645. Park Management Seminar.** (1) I, II. Various guest speakers and exercises designed to offer the student opportunities to articulate and interact in structured small group situations, discussing Park and RAM topics. 040-645-0-0114

**040 660. Concepts of Travel and Tourism.** (3) S. Field trips required at the expense of the student. Advanced study of non-business travel and tourism including its origins, present characteristics, economic impact, and leisure implications. Pr.: Park and RAM Option, 040 440 or consent of instructor. 040-660-2-0114

**040 661. Greenhouse Clinical Practices.** (3-6) I, II, S. Supervised training in the application of greenhouse practices and the use of plants and flowers in the treatment of institutional patients. Pr.: Consent of instructor. 040-661-2-0109

**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. 040-662-2-0109

**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 050 501 or equiv. 040-680-1-0108

**040 699. Park Administration and Management.** (3) I. Analysis 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.: 040 440. 040-699-0-0114

**040 700. Vegetable Crop Physiology.** (3) I. Offered 1976-77 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. 040-700-0-0108

**040 705. Turfgrass Science.** (2) II. A study of current literature and research reports on grasses used for fine turf. Written and oral reports. Pr.: 040 610 or consent of instructor. 040-705-0-0108

**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.: 040 520. 040-730-1-0108

**040 792. Handling and Processing Fruits and Vegetables.** (3) I. Fall '75 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. 040-792-0-0108

**040 795. 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.: Senior standing and 040 620 or concurrent enrollment or consent of instructor. 040-795-0-0108

**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. 040-846-1-0108

**040 898. Master's Report.** Credit arranged. I, II, S. Investigations in pomology, olericulture, floriculture, ornamental horticulture, forestry, or parks and recreation area management, for preparation of master's report. Pr.: Consent of instructor. 040-898-4-0108

**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 master's thesis. Pr.: Consent of instructor. 040-899-4-0108

**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. 040-900-0-0108

**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) 040-910-0-0108

**040 920. Advanced Pomology.** (1-3) II. Spring '76 and alt. years. Morphological and physiological changes occurring in fruit plants. Pr.: Consent of instructor. 040-920-0-0108

**040 921. Horticultural Crop Nutrition.** (2) I. Fall '75 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, 015 305 and 215 600 or equivalent. 040-921-0-0108

**040 930. Topics in Plant Genetics.** Credit arranged. I, II, S. Discussion and lectures on important papers and con-



tributions in this field. Pr.: Consent of instructor. (Joint listing with Dept. of Agronomy, 015 930) 040-930-0-0108

**040 951. Horticulture and Forestry Graduate Seminar.** (1) I, II. A discussion of investigational works in the various branches of horticulture and forestry. 040-951-0-0108

**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. 040-955-0-0108

**040 961. Dormancy and Regeneration.** (2) I. Fall '76 and alt. years. Physiological and anatomical bases for dormancy, rest and regeneration in seeds, buds and stems. Manipulation and use in research. Pr.: 040 400 or consent of instructor. 040-961-0-0108

**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. 040-999-4-0108

## NATURAL RESOURCE MANAGEMENT

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

Advisers: Bidwell, Agronomy; Keen, Horticulture and Forestry; Mahaffey, Horticulture and Forestry; Owensby, Agronomy.

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 students sensitive to environmental surroundings, courses in the physical and biological sciences which help them 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) Range Management and (C) Park and Recreational Areas Management, are administered by a committee of faculty from the Departments of Agronomy and Horticulture and 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.

### General Requirements

#### FRESHMAN

Fall Semester	Spring Semester
Ag Orientation .....	English Comp. II .....
Chemistry I .....	Plane Trigonometry .....
English Comp. I .....	Oral Communication I .....
College Algebra .....	Gen. Botany or Prin. Biol. ....
Prin. of Pol. Sci. ....	Chemistry II Lecture .....
or State & Local Govt. ....	Lifetime Sports .....
Concepts in Phys. Ed. ....	
15	15

#### SOPHOMORE

Fall Semester	Spring Semester
Economics I .....	Soils .....
Geology I .....	Prin. Ag. Econ. ....
Plant Science <sup>1</sup> .....	Option & Electives .....
General Physics I <sup>2</sup> .....	
14	16 or 17

#### JUNIOR

Fall Semester	Spring Semester
Forest Cons. or Range Mgmt. ....	Humanities or Soc. Sci. <sup>3</sup> .....
Intro. to Sociology .....	Environmental Biology .....
Math. or Statistics .....	Economic Entomology .....
Humanities or Soc. Sci. <sup>3</sup> .....	Option & Electives .....
Option & Electives .....	
16	16

#### SENIOR

Fall Semester	Spring Semester
Intro. to Planning .....	Option & Electives .....
Option & Electives .....	
16	16
Total:	126

#### Option A: Soil and Water Conservation<sup>4</sup>

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

Select courses from four of the following areas:

Crop and Soil Management or	
Mgmt. of Irrigated Soils .....	2 or 3
Soil as a Natural Resource .....	3
Soil-Plant Relationships or	
Chemical Properties of Soils .....	3
Crop Ecology or Turf Management .....	3
Physical Environment of Crops & Soils	
or Conservation Survey & Plan. ....	3
Electives .....	19
	49

#### Option B: Range Management<sup>6</sup>

Principles of Animal Science .....	3
Organismic Biology .....	4
Gen. Organic Chemistry .....	3
Range Management II .....	3
Field Course, Range Mgmt. ....	2
Ident. Range, Pasture Plants .....	2
Range Mgmt. Problems .....	3
Soil as a Natural Resource .....	3
Beef Science .....	3
Higher Plants .....	4
Electives .....	19
	49

#### Option C: Park and Recreation Areas Management<sup>7</sup>

Natural Resources and Man .....	3
Use of Natural Resources for Leisure .....	3
Methods of Envir. Interpretation .....	3
Park Administration & Mgmt. ....	3
Park Operations .....	3
Park & Rec. Areas Field Studies .....	2
Park Management Seminar .....	1
Community Recreation .....	3
Turf Management .....	2
Arboriculture .....	3
	26

Select 9 hours from the following:

Concepts of Travel & Tourism .....	3
Landscape Design .....	3
Landscape Horticulture .....	3
Plant Pathology .....	3
Plant Protection .....	3
Soil Interp. for Land Use Planning .....	3
	9

General Electives .....	14
Total Option .....	49

- Students in Option A & B may substitute Crop Science for Plant Science.
- Descriptive Physics may be substituted for General Physics I in Options B & C.
- To be selected from List of Approved Humanities & Social Science electives on page 44.
- Students enrolling in this option will be advised through the Department of Agronomy.
- Students terminating with the B.S. degree may substitute Elementary Biochemistry for General Organic Chemistry.
- Students enrolling in this option will be advised through the Department of Agronomy.
- Students enrolling in this option will be advised through the Department of Horticulture and Forestry.



## PLANT PATHOLOGY

B.S. in Agriculture under the Crop Protection Curriculum which includes a Plant Pathology Science Option (See page 55).

L. R. Faulkner,\* Head of Department

Professors Dickerson,\* Faulkner,\* and Hansing;\* Associate Professors Edmunds,\* Johnson,\* Niblett,\* Schwenk,\* Stuteville,\* and Willis;\* Assistant Professors Browder,\* Claflin,\* Eversmeyer,\* Sauer,\* and Tillman;\* Adjunct Associate Professor Kramer;\* Adjunct Assistant Professor Slesinski;\* Emeritus: Professor King.

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 55. 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 55)

Major Courses		Semester Hours
21S 210	General Botany .....	4
01S 200	Plant Science .....	4
050 501	Plant Pathology .....	3
21S 640	Introductory Mycology .....	4
050 71S	Plant Pathogens .....	4
	Electives in the Botanical Sciences .....	9
Supporting Courses		
21S 55S	Microbiology .....	4
00S 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
01S 30S	Soils .....	4
24S 150	Plane Trigonometry .....	3
28S 340	Biometrics I .....	3
26S 113	General Physics I .....	4
One of the following:		
26S 193	Descriptive Meteorology .....	3
26S 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
211 655 and 211 656	Biochem. I Lec. and Lab. ....	5
One of the following:		
030 300	Economic Entomology .....	3
030 312&313	General Entomology & Lab. ....	3
One or more of the following:		
24S 22S	Analytical Geometry and Calculus I .....	4
	OR	
286 200	Fundamentals of Computer Programming .....	3
One or more of the following:		
00S 102	Principles of Animal Sci. ....	3
00S 103	Animal Science & Industry .....	1
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 prerequisites. 050-210-0-0404

**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. 050-420-1-0404

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**050 501. Plant Pathology.** (3) I, II. An introductory course on the nature, cause, and control of crop diseases. One hour lec. and two hours lab. a week. Pr.: Biology 198, 210 or equiv. 050-501-1-0404

### UNDERGRADUATE AND GRADUATE CREDIT

**050 610 Plant Disease Diagnosis.** (1) I. Practical experience in diagnosing plant diseases in fields, lawns and gardens. Four hours combined rec. and lab. a week. Pr: Plant Pathology 501. 050-610-1-0404

**050 615. Diseases of Field Crops** (3) II. Diseases of cereals, forage and fiber crops; their causes, symptoms, life histories, epidemiology and control. Pr.: Plant Pathology 501. 050-615-1-0404

**050 625. Diseases of Horticultural Crops.** (3) I. Diseases of vegetables, fruit and ornamental plants; their causes, symptoms, life histories and control. Two hours rec. and two hours lab. a week. Pr.: Plant Pathology 501. 050-625-1-0404

**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. 050-635-0-0404

**050 651. Internship in Crop Protection.** (1-2) I. On-the-job training in various areas of Crop Protection. One hour credit for each four weeks of supervised work. A maximum of two hours may be applied towards a B.S. in Crop Protection. Credit is allowed only for approved work-study programs. Pr.: Junior standing in Crop Protection curriculum; or Agronomy



230, Entomology 312 and 313, Plant Pathology 420 and 501. 050-651-0-0404

**050 655. Integrated Pest Management.** (3) II. 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. Offered in cooperation with Agronomy and Entomology. 050-655-0-0404

**050 715. Plant Pathogens.** (4) I. A study of the principles and techniques of Plant Pathology with emphasis on crop diseases caused by bacteria, fungi, nematodes and viruses. Two hours lec. and four hours lab. a week. Staff-taught. Pr.: Biol. 198 or 210. 050-715-1-0404

**050 716. Plant Disease Development.** (2) II. Detailed study of host:pathogen interactions (physiologic, genetic, environmental, epidemiological) using selected host:pathogen models. One lec. and one two-hour lab. per week. Staff-taught. Pr.: Plant Pathology 715. 050-716-1-0404

**050 720. General Nematology.** (3) I. Offered 1975-76 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 501 or consent of instructor. 050-720-1-0404

**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). 050-730-0-0404

**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. 050-850-3-0404

#### GRADUATE CREDIT

**050 870. Seminar in Plant Pathology.** (1) I, II. Reports in the field of plant pathology. Pr.: Consent of instructor. 050-870-0-0404

**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. 050-899-4-0404

**050 900. Plant Virology.** (3) I. Offered 1976-77 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 050 715 or 730, Biochemistry 521 or equiv., and consent of instructor. 050-900-1-0404

**050 910. Physiology of Plant Disease.** (3) II. Offered in 1975-76 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 three hours lab. a week. Pr.: Biology 600 and a course in Biochemistry, or consent of instructor. 050-910-1-0404

**050 920. Topics in Plant Pathology.** Credit variable. I, II, S. Discussions and lectures on important areas and contributions in the field of phytopathology. Pr.: Graduate I standing. 050-920-0-0404

**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. 050-999-4-0404



# the college of architecture and design

Bernd Foerster, Dean

William R. Jahnke, Assistant Dean

The College of Architecture and Design provides the opportunity for professional study in architecture, interior architecture, landscape architecture and regional and community planning.

The curriculum in architecture is accredited by the National Architectural Accrediting Board. The interior architecture curriculum is accredited by the Foundation for Interior Design Education and Research. 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 recognized 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: Pre-Design Professions, Architecture, Interior Architecture, Landscape Architecture and Regional and Community Planning.

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

Architecture (curriculum on page 76)

Interior Architecture (curriculum on page 76)

Landscape Architecture (curriculum on page 76)

## DUAL DEGREE PROGRAMS

A student may earn two undergraduate degrees by pursuing a dual degree program. There are several possibilities for a second major. Ordinarily such a program must begin not later than the student's junior year. Those students interested should contact the assistant dean.

## GRADUATE PROGRAMS

The College of Architecture and Design offers graduate study in architecture, environmental technology, interior architecture and urban design leading to the degree Master of Architecture as well as graduate programs leading to the degrees Master of Landscape Architecture and Master of Regional and Community Planning. Additional information on the graduate programs is included under Graduate School, page 30.

## SUMMER SCHOOL

Entering freshmen and transfer students will find that some 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, KS 66506.

## STUDENT PROJECTS

All programs within the College of Architecture and Design involve extensive project work. Students are cautioned to budget sufficient funds to cover the cost of these materials and supplies, many of which are expendable. Materials costs will be somewhat higher than those published for non-studio curricula.

All student projects, assignments, presentations and models are retained by the various departments. Students are advised to assemble a photograph file of their work for their personal use and portfolio.



**ELECTIVES**

Curricula in the College indicate two types of electives: those listed as free electives may be chosen from any course offered in the University that is open to the student; those electives listed with a specific designation must be chosen from those courses in the indicated field that are open to the student. Four hours of electives may be taken in Basic Military Science. Lists of acceptable electives are 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 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 understanding gained 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—100 PDP****FIRST YEAR**

First Semester			Second Semester		
104 210	Des. Graphics I	3	104 211	Des. Graphics II	3
	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			Mathematics	
	Elective	3		Elective	3
281 105	Oral Comm. I	2	261 001	Physical Education	0
261 001	Physical Education	0		(Lifetime Sport)	
	(Concepts)		104 201	Sur. Des. Pro.	1
104 200	Env. Des. Ed.	1			
		17			17

**SECOND YEAR**

First Semester			Second Semester		
104 260	Envir. Des. Studio I	4	104 261	Envir. Des. Stu. II	4
104 271	Elem. Iss. Env. Des.	2	104 280	Landscape Ecology	2
104 290	Basic Const. Tech. I	3	104 291	Basic Const. Tech. II	3
104 250	Hist. Des. Envir. I	3	104 251	Hist. Des. Envir. II	3
	* Science Elective	3		* Science Elective	3
		15			15

**PROFESSIONAL CURRICULUM  
IN ARCHITECTURE—115 AR****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	105 604	Arch. Des. IV**	5
106 521	Env. Tech. II	3		Prof. Support	
109 315	Intro. to Planning	3		Electives	10
	Free Elective	6		OR	
		17	105 504	Arch. Internship	15

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

Ninth Semester			Tenth Semester		
105 800	Arch. Des. Prog.	2	105 802	Arch. Des. VI**	5
105 801	Arch. Des. V**	5		Prof. Support	
	Prof. Support			Electives	4
	Electives	4	105 757	Topics Pro. Prac. II	2
105 756	Topics Pro. Prac. I	2		Free Electives	6
	Free Electives	4			17
		17			

A minimum of 100 hours is required for completion of the professional program.

**PROFESSIONAL CURRICULUM  
IN INTERIOR ARCHITECTURE—150 ARI****Bachelor of Interior Architecture**

Fifth Semester			Sixth Semester		
107 401	Int. Arch. Des. Studio I	5	107 402	Int. Arch. Des. Studio II	5
107 409	Finishing	3	107 420	Theory of Furn. Des.	2
107 413	Env. Systems in Arch.	3	106 520	Env. Technology I	3
107 415	Hist. Int. Arch.	2		Art Elective	4
	Electives	3		Electives	3
		16			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	610 260	Textiles	3
106 521	Env. Technology II	3		Electives	3
	Electives	3		Bus. Adm. Elective	3
		17			17
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	4	107 783	Contemp. Furn. Des.	4
105 720	Sem. Env. Behavior	3	107 820	Int. Arch. Seminar	3
107 753	Contract Des. Practice	2		Electives	4
	Bus. Adm. Elective	3			16
		17			

A minimum total of 100 credit hours is required for completion of the professional curriculum.

**PROFESSIONAL CURRICULUM  
IN LANDSCAPE ARCHITECTURE—180 LA****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	Lands. Const. I	3	110 437	Lands. Const. II	3
525 212	Elem. Surveying		040 271	Woody Plant Matls.	3
	Engr.	3		Science Elective	3
110 433	Hist. & Theory				16
	Land. Des.	3			
		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	Lands. Const. III	3	110 645	Pro. Internship	0
140 508	Lands. Horticulture	3	109 215	Intro. Planning	3
	Art Elective	2	110 501	Lands. Arch. Sem.	1
110 501	Lands. Arch. Sem.	1	525 718	Engr. Photo Interpretation	3
		16		Free Electives	4
					18

\*\*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 advisers. 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	
110 801	L.A. Design V ..... 5	110 802	L.A. Design VI ..... 5
110 756	Parks & Rec. .... 3	110 753	Prof. Practice ..... 2
110 501	Lands. Arch. Sem. .... 1	110 501	Lands. Arch. Sem. .... 1
	Bus. Adm. Elective ... 3		Bus. Adm. Elective ... 3
	Science Elective ..... 3		Free Electives ..... 6
	Free Elective ..... 2		17
	17		

A minimum total of 100 credit hours is required for completion of the professional curriculum.

## PRE-DESIGN PROFESSIONS

W. Mike Martin, Head of Department

Professors Ealy,\* Fischer,\* Foerster,\* and Krider,\* Visiting Professor Evans; Associate Professor Hall;\* Assistant Professors Friedberg, Lippenberger, Marshall, Martin, Selfridge, and Spurgeon; Instructors Law, Melnick, McDonald, and Wells.

For curriculum see page 76.

**014 200. Environmental Design Education and the University.** (1) I. Introduction to environmental design education; discovery of the resources of the department, college, and university. One hour lec. per week. 104-200-0-0201

**104 201. Survey of the Design Professions.** (1) II. Illustrates the challenges and career opportunities of the design professions; identification of attitudes and aptitudes required of environmental designers. One hour lec. per week. 104-201-0-0201

**104 210 and 104 211. Design Graphics I and II.** Intensive skill development in graphic communication: utilizing media to visualize and record physical design information, including the methodologies of orthographic, oblique, and perspective systems. Exercises in freehand, instrumental diagrammatic, computer, numerical, and presentation modes. Six hours lab. per week.

**104 210. Design Graphics I.** (3) I, II, S. 104 210-1-0201

**104 211. Design Graphics II.** (3) I, II, S. Pr.: 104 210. 104-211-1-0201

**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. Ten hours studio and lec. per week.

**104 260. E.D.S. I.** (4) I. Pr.: 104 211. 014-260-1-0201

**104 261. E.D.S. II.** (4) II, S. Pr.: 104 260. 104-261-1-0201

**104 271. Elements and Issues of Environmental Design.** (2) I. Principles of environmental design; attitudes toward the physical surroundings; identification of issues confronting environmental designers; exposure to and reinforcement of the design vocabulary. Two hours lec. per week. Pr.: 2nd year classification. 104-271-0-0201

**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 lec. per week. 104-280-0-0201

**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 lec. per week.

**104 290 B.C.T. I.** (3) I, II. Pr.: 104 208. 104-290-0-0201

**104 291 B.C.T. II.** (3) I, II. Pr.: 104 290. 104-291-0-0201

**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. 104-250-0-0201

**104 251 H.D.E. II.** (3) II. Pr.: 104 250. 104-251-0-0201

**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. 104-299-4-0201

**104 370. Perspective Methodology for Designers.** (2) Intersession. 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. 104-370-0-0201

**104 380. Visual Thinking.** (2) Intersession. An analysis of man's recognition, visualization, and recording of environmental experiences. Experimental exercises in sensory stimulation and response recording. Pr.: Approval of instructor. 104-380-0-0201

**104 510. Man and His Surroundings.** (3) 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. Three hours illustrated lecture-discussion per week. Not for students in architecture, interior architecture and landscape architecture. 104-510-0-0201

**104 520. Design Graphics Workshop.** (1-4) I, II, S. Exposure to principles, techniques and discipline of the communication modes of design drawing: exercises to illustrate the basic methodologies of perspective, orthographic and oblique graphic systems for displaying three-dimensional messages of physical design issues and ideas. Pr.: Junior standing/open to non-majors/Arch. and Design majors by permission of the Dept. Head only. 104-520-0-0201

## ARCHITECTURE

Eugene Kremer,\* Head of Department

Professors Chang,\* Fischer,\* Foerster,\* Heintzelman,\* Jahnke,\* and Krider,\* Associate Professors Christensen,\* Ernst,\* Hall,\* Reid,\* Sanner,\* Slack, and Stotesbury,\* Assistant Professors Desmarais, Friedberg, Selfridge,\* Shepard, Spurgeon, and Windley,\* Adjunct Professor Shaver; Emeritus: Chadwick,\* and Weigel.\*

For curriculum see page 76.

The Bachelor of Architecture professional program consists of a three-year course of study following the two-year pre-design professions program.

The Kansas State University Bachelor of Architecture is accredited by the National Architectural Accrediting Board. This professional degree and three years' practical experience under the supervision of a Registered Architect qualify one to take the Professional Architectural Licensing Exam, without the need to take a qualifying examination.

One of the few certainties the future holds is change. It is for this reason that the professional program in architecture emphasizes principles and problem-solving processes rather than focusing on mastery of the myriad technical details of the profession which are rapidly supplanted by new social, political, and technological developments. The design studio experience forms the core of the program, where concepts earlier introduced through courses in human



needs, history, construction technology, structures, and environmental control systems are synthesized. A 30-week internship program, which may include work-study experience in professional offices, industry, or governmental agencies, affords advanced students an opportunity to work in a professional context and to apply the problem-solving approaches they have developed.

Individual graduate programs in the Master of Architecture curriculum accommodate students with a four-year architectural degree or graduates of a five-year accredited program. Applicants are considered upon the merits of their academic background and proposed program of study.

## 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. 015-301-0-0202

**105 413. Environmental Systems in Architecture.** (3) I, II. Discussion of the influences of environmental technology upon design concepts. Three hours rec. a week. Pr.: Approval of instructor. 105-413-0-0202

**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. Seven and one-half hours lab. per week. Pr.: 104 291 and 105 433.

**105 433. Arch. Constr. I.** (3) I, II. Pr.: 104 291. 105-433-1-0202

**105 434. Arch. Constr. II.** (3) II, S. Pr.: 105 433. 105-434-1-0202

**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 six credits in Art or approval of instructor. 105-460-1-0202

**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. 105-475-3-0202

**105 401 and 105 402. Architectural Design Studio I and 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. 15 hours studio per week.

**105 401. A.D.S. I.** (5) I. Pr.: Admission to the Professional Program and 104 261. 105-401-1-0202

**105 402. A.D.S. II.** (5) II, S. Pr.: 104 501. 105-402-1-0202

**105 504. Architectural Internship.** (15) I, II. 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. 105-504-2-0202

### 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. 105-566-3-0202

**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 hours credit. Three hours rec. per week. Pr.: 104 251 or approval of instructor. 105-601-0-0202

**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. 105-603-1-0202

**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. 15 hours studio per week. Pr.: Arch 105 603. 105-604-1-0202

**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. 105-655-2-0202

### UNDERGRADUATE OR GRADUATE CREDIT

**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 Structures, Urban Design. 105-703-0-0202

**105 704. Environmental Seminar.** Credit arranged. I, II. Environmental systems related to human perception, reactions and behavior. Pr.: Senior standing or consent of the instructor. 105-704-3-0202

**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. 105-720-0-0202

**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. 105-725-0-0202

**105 756 and 105 757. Topics in Professional Practice I and II.** Studies of conventional and newly developing modes of professional architectural practice. The relationship of the architect and the profession to the user, client, building industry and society. Two hours lec. per week.

**105 756.** (2) I, II. Pr.: 4th year standing. 105-756-0-0202

**105 757.** (2) I, II. Pr.: 4th year standing. 105-757-0-0202

**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. 105-765-3-0202

**105 800. Architectural Design Programming.** (2) I, II, S. Independent development of the program for 105 802, Architectural Design VI, under the direction of a faculty committee. Must be taken in residence and may be concurrent with 105 604 or 105 801. Pr.: 105 603 and approval of the faculty committee. 105-800-3-0202

**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 func-



tion and space definition systems. Relating environmental technology to total design. 15 hours studio per week. Pr.: Arch 604 105-801-1-0202

**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. 15 hours studio per week. Pr.: Arch 800 and 801. 105-802-1-0202

#### 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. 105-810-4-0202

**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. 105-815-0-0202

**105 830. Advanced Architectural Design.** Credit arranged. I, II, S. Studies related to a comprehensive program in architecture. Pr.: Arch. 802. 105-830-3-0202

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### INTERIOR ARCHITECTURE

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Jack C. Durgan, Head of Department

Professors Durgan,\* and Foerster,\* Associate Professor McGraw,\* Instructors Murphy, and Wells.

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, behavior analysis, space component construction and design, the integration of environmental systems, and the preparation of working drawings and contract documents.

Graduates are generally 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. 107-406-0-0203

**107 409. Finishing.** (2) II. Methods of finishing various materials in interiors. Six hours lab. a week. Pr.: 104 261. 107-409-0-0203

**107 415. History of Interior Architecture.** (2) I. History of the design of architectural interiors and its related components. Special emphasis upon the developments of the 20th century.

Pr.: Admission to professional program in architecture, interior architecture, or landscape architecture. Two hours lec. 107-415-0-0203

**107 420. Theory of Furniture Design.** (2) II. Design theory related to analysis, materials, and construction techniques of contemporary furniture. Pr.: Admission to professional program in architecture, interior architecture, or landscape architecture. Two hours lec. 107-420-0-0203

##### 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. 107-401-1-0203

**107 402. Interior Architectural Design Studio II.** (5) II, S. Pr.: 107 401. 107-402-1-0203

**107 603. Interior Architectural Design Studio III.** (5) I, S. Pr.: 107 402. 107-603-1-0203

**107 604. Interior Architectural Design Studio IV.** (5) II, S. Pr.: 107 603. 107-604-1-0203

**107 801. Interior Architectural Design Studio V.** (5) I, S. Pr.: 107 604. 107-801-1-0203

**107 802. Interior Architectural Design Studio VI.** (5) II, S. Pr.: 107 801. 107-802-1-0203

**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. 107-407-1-0203

**107 408. Design Workshop II.** (3) II, S. Pr.: 107 407. 107-408-1-0203

**107 710. Design Workshop III.** (4) I, S. Pr.: 107 408 or graduate standing. 107-710-1-0203

**107 753. Contract Design Practice.** (2) I. The preparation of specifications, contract documents, purchasing, and professional responsibilities. Pr.: 107 604 or graduate standing. 107-753-0-0203

**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. 107-783-1-0203

##### 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. 107-820-0-0203

**107 821. Advanced Interior Architectural Design.** (4) I, II, S. Advanced study of interior space planning and interior component design. Pr.: Professional Design Degree. 107-821-0-0203

**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. 107-830-3-0203



## LANDSCAPE ARCHITECTURE

Robert P. Ealy,\* Head of Department

Professor Ealy;\* Associate Professors Day,\* and Oblinger;\* Assistant Professors Austin,\* Dunbar, and Page;\* Instructor Melnick; Assistant Instructor Law; 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) II. Basic graphic communication skills, design principles, and design vocabulary for the installation of residential and small landscape development plans. Two hours lec. and two hours of studio per week. Pr.: Consent of instructor. A general course for majors other than those in the College of Architecture & Design. 110-200-1-0204

**110 204. Landscape Architectural Delineation Techniques.** (2) I. 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. 110-204-1-0204

**110 300. Residential Landscape Design.** (2) I. The application of landscape design principles to the small-scale site. For non-majors. Four hours of studio per week. Pr.: Consent of instructor and 040 271, 110 200. 110-300-1-0204

**110 431 and 110 432. 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, communications, specification, construction, planting and maintenance.

**110 431. L.A.D. I.** (4) I. 12 hours design studio per week. Pr.: Admission to the Professional Program and 104 261, 280. 110-431-1-0204

**110 432. L.A.D. II.** (4) II. 12 hours design studio per week. Pr.: 110 431. 110-432-1-0204

**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.: First year classification in Professional L.A. Program. 110-433-0-0204

**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. 110-434-1-0204

**110 435. Planting Design II.** (3) II. Cont. of L.A. 434. Eight hours lab. a week. Pr.: L.A. 434. 110-435-1-0204

**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. 110-436-1-0204

**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. 110-437-1-0204

**110 440. Problems in Landscape Design.** Credit arranged. I, II, S. Assigned problems and reports in the area of landscape architecture. Pr.: Junior classification. 110-440-3-0204

#### 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. 110-501-2-0204

**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.

**110 641. L.A.D. III.** (4) I. Twelve hours design studio per week. Pr.: 110 432 and 110 436. 110-641-1-0204

**110 642. L.A.D. IV.** (4) II. Twelve hours design studio per week. Pr.: 110 641 and 110 437. 110-642-1-0204

**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. 110-643-1-0204

**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. 110-644-1-0204

**110 645. Professional Internship.** (2) I, II, S. Confirmed employment in a professional physical planning office, subject to the approval of the departmental faculty, for a period of eight weeks, documented by the employer and a written report by the student. Pr.: 110 432, 110 437. 110-645-2-0204

**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. 110-647-1-0204

#### 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. 110-741-3-0204

**110 750. Graduate Seminar in Landscape Architecture.** (1) I, II. Required of all graduate student majors in the department during their tenure. Presentation and discussion of research proposals, procedures, data collection, and use, and thesis preparation. Pr.: Graduate standing in the department. 110-750-0-0204

**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. 110-753-0-0204

**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. 110-755-1-0204

**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. 110-756-0-0204

**110 757. Design for Special Populations.** (Var.) II. Design of exterior environments to accommodate the handicapped and disadvantaged individual. Pr.: Advanced undergraduate or graduate standing. 110-757-0-0204

**110 758. Land Resource Information Systems.** (3) II. The methods available for the detection, storage and manipulation of landscape data. Including basic remote sensing techniques, their implications, and their interface with various computerized methods of data storage and



manipulation. Two hours lec. a week, plus two hours lab. Pr.: Advanced undergraduate or graduate standing. 110-757-1-0204

**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. 110-801-1-0204

**110 802. L.A.D. VI.** (5) II. Terminal project. Individual studies approved by departmental faculty. Fifteen hours design studio per week. Pr.: 110 801 and 110 643. 110-802-1-0204

#### GRADUATE CREDIT ONLY

**110 870. Problems in Advanced Landscape Architecture.** Credit arranged. I, II, S. Special studies and designs in advanced landscape architecture. Pr.: L.A. 802. 110-870-4-0204

**110 880. Problems in Advanced Landscape Construction.** Credit arranged. I, II, S. Specialized study of large-scale landscape planning involving landscape construction and grading. Pr.: L.A. 647. 110-880-4-0204

**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. 110-899-4-0204

#### REGIONAL AND COMMUNITY PLANNING

Vernon P. Deines,\* Head of Department

Professors Deines,\* and Foerster,\* Associate Professors Ernst,\* McGraw,\* Reid,\* and Weisenburger,\* Assistant Professors Keithley, Keller, and Selfridge.\*

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 interdepartmental 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. (See page 40 under Graduate School.)

Applicants with undergraduate degrees in administration, agriculture, architecture, commerce, construction science, 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  
Community Development Workshop

City Planning I  
Regional Planning I  
Housing and Renewal  
Planning Theory  
Economics II and Urban and Regional Economics  
Urban Geography and Man, Space and the Environment  
Introduction to Sociology and Urban Sociology  
Principles of 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 and construction professions:

Introduction to Planning  
Planning and Development Codes  
Community Development Workshop  
City Planning I  
Urban Design I  
Housing and Renewal  
Urban Visual Analysis  
Economics II and Urban and Regional Economics  
Urban Geography and Man, Space and the Environment  
Introduction to Sociology and Urban Sociology  
Urban Transportation Analysis I  
Site Planning and Analysis  
Environmental Aesthetics  
Principles of 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 professions 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  
Topics in Planning

#### 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. 109-315-0-0206

##### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**109 505. Community Development Workshop.** Credit arranged. I, II, S. Application of interdisciplinary and interprofessional team techniques to the organization, planning, design, development and evaluation of community development projects on specific topics with real clients and actual locations. Pr.: Introduction to Planning or equivalent course and approval of the instructor. 109-505-2-0206

**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. 109-515-0-0206



**UNDERGRADUATE AND GRADUATE CREDIT**

**109 705. Planning Communications.** (3) I. Study and application of communication concepts and media utilized in regional and community planning to convey information regarding the spatial and aspatial aspects of the environment. Pr.: Senior standing and approval of instructor. 109-705-1-0206

**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 745 or equiv. 109-710-1-0206

**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. 109-715-0-0206

**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. 715 or equivalent and nine other credit hours in planning and/or administration courses. 109-720-0-0206

**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. 109-725-0-0206

**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. 715 or 725. 109-735-1-0206

**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. 315, 715 or 725. 109-745-1-0206

**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. 715 or 725. 109-750-0-0206

**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. 715 or 725. 109-755-1-0206

**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.: 715 or equivalent and one course each in graphics, statistics, and computer programming. 109-800-1-0206

**109 805. Internship in Planning.** (0) I, II, S. Assignment to a planning staff for a period of at least 10 weeks; supervision by a professional planner with periodic reports of activities to planning faculty. Pr.: Completion of two semesters of graduate study in planning. 109-805-2-0206

**109 810. Practicum in Planning and Development.** Credit arranged. I, II, S. Supervised experience in professional planning and development, including internships, field research, public service and professional workshops. Pr.: Plan. 715 and 725 or concurrent enrollment. 109-810-2-0206

**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. 109-815-0-0206

**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. 109-820-0-0206

**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.: 725 and completion of two semesters of graduate study in planning. 109-825-0-0206

**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. 735 or equiv. 109-835-1-0206

**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. 745 or equiv. 109-845-1-0206

**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 755 or equiv. 109-855-1-0206

**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. 715 or graduate standing. 109-880-0-0206

**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. 109-890-4-0206

**CENTER FOR COMMUNITY AND REGIONAL PLANNING**

Vernon P. Deines, 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 college of arts and sciences

William L. Stamey, Dean  
William E. Carpenter, Associate Dean  
Marjorie Adams, Assistant Dean  
Marjorie Cleland, Assistant to the Dean

The College of Arts and Sciences through its 25 departments and one division offers programs of study which enable students to acquire a broad preparation for life in a democratic society, to obtain a sound basis for professional training, or to receive training in the specific skills required for their chosen field of endeavor.

The courses offered in the College of Arts and Sciences provide students an opportunity to develop skills in communication, to appreciate the heritage of the past, to understand the laws of nature, to participate in the arts, and to maintain healthy bodies. 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 students in high school and an evaluation of their 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. These programs provide for independent reading in areas of general interest.

A list of the areas in which students 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 students in consultation with their advisers. The aim of these requirements is to provide breadth in students' programs 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 areas of natural sciences, social sciences, and humanities.



**DEGREES AND MAJORS****A.B.<sup>1</sup>**

Anthropology  
Art  
Biochemistry  
Biology  
Chemistry  
Computer Science  
Economics  
English  
General (Area Major)  
Geography  
Geology  
Health, Physical  
Education and  
Recreation  
History  
Journalism and Mass  
Communications  
Mathematics  
Modern Language  
Music  
Philosophy  
Political Science  
Psychology  
Social Work  
Sociology  
Speech  
Statistics  
Pre-Professional  
Corrections Administration  
Physical Therapy  
Pre-Medicine  
Pre-Dentistry  
Pre-Law  
Pre-Optometry

**B.F.A.**

Art

**B. of Music**

Music

**B.S. in Music Education**

Music

**Associate of Arts**  
**Associate in Science**

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

Anthropology  
Biochemistry  
Biology  
Chemistry  
Computer Science  
Economics  
General (Area Major)  
Geography  
Geology  
Health, Physical Education  
and Recreation  
History  
Journalism and Mass  
Communications  
Mathematics  
Physics  
Political Science  
Psychology  
Social Work  
Sociology  
Speech  
Statistics  
Pre-Professional  
Corrections Administration  
Cytotechnology  
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-Optometry  
Pre-Pharmacy<sup>4</sup>  
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)

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 184).

2. Requirements for a degree to be completed in the College of Education. (See page 184).

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 45).

**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 or 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 (500 level or above)

G. Natural Science from Division of Biology and Departments of Biochemistry, 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 Languages, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology, Speech, Journalism and Mass Communications).

Seven courses, taken from at least two departments, including one course in Philosophy and two advanced level courses (500 level or above or second year of a foreign language).

D. Natural Science from Division of Biology and Departments of Biochemistry, 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

\*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.



has a prerequisite in the same department in which it is located)

E. Physical Education (or marching band or varsity sports).

Two courses

II. Major Requirements: Remaining hours in major and additional tool and related courses and electives.

Pre-professional programs are administered by the appropriate department or, where not applicable, by the Office of the Dean of Arts and Sciences.

## BACHELOR OF FINE ARTS

The Bachelor of Fine Arts Degree is the more professionally oriented undergraduate degree in art. It is designed primarily for those planning to become professional artists or artist-teachers. Greater emphasis is placed on actual practice in the creative art disciplines. The degree is considered the appropriate preparation for the Master of Fine Arts degree which is recognized as the terminal degree in studio arts. The BFA in Art is a 4-year 120-hour program with majors possible in Painting, Sculpture, Ceramics, Graphic Design, and Printmaking. The degree requirements are as follows:

I. General Education (45 hours)

A. Communications, English Composition, 2 courses; and Oral Communication 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)

G. Physical Education (or marching band or varsity sports)

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 (42 hours)

A. English Composition I and II

B. Oral Communication I or Ia

C. Physical Education (or marching band), 2 semesters

D. Physics for Musicians

E. General Psychology

F. Non-music courses, 9 to 19 hours

G. Modern Language, 8 to 20 hours

II. The remaining hours to be taken in major, additional tool and related courses, as well as electives in music. For specific music requirements, see catalog statement for the Department of Music, page 144.

## 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 175, 176, 214, 215, 406, 407, 416, 503, 504, 505 (Comprehensive Musicianship Courses); 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 (page 84) and one of the following four major requirements:

**A. Life Sciences:** Bacteriology and Man, 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 500 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.

### ASSOCIATE OF ARTS DEGREE

Associate of Arts Degree to be offered at Fort Riley only to personnel stationed or working on the post with the following requirements:

Option 1: 60 hours including the following General Requirements\*

- A. English Composition I and II
- B. Oral Communication I
- C. Modern Languages. Two years in one language (or equivalent competence)
- D. Mathematics. One course (Credit for Intermediate Algebra may not apply toward a degree.)
- E. Humanities (from Departments of Art, English, History, Modern Languages, Music, Philosophy and Speech). Three courses. No more than three courses in history to fulfill E and F
- F. Social Sciences (from Departments of Economics; Geography, excluding Geography 150 and 151; History; Political Science; Psychology; Sociology and Anthropology; Journalism and Mass Communications). Three courses, including one course above the introductory level. No more than three courses in history to fulfill E and F
- G. Natural Science (from Department of Biochemistry; Division of Biology; Departments of Chemistry; Computer Science; Geography, courses 150 and 151 only; Geology; Mathematics; Physics or Statistics). Four courses including one laboratory course above the introductory level (a course which has a prerequisite in the same department in which it is located)

H. One course in Physical Education

Option 2: 60 hours including the following General Requirements\*

- A. English Composition I and II
- B. Oral Communication I
- C. Humanities and Social Sciences (from Departments of Art; Economics; English; Geography, excluding Geography 150 and 151; History; Modern Languages; Music; Philosophy; Political Science; Psychology; Sociology and Anthropology; Speech; Journalism and Mass Communications). Seven courses, taken from at least two departments, including one course in Philosophy
- D. Natural Science (from Department of Biochemistry; Division of Biology; Departments of Chemistry; Computer Science; Geography, courses 150 and 151 only; Geology; Mathematics; Physics, or Statistics). Four courses, including one laboratory and one course above the introductory level (a course which has a prerequisite in the same department in which it is located)
- E. One course in Physical Education

### ASSOCIATE IN SCIENCE

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 Languages, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology, Speech, Journalism and Mass Communications). Seven courses, taken from at least two departments including one course in Philosophy
- D. Natural Science from Division of Biology and Departments of Biochemistry, 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: one course

### PRE-PROFESSIONAL PROGRAMS

**A. Corrections Curriculum:** 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 integration and reintegrating law violators into society. These positions include, among others: probation and parole officers,

\* Fifteen of the last thirty hours must be taken at Fort Riley in Option 1 and Option 2.



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 to state correctional systems, teachers, and researchers.

**B. Cytotechnology Curriculum.** In addition to the general requirements of the College of Arts and Sciences the following courses must be taken: College Algebra (3), General Chemistry (5), Principles of Biology (4), Plane Trigonometry (3), Intro. to Organic and Biochemistry (5), Microbiology (4), Structure and Function of the Human Body (6), General Physics I (4), Cell Biology (3), Cell Biology Lab (1), General Physics II (4), Histology (4), 18 hours humanities or social science electives and the remaining 13 hours in free electives. Upon acceptance into and completion of 30 hours of a Cytotechnology Program, the student will receive a B.S. degree and eligibility for professional certification.

**C. 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), Trigonometry (3), Chemistry I (5), Chemistry II Lecture (3), General Organic Chemistry (5), General Biochemistry (5), Chemical Analysis (4), Descriptive Physics (4), Principles of Biology (4), Microbiology (4), Human Physiology (4), Genetics (3), Bacteriology of Human Diseases (5), Immunology (5), Human Parasitology (4), and Introduction to Medical Technology (1). Upon acceptance into and completion of a Medical Technology Program, the student will receive a B.S. degree and will be eligible for professional certification.

**D. Physical Therapy Curriculum:** In addition to the general requirements of the College of Arts and Sciences, students should take the following: College Algebra (3) and Trigonometry (3), General Chemistry (5), Intro. to Bio-Organic Chemistry (5), Physics I (4) and Physics II (4), Human Anatomy (4), Principles of Biology (4), Human Physiology (4), Kinesiology (3), Microbiology (4), Intro. to Physical Therapy (1), General Psychology (3), plus two of the following five courses: Abnormal Psychology (3), Psychology of Childhood and Adolescence (3), Social Psychology (3), Psychology of Exceptional Children (3), and Personality Development (3). Upon acceptance into and completion of 30 hours of a Physical Therapy Program, the student will receive a B.S. degree and eligibility for professional certification.

**E. 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, 12 hours of social sciences and 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 or 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 page 45).

#### 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 .....	4
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/> 15 or 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.	

**F. Pre-Medicine Curriculum:** Fulfill General Requirements for the A.B. (page 84) or B.S. degree (page 84) 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, Calculus, and Embryology. For additional information consult an adviser in the Office of the Dean of Arts and Sciences.

**G. 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 (page 84) or the B.S. degree (page 84) 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).

**H. 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.

**I. Pre-Optometry Curriculum:** Students wishing to enter a school of optometry at the end of the junior year should fulfill the General Requirements for the Bachelor of Science or Bachelor of Arts degree and the required courses for admission to a school of optometry.

**J. 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 (page 84), 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.

**K. Pre-Secondary Education:** Students preparing to teach in the junior and senior high schools are usually enrolled in a Pre-Secondary Education Curriculum in the College of Arts and Sciences for the freshman and sophomore years. Students fulfill requirements for the B.S. Degree in the College of Education (page 185). 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 their 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 (page 185).

**L. 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 (page 185). 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 (page 185).

**M. 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.

## 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 Maldives Republic. Of their principal languages, the Center currently offers three years of Urdu and one year of Hindi at the intermediate level, and one year of Tamil. While the Center does not offer a major, it affords undergraduates an opportunity to give their 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

The Departments of English, Modern Languages and Speech cooperate in an interdepartmental linguistics program that offers cross-listed courses of study



leading to the BA and MA degrees. Students identify themselves with the department most suiting their academic background and interests. The program's offerings also provide an opportunity for students in any discipline to gain an appreciation of the rich structure of human languages and an understanding of linguistics as it may relate to education, psychology, foreign language study, philosophy, literature, speech pathology, audiology, and so forth.

Undergraduates in either Modern Languages or Speech may work toward a BA degree in linguistics. Graduates in English, Modern Languages or Speech may choose linguistics for their MA degree. For both undergraduates and graduates, the program's core courses attempt to provide a solid foundation in modern theoretical linguistics, in particular the linguistics of the "Chomskyan revolution." The student would be wise, however, to pursue (with advisor's approval) as many non-core linguistics-related courses as possible in the various departments that offer them, so as to avoid too narrow a view of the field. (See course listings in Anthropology, Computer Science, English, General Speech, Modern Languages, Philosophy, Psychology, and Speech Pathology and Audiology.)

General admission requirements for undergraduates will be found beginning on page 84. Students seeking graduate admission should hold a bachelor's degree and have at least 12 semester hours, or equivalent, beyond the introductory level in a single foreign language (or in English, for non-native speakers of English). Graduates write either a report (2 credit hours) or a thesis (6 credit hours), with course work bringing the total to at least 30 credit hours.

For further information about undergraduate or graduate study in linguistics, including a list of available courses, contact the participating departments or James L. Armagost, Leasure Hall 109, phone 532-6880.

### 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

Col. Donald M. Marks, Head of Department

Professor Marks; Associate Professor Jones; Assistant Professor Mercer; Instructors Schwab, Hubbard and Wagner.

The Air Force Reserve Officer 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 either:

1. Enter into Air Force-sponsored graduate study at full pay while serving as Air Force officers, or
2. Are 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, or,
4. Enter the active or inactive Air Force Reserve.

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.

Students electing the four-year program normally will start the General Military Course (GMC) during their 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 students 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 Arizona. 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 \$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, students should be above-average scholars, physically capable, possess leadership



potential, and make application in October of their 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. 205-113-0-1803

**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. 205-114-0-1803

**205 200. Aerospace Studies 2A.** (1) I. This course examines the development of air power from its beginnings to the end of World War II. It traces the development of various concepts of employment of air power. One hour of class plus one hour of leadership training a week. 205-200-0-1803

**205 201. Aerospace Studies 2B.** (1) II. This course examines the development of air power from the close of World War II to the present. It focuses upon factors which have prompted research and technological change and stresses 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. 205-201-0-1803

### 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. 205-300-0-1803

**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. 205-301-0-1803

**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. 205-380-2-1803

**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. 205-381-3-1803

**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. 205-390-0-1803

**205 391. The Professional Officer 4B.** (3) II. Continuation of AS 390. Three hours of class plus one hour of leadership training a week. 205-391-0-1803

**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. 205-399-3-1803

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## ART

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Jerrold Maddox,\* Head of Department

Professors Garzio,\* Howard,\* and Larmer,\* Associate Professors Deibler,\* Tomasch,\* and Vogt,\* Assistant Professors Abraham, Culley, Davis, McIlvain, Munce,\* Noblett, O'Shea,\* Pujol, Rex Replogle,\* Sturr, Swiler, Winegardner, and Woodward; Instructors Clore, Ogg, Renata Replogle, 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, drawing, art history, and graphic design. Bachelor of Art Degree requires a minimum of 48 semester hours in art.

**Bachelor of Fine Arts.** The Bachelor of Fine Arts Degree is the more professionally oriented undergraduate degree in art. It is designed primarily for those planning to become professional artists or artist-teachers. Greater emphasis is placed on actual practice in the creative art disciplines. The degree is considered the appropriate preparation for the Master of Fine Arts degree which is recognized as the terminal degree in



studio arts. The B.F.A. in Art is a four-year 120-hour program with majors possible in painting, sculpture, ceramics, graphic design, printmaking, and drawing. 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 (2 courses)
- (3) Humanities (3 courses)
- (4) Philosophy, Aesthetics, or Mathematics (1 course)
- (5) Natural Sciences (2 courses\*)
- (6) General Electives (11-19 hours\*\*)
- (7) Physical Education (or marching band or varsity sports) (two courses)

\*Including one course with lab.

\*\*Minimum to maximum, depending on credit hours attached to courses taken under above categories.

**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 any of **three** programs:

(1) B.A. and teacher certification, (2) B.F.A. and teacher certification or (3) 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. Art students may enroll in Introduction to Civilization of South Asia, as a humanities requirement.

Studios, laboratories, equipment for creative work are provided and adequate to the needs of the art areas. Student work may be retained at the discretion of the faculty for an indefinite period of time for instructional and exhibition purposes.

**Graduate Study**

Work leading to the Master of Arts is offered in the Department of Art in the fields of drawing, painting, sculpture, ceramics, crafts, and prints.

Candidates for graduate work should have completed an undergraduate curriculum with a broad background in art. Students lacking preparation in certain areas may be asked to do additional work. Other requirements for the degree Master of Arts include a minimum of 30 semester hours, approximately two-thirds of which will be in the major field. The candidate will be encouraged to take supporting courses 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 and art education majors each semester. By appt. not to exceed one meeting per month. 209-095-2-0831

**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. 209-096-2-0831

**209 100. Design I.** (2) I, II, S. Introduction to and laboratory practice in the principles and elements of design. Four hours lab. 209-100-1-1002

**209 170. Art for Elementary Schools.** (3) I, II, S. Art methods, materials, and philosophy of children's art at different grade levels. 209-170-1-0831

**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. 209-190-1-1002

**209 195. Survey of Art History I.** (3) Historical development of art from Pre-History through the Middle Ages. 209-195-0-1003

**209 196. Survey of Art History II.** (3) Historical development of art from the Renaissance through the nineteenth century. 209-196-0-1003

**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. 209-100-1-1002

**209 205. Graphic Design Techniques.** (2) I, II, S. Layout and drawing techniques and tools used in various media related to reproducing art for commercial reproduction purposes. Four hours lab. Pr.: Art 100, 190. 209-205-1-1002

**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. 209-210-1-1002

**209 215. 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 100. 209-215-1-1002

**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. 209-220-1-1002

**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. 209-225-1-1002

**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. 209-230-1-1002

**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. 209-235-1-1002

**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. 209-245-1-1002

**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. 209-260-1-1002

**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. 209-265-1-1002

**209 270. Metalsmithing and Jewelry.** (2) I, II, S. Design and execution of small-scale, three-dimensional objects, involving



the basic processes of raising, forging, and fabrication in semi-precious metals. The techniques of centrifugal and vacuum casting of precious metals will also be introduced as well as soldering and piercing. Four hours lab. May be taken for credit three semesters. Pr.: Art 215. 209-270-1-1002

**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. 209-290-0-1002

**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. 209-299-0-1002

**209 420. History of South Asian Art.** (3) I, II. A survey of the history of art in the South Asian sub-continent from its prehistoric origins to the height of the Mughal period in the 18th century A.D. Mythological, symbolic, tantric and religious dimensions of South Asian art are studied as well as regionally important technical and aesthetic aspects. Includes the art of India, Pakistan, Bangladesh, Nepal, Ceylon, Afghanistan, Indonesia and Indochina. 209-420-0-1003

**209 430. Independent Study — Ceramics.** (1-5) I, II, S. Work offered in ceramics after competency has been achieved. Personal development is emphasized. 209-430-3-1002

**209 435. Independent Study — Crafts.** (1-5) I, II, S. Work offered in crafts after competency has been achieved. Personal development is emphasized. 209-435-3-1002

**209 440. Independent Study — Drawing.** (1-5) I, II, S. Work offered in drawing after competency has been achieved. Personal development is emphasized. 209-440-3-1002

**209 445. Independent Study — Graphic Design.** (1-5) I, II, S. Work offered in graphic design after competency has been achieved. Personal development is emphasized. 209-445-1-1002

**209 450. Independent Study — Metalsmithing and Jewelry.** (1-5) I, II, S. Work offered in metalsmithing and jewelry after competency has been achieved. Personal development is emphasized. 209-450-3-1002

**209 455. Independent Study — Painting.** (1-5) I, II, S. Work offered in painting after competency has been achieved. Personal development is emphasized. 209-455-3-1002

**209 460. Independent Study — Printmaking.** (1-5) I, II, S. Work offered in printmaking after competency has been achieved. Personal development is emphasized. 209-460-3-1002

**209 465. Independent Study — Sculpture.** (1-5) I, II, S. Work offered in sculpture after competency has been achieved. Personal development is emphasized. 209-465-3-1002

**209 470. Independent Study — Water Color.** (1-5) I, II, S. Work offered in water color after competency has been achieved. Personal development is emphasized. 209-470-3-1002

#### 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. 209-505-0-1003

**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. 209-510-0-1003

**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. 209-515-0-1003

**209 520. Southern Baroque Art History.** (3) The development of the Baroque period in Italy, Spain and France, from its beginnings in the 17th century to Tiepolo and the Rococo style of the 18th century. Pr.: Art 195, 196. 209-520-0-1003

**209 525. Northern Baroque Art History.** (3) The development of the Baroque in Holland and Flanders. Pr.: Art 195, 196. 209-525-0-1003

**209 530. The Development of American Art.** (3) I, II, S. A study of American art from the Colonial period to the beginnings of Abstract Expressionism in the early 1940s, with major emphasis on the late 19th and early 20th century developments. Pr.: Art 195, 196. 209-530-0-1003

**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. 209-540-0-1003

**209 545. Twentieth Century Art History I.** (3) I. Origins and development of twentieth century art from 1890 to 1914. Pr.: Art 195, 196. 209-545-0-1003

**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. 209-550-0-1003

**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. 209-560-1-1003

**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. 209-565-1-1002

**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. 209-570-1-1002

#### UNDERGRADUATE AND GRADUATE CREDIT

**209 575. Graphic Design and Illustration.** (3-4) I, II, S. Problems in layout design and illustration for newspapers, magazines and general advertising. Six hours lab. May be taken for four semesters. Final semester will include a portfolio project. Pr.: Art 205, 290, or consent of instructor. 209-575-0-1002

**209 576. Metalsmithing Techniques.** (3) I, II, S. A variety of techniques will be explored by the intermediate student. Surface embellishment, container construction of various techniques, linkage and mechanical problems will be explored in addition to stone setting. Nine hours lab. May be taken for three semesters. Pr.: 209 270. 209-576-1-1002

**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. 209-610-1-1002

**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. 209-615-1-1002

**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. 209-620-1-1002

**209 580. Sculpture II.** (3) I, II, S. Emphasis on personal development through exploratory experiences in the various media. Introduction to foundry techniques and welding processes. Nine hours lab. May be taken for four semesters. Pr.: Art 230. 209-580-1-1002

**209 635. Printmaking II.** (3) I, II, S. Advanced work in block-prints, serigraphy, lithography, and intaglio. Six hours lab. May be taken for four semesters. Pr.: Art 235. 209-635-1-1002

**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. 209-640-1-1002

**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 570 and consent of instructor. 209-650-3-1002

**209 660. Sculpture III.** (3-5) I, II, S. Continuation of Sculpture II. Further exploration of media and technique, emphasizing the development of individual direction and expression. Primarily for undergraduate sculpture majors. May be taken for four semesters. Pr.: Art 580. 209-660-0-1002

**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 lec. and two hours lab. Pr.: Art 265. 209-665-1-1002

**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. 209-670-1-1002

**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. 209-675-0-1003

**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. 209-680-1-1002

**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. 209-685-3-1002

**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. 209-690-2-0831

**209 695. Problems in Art History.** Credit arranged. I, II, S. Independent exploration in selected problems in art history. Pr.: Twelve hours art history. 209-695-3-1003

## 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. 209-830-3-1002

**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. 209-845-3-1002

**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. 209-855-3-1002

**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. 209-865-3-1002

**209 885. Graduate Independent Study.** (1-5) I, II, S. Advanced individual work offered in studio areas of ceramics, graphic design, drawing, painting, printmaking and sculpture. 209-885-3-1002

**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. 209-899-4-1002

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## ATHLETICS

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### Men's Athletics

Mr. Ernie Barrett, Head of Department.

Athletic Director Barrett; Assistant Professor Dodds; Instructors Morgan, Nelson, and Wilson; Coaches Hartman, Fozzard, and Rainsberger; Assistant Coaches Adams, Bates, Buda, Hardwick, Heggie, Moran, Pendry, Selcer, Walstad, Weber and Williams; Assistant Athletic Director Rothermel; Administrative Assistant Pryor.

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.

### Women's Intercollegiate Athletics

Judy Akers, Head of Department

Athletic Director and Coach Akers; Instructor Habiger; Coaches Anderson and Schroeder.

The women's athletic program is designed to enrich the lives of the University's young women through athletic competition. The program offers competition in tennis, cross country, volleyball, basketball, gymnastics, swimming, track and field, and softball.

Kansas State is a member of the national Association of Intercollegiate Athletics for Women (AIAW), and competes under the Kansas Association of Intercollegiate Athletics for Women (KAIAW) conference alignment first established in 1968.

Kansas is in Region VI of the AIAW along with Missouri, Nebraska, Iowa, North Dakota, South Dakota, and Minnesota.

Competition starts at the state level and continues through regional and national competition.

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## BIOCHEMISTRY

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David J. Cox,\* Head of Department

Professors Burkhard,\* Clegg,\* Cox,\* Mitchell,\* Nordin,\* Parrish,\* and Ruliffson,\* Associate Professors Cunningham,\* Hedgcoth,\* and Klopfenstein,\* Assistant Professors Kramer,\* Mueller,\* Reeck,\* and Roche.\* 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 agriculture, food science, health, medicine and nutrition.

### Undergraduate Study

The Department of Biochemistry offers work leading to Bachelor of Arts and Bachelor of Science degrees with majors in biochemistry. The A.B. degree is designed to provide a liberal education with sufficient emphasis on science for students who wish to prepare for certain professional schools. The B.S. degree is designed to prepare students for professional careers in biochemistry or entry in graduate biochemistry training programs.

The requirements for the A.B. degree with a major in biochemistry include the General Requirements of the College of Arts and Sciences (page 84) plus the following: Biochemistry Orientation (1 hour), Chemistry I & II (8 hours), Chemical Analysis (4 hours), Organic Chemistry I & II (6 hours), Organic Chemistry I & II Laboratory (4 hours), Biochemistry I & II (6 hours), General Biochemistry Laboratory (2 hours), Analytical Geometry and Calculus I & II (8 hours), General Physics I & II (8 hours), Principles of Biology (4 hours), Organismic Biology (4 hours), and biological science electives (4 hours). These science courses satisfy the Mathematics and Natural Sciences Requirements shown in the General Requirements for the A.B. degree. The Modern Language Requirement for the A.B. degree must be satisfied by either German, French or Russian for a biochemistry major.

The requirements for the B.S. degree with a major in biochemistry include the General Requirements of the College of Arts and Sciences (page 84) plus the following: Biochemistry Orientation (1 hour), Chemistry I & II (8 hours), Chemical Analysis (4 hours), Organic Chemistry I & II (6 hours), Organic Chemistry I & II Laboratory (4 hours), Biochemistry I & II (6 hours), Biochemistry I & II Laboratory (4 hours), Physical Chemistry I & II (6 hours), Physical Chemistry II Laboratory (2 hours), upper division biochemistry or chemistry elective (3 hours), Analytical Geometry and Calculus I, II & III (12 hours), Engineering Physics I & II (10 hours), Principles of Biology (4 hours), Organismic Biology (4 hours), biological science electives (8 hours), and one year of either German, French or Russian. The science courses in this list satisfy the Natural Science Requirements shown in the General Requirements for the B.S. degree. The year of German, French or Russian satisfies two of the required seven Humanities & Social Science courses shown in the General Requirements.

### Graduate Study

The Department of Biochemistry, as a participant in the interdepartmental Graduate Biochemistry Group, offers work leading to the Master of Science and Doctor of Philosophy degrees with majors in biochemistry. See Biochemistry, page 36, for further details.

The Department of Biochemistry also participates in interdepartmental programs in Animal Science leading

to the Master of Science and Doctor of Philosophy degrees with majors in animal nutrition, and in Food Science leading to the Master of Science and Doctor of Philosophy degrees with majors in food science. See Animal Science, page 35, and Food Science, page 37, for further details.

### Courses in Biochemistry

#### UNDERGRADUATE CREDIT

**211 100. Biochemistry Orientation.** (1) I. Discussion of biochemistry as a discipline in the life sciences. 211-100-0-0414

**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. 211-110-0-0414

**211 120. Introductory Organic and Biological Chemistry.** (5) I, 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. 211-120-1-0414

**211 201. Elementary Biochemistry.** (3) I, II. An elementary treatment of the chemistry and metabolism of carbohydrates, lipids, proteins and nucleic acids. Pr.: Chem. 190. 211-201-0-0414

**211 202. Elementary Biochemistry Laboratory.** (2) I, II. A laboratory course to accompany Biochem. 201. Six hours lab. a week. Pr.: Biochem. 201 or concurrent enrollment. 211-202-1-0414

**211 499. Biochemistry Seminar.** (0) I, II. Lectures, discussions, and activities of biochemical interest. 211-499-0-0414

#### 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. 211-510-1-0414

**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. 201. Pr.: Chem. 350. 211-521-0-0414

**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.: Chemical analysis, Chem. 351 and Biochem. 521 or conc. enrollment, or Biochem. 665 or conc. enrollment. 211-522-1-0414

#### 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. Biochem. 655 and 665 are for students interested in a two-semester comprehensive coverage of biochemistry. For a one-semester course, enroll in Biochem. 521. Pr.: \*Chemical analysis, one year of organic chemistry, differential and integral calculus. 211-655-0-0414

**211 656. Biochemistry I Laboratory.** (2) I. An intensive laboratory course to accompany Biochem. 655. Biochem. 656

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



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. 522. Six hours lab. a week. Pr.: \*Biochem. 655 or conc. enrollment. 211-656-1-0414

**211 665. Biochemistry II.** (3) II. A cont. of Biochem. 655; lipid chemistry and metabolism, amino acid metabolism, nutrition, nucleic acid chemistry and metabolism, integration of biochemical pathways and metabolic control mechanisms. Pr.: \*Biochem. 655. 211-665-0-0414

**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. 211-666-1-0414

**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. 211-670-0-0414

**211 790. Physical Biochemistry.** (3) I. A survey of biophysical methods most frequently encountered in biochemistry and related disciplines. The course emphasizes principles underlying methods used to determine the molecular weight and shape of biopolymers, and techniques used to detect conformational changes in polynucleotides, proteins, and polysaccharides. Pr.: Calculus, a course in physical chemistry, Biochem. 655, 656, 665 and 666. 211-790-1-0414

**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. 211-799-3-0414

#### GRADUATE CREDIT

**211 806. Biochemistry Seminar.** (0-1) I, II. Seminar for graduate students in biochemistry. 211-806-0-0414

**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. 211-810-0-0414

**211 815. Plant Biochemistry.** (3) I. A more advanced treatment of the material of Biochem. 510, with greater emphasis on the chemistry involved. Two hours lec. and three hours lab. a week. Pr.: \*Biochem. 655 and 656. 211-815-0-0414

**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. 211-820-0-0414

**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. 211-830-0-0414

**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. 211-840-0-0414

**211 845. Hormones.** (2) I. Offered 1974-75 and alt. years or on demand. A study of the structure, biosynthesis, biochemical role, metabolism and interrelations of internal secretions. Pr.: Biochem. 665. 211-845-0-0414

**211 850. Advanced Biochemistry Laboratory.** (2) II. Specialized laboratory techniques for advanced biochemical investigations. Pr.: \*Biochem. 666. 211-850-1-0414

**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. 211-899-4-0414

**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. 211-910-0-0414

**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. 211-920-0-0414

**211 930. Proteins.** (2) I. Offered 1975-76 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. 211-930-0-0414

**211 940. Chemistry of Carbohydrates.** (2) I. Offered 1974-75 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. 211-940-0-0414

**211 950. Enzyme Chemistry.** (2) II. Offered 1974-75 and alt. years. Lectures and readings on the chemical nature of enzymes, their reactions and assay. Pr.: \*Biochem. 665. 211-950-0-0414

**211 951. Enzyme Laboratory.** (2) II. Offered 1974-75 and alt. years. A laboratory course to accompany Biochem. 950. Pr.: \*Biochem. 656 and 950 or conc. enrollment. 211-951-1-0414

**211 960. Advanced Animal Nutrition.** (3) I. Offered 1974-75 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. 211-960-0-0414

**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. 211-999-4-0414

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#### DIVISION OF BIOLOGY

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L. E. Roth, Director

M. F. Hansen, Associate Director

Jerry S. Weis, Associate Director for Development of Instruction

Professors Barkley,\* Bode,\* Consigli,\* Fina,\* Gier,\* Hansen,\* Harris,\* Hulbert,\* Kramer,\* Marzolf,\* Pittenger,\* Robel,\* and Roth,\* Associate Professors Burlingham,\* Conrad,\* Goss,\* Iandolo,\* Johnson,\* Kammer,\* Lockhart,\* Marchin,\* Rodkey,\* Smith,\* Spooner,\* Tomb,\* Weis,\* Wilcox,\* Wilson,\* and Zimmerman,\* Assistant Professors Center,\* Denell,\* Fretwell,\* Klaassen,\* Slesinski,\* Urban,\* and Williams,\* Instructors M. Davis, Eads, Granrose, Hook, Kreitner, Paulsen, Roberts, and A. Smith. Emeritus: Professors Ameel,\* Frazier,\* Goodrich,\* Guhl,\* Pady,\* and Wimmer.\* Associate Professors McCracken,\* and Newcomb.\*

The Division of Biology has the largest science faculty in the College of Arts and Sciences, thereby reflecting the breadth of biology as a dominant academic discipline in our times. Developments in the past quarter century have linked many biological phenomena to firmly-based concepts of physics and chemistry, and have opened a wide array of theory and techniques to approach biological phenomena which

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



are only beginning to be understood; e.g. the mechanisms of organism development, the function of the nervous system and its manifestation in behavior, and the biological bases of malfunctions leading to disease. Likewise, developments in mathematics, statistics, data-processing and geology are providing new approaches to the complex problems of ecological function and evolution. All of these biological problems are both intellectually challenging and relevant to many societal problems. Through research the faculty of the Division of Biology seeks to contribute to man's understanding of these problems. Through teaching it seeks to develop the competence in students to contribute creatively in the next generation of biological scientists and in the generally educated citizenry.

The several curricula which follow are supplemented by extra-curricular experiences ranging from participation in Bioclub, Microbiology Club or the Student Chapter of the Wildlife Society to participation in independent research and assisting faculty members in teaching or research programs.

### Undergraduate Study

The course offerings and curricula are being constantly revised in order to reflect accurately both the recent developments in the field of Biology and the changing requirements of students. Undergraduate majors are specifically offered in Biology, Microbiology, and Fisheries and Wildlife Biology, plus the professional (paramedical) and pre-professional areas. Students majoring in the areas of the Division of Biology are assigned advisers to assist students in planning their academic programs. The course offerings and degree requirements are sufficiently broad to allow great flexibility in tailoring the program of study to the interests and needs of the individual student. Undergraduate curriculum planning, including the choice of areas of emphasis and elective courses, is ultimately the responsibility of students in consultation with their advisers.

**Biology Degree.** Students may arrange their program to receive either a B.A. or B.S. degree; the essential distinction between the two is 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 bachelor's 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 (3 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 additional course work in Calculus, Statistics, Biochemistry, and a modern foreign language.

**Microbiology Degree:** The 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.), Microbiology (4 hrs.), Bacteriology of Human Diseases (5 hrs.), Immunology (4 hrs.), Genetics of Microorganisms (3 hrs.), Microbial Physiology (5 hrs.), General Virology (3 hrs.), plus 8 additional hours in Microbiology of the students' choice. The following courses given by other departments are also required: Analytic Geometry and Calculus I (4 hrs.), Chemistry I (5 hrs.), Chemistry II Lecture (3 hrs.), Chemical Analysis (4 hrs.), Organic Chemistry I (5 hrs.), Organic Chemistry II Lecture (3 hrs.), General Biochemistry Lecture (3 hrs.) or Biochemistry I and II Lecture (6 hrs.), and General Physics I & II (8 hrs.). Students contemplating graduate school should also consider taking a modern foreign language.

**Fisheries and Wildlife Biology Degrees.** This curriculum has 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.), Biometrics I (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, Geology I (3 hrs.) and General Entomology (3 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 II (3 hrs.), Physics I & II (8 hrs.), Lower Plants (3 hrs.), Ichthyology (3 hrs.), Fisheries Management (3 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 (3 hrs.), Microbiology (4 hrs.) and Evolution (3 hrs.).

Major requirements for the Wildlife Biology option include: Biometrics II (3 hrs.), Physics I & II (8 hrs.), Higher Plants (4 hrs.), Ornithology (3 hrs.), Mammalogy (3 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 (3 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 (3 hrs.), plus two of the following five courses: Cell Biology (4 hrs.), Developmental Biology (3 hrs.), Microbiology (4 hrs.), Molecular Genetics (3 hrs.), and Evolution (3 hrs.). A minimum of nine additional elective hours in biology are also required.



**Professional and Pre-Professional Curricula.** Students preparing to seek admission to medical school, dental school, veterinary school or similar professional school may major in biology (or other academic discipline) provided the specific pre-professional requirements are met. Such students are encouraged to contact the appropriate pre-professional adviser through either the Division of Biology Office or the Dean's Office as early in their academic careers as possible. This will facilitate the planning of a proper academic program for the students' professional goals.

The Division of Biology is intimately associated with several professional degree programs which are officially organized by the office of the Dean of Arts and Sciences. These programs are Physical Therapy, Medical Technology, Pre-Nursing, and Cytotechnology. Students with professional interests in these fields should contact either the Division of Biology Office or the Deans' Office.

Special advisement is offered in connection with the College of Education for students preparing to be biology teachers in the secondary schools.

### Graduate Study

The Division offers both the M.S. and the 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 into which the Division faculty is divided according to research interests and teaching interactions. These are: Molecular Biology and Genetics, Microbiology and Immunology, Physiology and Developmental Biology, and Environmental Biology.

Graduate students may establish research advisory committees with faculty members from several of these sections as well as from appropriate departments outside of Biology, thereby gaining a considerable latitude of expertise in developing the program of study. It should be noted that a graduate student's education is self-determined in consultation with the major professor and advisory committee; therefore the program of study is always designed to fit the student's particular interests and needs.

### 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 lab. per week. 215-198-1-0401

**215 201. Organismic Biology.** (4) I, II, S. The animal phyla and plant divisions, illustrating their taxonomy and functional adaptations that affect their survival. Two hours lec. and two three-hour labs per week. Pr.: 215 198 or equiv. 215-201-1-0401

**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. 215-202-2-1203

**215 210. General Botany.** (4) I, II. Plant groups and their evolutionary development. Physiology, anatomy, ecology, and identification of seed plants. Economic applications. Two hours rec. and six hours lab. per week. 215-210-1-0402

**215 220. Bacteriology and Man.** (3) I, II. Two hours lec. and three hours lab. 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 cannot be used as a prerequisite for other Microbiology courses. Pr.: One course in Biology, one course in Chemistry. 215-220-1-0403

**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 three-hour lab. per week. Pr.: Sophomore standing. 215-222-1-0499

**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. 215-230-2-1212

**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. 215-235-2-1223

**215 240. Structure and Function of the Human Body.** (6) I, II, S. Anatomy and physiology of the organ systems of the body. Course is directed toward non-biology majors. Four hours lec. and two three-hour lab. sessions per week. Pr.: 215 198. 215-240-1-0410

**215 303. Ecosystems and Society.** (3) II. 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 lec. and one hour discussion per week. Pr.: Two courses in natural sciences. 215-303-0-0420

**215 310. Biology and the Future of Man.** (3) II. Discussions of recent developments in biological research and their impact on the social, moral and ethical dimensions of man's existence. Topics covered include human reproduction, human genetics, aging, death, and organ transplantation. Two hours lec. and one hour discussion per week. Pr.: Junior standing. 215-310-0-0401

**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. 215-325-2-0401

**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.: 215 198. 215-345-1-0401

**215 350. Basic Concepts of Human Disease.** (3) I. An exploration into the causes, pathogenesis, and therapeutic approaches to heart attack, arteriosclerosis, stroke, high blood pressure, cancer, bacterial and viral infections, venereal disease, genetic and congenital errors, alcoholism, drug abuse and addiction, and personality disorders. Three lectures and one rec./discussion per week. Pr.: Junior standing and a basic college biology course. 215-350-0-0408

**215 360. Freshwater Invertebrate Biology.** (2) II. A basic course in techniques of collection, preservation and identification of freshwater invertebrates of the Great Plains region. Two three-hour labs per week. Pr.: 215 198. 215-360-1-0407

**215 398. Junior Honors Colloquium in Biology.** Credit arranged. I, II. Open only to juniors in the Arts and Sciences Honors Program. 215-398-0-0401



**215 399. Honors Seminar in Biology.** (1-3) I, II. Selected topics. Open to non-majors in the Honors Program. 215-399-0-0401

**215 412. Principles of Zoophysiology.** (3) II. An inquiry into the bases and control of a variety of cellular and systemic functions in animals. Pr.: 215 198, two semesters of Chemistry or equivalent, and junior standing. 215-412-1-0410

**215 413. Laboratory in Zoophysiology.** (1) II. For majors in Fisheries Biology and in Wildlife Biology. Enrollment of students in other curricula, including Fisheries and Wildlife Conservation, is by permission of instructor. Pr.: Concurrent enrollment in 215 412. 215-413-1-0410

**215 420. Developmental Biology I.** (3) I. A study of development and differentiation in plants and animals. Three hours lec. per week. Pr.: 215 201. 215-420-0-0427

**215 460. Animal Virology Laboratory.** (2) II. Laboratory techniques and investigative procedures for the analysis of viral growth in animal cell cultures. This course is intended for undergraduate students only, but is offered in conjunction with General Virology (215 730). Pr.: Concurrent enrollment in 215 730. 215-460-1-0416

**215 465. Practicum in Biology.** (2-4) I, II. Experimental approaches to learning biology through teaching. One hour rec. per week plus 3-9 hours lab. per week. Pr.: Permission of instructor and credit with superior performance in the course in which the student will be involved. 215-465-2-0401

#### 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.: 215 198. 215-505-1-0412

**215 510. Embryology.** (4) I, II. Developmental anatomy and physiology of reproduction of birds and mammals. Three hours rec. and three hours lab. per week. Pr.: 215 198. 215-510-1-0427

**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.: 215 198. 215-518-1-0413

**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.: 215 555 or equiv. 215-520-1-0411

**215 524. Human Anatomy.** (4) I. Human anatomy as studied by demonstrations and dissection. Two hours rec. and six hours lab. per week. Pr.: 215 198 and junior standing. 215-524-1-0412

**215 525. Human Physiology.** (4) II. Functions of various organ systems of the body. Three hours rec. and two hours lab. per week. Pr.: 215 198, and one course in either biochemistry or organic chemistry. 215-525-1-0410

**215 530. Ecology.** (3) I, II, S. Designed for science majors; mathematical and descriptive applications of principles and theories of ecology to population regulation, evolutionary ecology, trophic dynamics and ecosystem structure. Pr.: 215 198, 215 201, and junior standing. 215-530-0-0420

**215 531. Ecology Laboratory.** (1) I, II, S. 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 215 530. 215-531-1-0420

**215 533. Wildlife Conservation.** (3) II. Methods and techniques in the management and propagation of wildlife. Pr.: Two courses in Bio. 215-533-0-0107

**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 221 351 or equiv. 215-535-0-0417

**215 536. Cell Biology Laboratory.** (1) I. One three-hour lab. per week. Pr.: Concurrent enrollment in 215 535, status as undergraduate major in the Division of Biology. 215-536-1-0417

**215 542. Ichthyology.** (3) II. Classification, morphology, physiology, distribution, and natural history of fishes. Two hours lec. and three hours lab. per week. Pr.: 215 198. 215-542-1-0407

**215 543. Ornithology.** (3) II. Classification, morphology, physiology, distribution and natural history of birds. Two hours lec. and three hours lab. per week. Pr.: 215 198. 215-543-1-0407

**215 544. Mammalogy.** (3) I. Characteristics, evolution, life histories and ecology of mammals, especially North American game species. Two hours lec. and three hours of lab. per week. Pr.: 215 198. 215-544-1-0407

**215 545. Human Parasitology.** (3) II. Protozoan and helminth parasites of man with lesser emphasis on ectoparasitic arthropods. Emphasis on life cycles, control and laboratory diagnosis. May be taken without lab. if not required in curriculum. Three hours lec. per week. Pr.: 215 198. 215-545-0-0411

**215 546. Human Parasitology Laboratory.** (1) II. Examination of prepared materials and identification of internal parasites of man. Two hours lab. per week. Pr.: Concurrent enrollment in 215 545. 215-546-1-0411

**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.: 215 201 or 210. 215-550-1-0402

**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.: 215 201 or 210. 215-551-1-0402

**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. 215-555-1-0411

#### UNDERGRADUATE AND GRADUATE CREDIT

**215 600. Plant Physiology.** (4) I. Detailed consideration of the physiological processes of higher plants. Three hours rec. and three hours lab. per week. Pr.: 215 201 or 210 and a course in organic chemistry. 215-600-1-0406

**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.: 215 510. 215-602-1-0427

**215 610. Bacteriology of Human Diseases.** (5) I. Three hours rec. and six hours lab. per week. Pr.: 215 555 or equiv. 215-610-1-0411

**215 625. Animal Parasitology.** (3) I. Biology, pathology, and prophylaxis of the principal external and internal parasites of domestic animals. Two hours rec. and three hours lab. per week. Pr.: 215 198 and junior standing. 215-625-1-0411

**215 634. Soil Microbiology.** (3) I in odd years. Microbial population of the soil and its role in soil fertility. Pr.: 215 555 or equiv.; 221 351 or equiv. 215-634-1-0411

**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.: 215 201 or 210. 215-640-1-0411

**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.: 215 201. 215-642-1-0407

**215 646. Human Heredity and Evolution.** (2) I, II. A study of human genetics and a survey of the principles of evolution of animals including man. Pr.: 215 201. 215-646-0-0422



**215 650. Molecular Genetics.** (3) I, II. 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. 215-650-0-0422

**215 660. Evolution.** (3) I, 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. 215-660-0-0422

**215 665. Developmental Biology II.** (3) II. An experimental analysis of developmental phenomena in plants and animals. Emphasis on elucidation of molecular mechanisms. Three hours lec. per week. Pr.: 215 525 or 215 420 and 215 535. 215-665-0-0427

**215 666. Developmental Biology II Lab.** (1) II. Experimental research in developmental biology of plants and animals. An investigative project approach will be followed rather than scheduled routine laboratory exercises. Pr.: 215 665 or conc. enrollment. Enrollment by permission of instructor only. 215-666-1-0427

**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. 215-670-0-0411

**215 671. Immunology Lab.** (1) II. Laboratory exercises in conjunction with 215 670 Immunology. Pr.: 215 670 or concurrent enrollment. 215-671-1-0411

**215 675. Genetics of Microorganisms.** (3) I. The genetics of bacteria, viruses and other microorganisms. Both the use of genetics in microbiological studies and the use of microbial systems to investigate basic genetic problems will be covered. Pr.: 215 555. 215-675-0-0422

**215 684. Wildlife Management.** (2) II. Designed for Fisheries and Wildlife Biology students. Fundamentals of managing wildlife with emphasis on North American game species; historical and recent developments in the field of wildlife management; habitat improvement, and related material. Two hours lec. per week. Pr.: 215 533. 215-684-0-0107

**215 685. Wildlife Management Techniques.** (3) I. Ecology and management techniques. Two hours rec. and three hours lab. per week. Pr.: 215 533 and 531. 215-685-1-0107

**215 690. Microbial Physiology.** (3) II. The study of bacteria as an integrated biochemical system emphasizing how the biochemical aspects serve the functional properties of cells. Pr.: 215 555 and 211 521 or 211 655. 215-690-0-0411

**215 691. Microbial Physiology Laboratory.** (2) II. Examination of microbial processes by biological and biochemical methods. Six hours a week. Pr.: Concurrent enrollment in 215 690. Enrollment of students in curricula other than Microbiology is by permission of instructor. 215-691-1-0411

**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 plus 221 210 and 221 230. 215-693-0-0420

**215 694. Limnological Methods.** (1) I. Problems in field observation and measurement of limnological phenomena. One three-hour lab. per week. Pr.: 285 340, 215 530, and concurrent enrollment in 215 693. 215-694-1-0420

**215 695. Fisheries Biology.** (2) I. Principles and concepts of fisheries biology form the basis for management. Topics include physiochemical conditions of fresh water, fish growth, production and yield, population dynamics, and propagation of game fishes. Two hours lec. per week. Pr.: 215 542 and 221 230. 215-695-0-0107

**215 696. Fisheries Management.** (3) I. Methods of managing fisheries resources; physical and biological survey methods; methods of aquatic environment improvement; fish population manipulation; management of streams, ponds

and lakes; and commercial fish culture. Two hours lec. and three hours lab. per week. Pr.: 215 695 or concurrent enrollment. 215-696-1-0107

**215 697. Topics in Biology.** (1-6) I, II, S. Pr.: Consent of instructor. 215-697-3-0401

**215 698. Problems in Biology.** (1-8) I, II, S. Pr.: Consent of instructor. 215-698-3-0401

**215 699. Undergraduate Seminar in Biology.** (1) I, II. Pr.: Consent of instructor. 215-699-2-0401

**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.: 215 640. 215-705-1-0411

**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.: 215 198 and a course in organic chemistry or biochemistry. 215-710-0-0410

**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.: 245 221 or 340 and 285 500 (or concurrently). 215-725-0-0419

**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 215 555 or equiv. and 211 521 or equiv.; consent of instructor. 215-730-0-0411

**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.: 215 201 or 210. 215-740-1-0402

**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.: 211 522 or equiv. 215-750-0-0417

**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.: 215 690 and 211 521. 215-770-1-0420

## GRADUATE CREDIT

**215 800. Mineral Nutrition of Plants.** (2) I. Current interpretation of the absorption and transport of mineral nutrients. Pr.: 215 600. 215-800-0-0402

**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.: 215 625 and consent of instructor. 215-802-1-0411

**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. 215-803-2-0401

**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 En-



vironmental Biology, Microbiology, Molecular and Cell Biology, OR Physiology and Developmental Biology. At least two areas must be represented. Pr.: 215 803. 215-804-2-0401

**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.: 215 600. 215-819-0-0402

**215 820. Plant Physiological Technique.** (2) II. Six hours lab. per week. Pr.: 215 600 and a course in biochemistry. 215-820-1-0406

**215 824. Paleobotany.** (3) II. Fossil plants and their use in elucidating ancient biospheres. Two hours rec. and two hours lab. per week. Pr.: 215 201 or 210 and 234 200. 215-824-1-0402

**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.: 215 730 and consent of instructor. 215-830-1-0411

**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.: 215 600. 215-833-0-0402

**215 840. Immunochemistry.** (3) I in odd years. Lectures and readings covering the chemical and physical properties of antibodies. Pr.: 215 670 or equiv. and consent of instructor. 215-840-0-0411

**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. 215-845-1-0420

**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. 215-855-0-0422

**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.: 211 522 or equiv.; a basic knowledge of molecular biology and consent of instructor. 215-858-0-0422

**215 860. Microbial Genetic Techniques.** (4) II. Experiments in multiplication, recombination, and mutation in bacteria and bacteriophage. Pr.: 215 675, 211 521 or equiv. 215-860-1-0422

**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.: 215 530 and 600. 215-865-1-0420

**215 868. Cellular and Developmental Biology.** (3) II. Chemistry, structure and function of cellular systems in growth, development and reproduction. Pr.: 211 522 or equiv. 215-868-0-0417

**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.: 215 551. 215-870-1-0402

**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.: 215 530, a course in Calculus and a course in Statistics. 215-880-0-0420

**215 881. Ecosystems Energetics.** (3) I (even years). Three credit hours of lecture and discussion. A study of the constraints placed on energy flow in ecosystems by bioenergetic principles at cellular, individual, and population levels of organization. The course will involve extensive reading of original literature. Pr.: Consent of instructor. 215-881-0-0420

**215 882. Reservoir Limnology.** (3) II (even years). Current investigations in aquatic ecology and limnology as they pertain to reservoirs. Great Plains Reservoirs will be viewed as systems for investigation of ecological phenomena. Pr.: 215 693. 215-882-0-0420

**215 890. Advanced Topics in Biology.** (1-6) I, II, S. Pr.: Consent of instructor. 215-890-3-0401

**215 891. Advanced Problems in Biology.** (1-8) I, II, S. Pr.: Consent of instructor. 215-891-3-0401

**215 895. Graduate Seminar in Biology.** (1) I, II. Pr.: Consent of instructor. 215-895-0-0401

**215 898. Master's Research in Biology.** (1-9) I, II, S. 215-898-4-0401

**215 899. Master's Research in Microbiology.** (1-9) I, II, S. 215-899-4-0411

**215 998. Research in Biology.** Credit arranged. I, II, S. 215-998-4-0402

**215 999. Research in Microbiology.** Credit arranged. I, II, S. 215-999-4-0411

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## CHEMISTRY

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William G. Fateley,\* Head of Department

Professors Copeland,\* Fateley,\* Hammaker,\* Lambert,\* McDonald,\* Meloan,\* Moser,\* Schrenk,\* and Setser;\* Associate Professors Danen,\* Des Marteau,\* Hawley,\* Johnson,\* Lanning,\* Paukstelis,\* Purcell,\* and van Swaay;\* Assistant Professors Kay,\* Hoffman,\* and Lenhart; Emeritus: Professors Andrews, Lash, and Silker; Assistant Professor Harriss; Instructor Crawford.

The Department of Chemistry occupies Willard Hall and 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.

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.

**Secondary Education Certification.** Students who desire to become high school chemistry teachers may prepare for teacher certification while completing requirements in either the chemistry or chemical science curriculum. A student pursuing this plan will have advisers in both chemistry and education.

### Graduate Study

Programs leading to the M.S. and Ph.D. degrees are offered. Research and graduate level courses are conducted in the areas of analytical, inorganic, organic, and physical chemistry and adequately prepare students for a career in research or college and university teaching.

In order to be admitted to the graduate program leading to the M.S. or Ph.D. degrees, a student must have completed undergraduate courses in chemistry, mathematics, and physics equivalent to those in the undergraduate chemistry curriculum (see below). Prospective graduate students whose undergraduate training does not meet these requirements may be admitted on a provisional basis but are required to take undergraduate courses, which may not be applied for graduate credit, to make up their deficiencies.

The Department of Chemistry requires all graduate students majoring in chemistry to teach as part of their training for an advanced degree.

Information and a brochure describing fields of research, supporting facilities, financial support, and other aspects of graduate study may be obtained on request from the Chairman, Graduate Assistantship Committee, Department of Chemistry, Kansas State University, Manhattan, Kansas 66506.

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

Preferred curriculum for those preparing for employment as chemists or those preparing for graduate study in chemistry. 120 credit hours required for graduation.

**Chemistry:** 42-43 hours (course hours are in parentheses)  
 Freshman: Chem. I (5); Chem. II (3); Chem. Analysis (4).  
 Sophomore: Org. I (3); Org. I Lab. (2); Org. II (3); Org. II Lab. (2); Chem. Separations (2).  
 Junior: Phys. Chem. I (3); Phys. Chem. II (3); Phys. Chem. II Lab. (2).  
 Senior: Inorg. Chem. (3-4); Instrumental Anal. (4); Undergrad. Research (3) (May be taken prior to the senior year.)

**Mathematics:** 12 hours  
 Freshman: Anal. Geom. & Calc. I (4); Anal. Geom. & Calc. II (4).

Sophomore: Anal. Geom. & Calc. III (4).

**Physics:** 10 hours  
 Sophomore: Engg. Phys. I (5); Engg. Phys. II (5).

**English:** 6 hours  
 Freshman: Engl. Comp. I (3); Engl. Comp. II (3).

**Speech:** Oral Communication (or another course recommended by the Speech Department)

**Physical Education:** 2 courses

**Social Sciences and Humanities:** 7 courses from the Departments of Art, Economics, English, Geography, History, Journalism and Mass Communications, Modern Languages, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology or Speech. Courses must include:

a. German: German I and II or German for Reading Knowledge I and II

b. Philosophy: 1 course

c. 2 advanced courses (500 level or above or German III and IV)

**Electives:** Sufficient courses to complete a total of 120 hours.

### Chemical Science Curriculum for the B.S. Degree<sup>1</sup>

Preferred curriculum for those intending to use their chemical training as a background for work or study in another area such as medicine, education, law, biology, agriculture.

120 credit hours required for graduation.

**Chemistry:** (course hours are in parentheses)  
 Chem. I (5); Chem. II (3); Chem. Analysis (4).  
 Org. I (3); Org. I Lab. (2); Org. II (3); Org. II Lab. (2); Chem. Separations (2).  
 Desc. Phys. Chem. (3).  
 One additional course in Chemistry or Biochemistry.

**Mathematics:**  
 College Algebra (3); Plane Trigonometry (3); Anal. Geom. & Calc. I (4); Anal. Geom. & Calc. II (4). (Requirements for College Algebra and Plane Trigonometry waived for those with credit in Anal. Geom. & Calc. I.)

**Physics:**  
 Gen. Phys. I (4); Gen. Phys. II (4)

**English:**  
 Engl. Comp. I (3); Engl. Comp. II (3)

**Speech:** Oral Communication I (or another course recommended by the Speech Department)

**Physical Education:** 2 courses

**Social Sciences and Humanities:** 7 courses from the Departments of Art, Economics, English, Geography, History, Journalism and Mass Communications, Modern Languages, Music, Philosophy, Political Science, Psychology, Sociology and Anthropology or Journalism and Mass Communications. Courses must include:

a. Philosophy: 1 course

b. 2 advanced courses (500 level or above)

**Electives:** Sufficient courses to complete a total of 120 hours.

### Courses in Introductory and General Chemistry

#### UNDERGRADUATE CREDIT

**221 095. Chemistry Seminar.** (0) I. 221-095-0-1905

**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

1. A program leading to the B.A. degree can be planned by modifying the social sciences and humanities requirements. See page ?? for specific requirements for the B.A. degree.



lab. a week. Not open to students having credit in any college course in chemistry. 221-110-1-1905

**221 210. Chemistry I<sup>2</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. Not open to students who have credit in Chem. 110. Those without high school chemistry should not enroll in this course until the second semester. Pr.: Math. 010 or equiv. 221-210-1-1905

**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. 221-230-0-1905

**221 250. Chemistry II Laboratory.** (2) I, II, S. Elementary qualitative analysis and additional experimental study of chemical principles. Five hours of lab. and one hour of lec. a week. Pr.: Chem. 230 or conc. enrollment. 221-250-1-1905

**221 299. Honors Seminar in Chemistry.** (1) I or II. 221-299-0-1905

**221 499. Problems in Undergraduate Chemistry.** Cr. arranged. I, II, S. Problems may include classroom and/or lab. work. Pr.: Consent of instructor. 221-499-3-1905

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**221 599. Undergraduate Research.** (1, 2, 3) I, II, S. Analytical, inorganic, organic or physical chemistry. 221-599-4-1905

#### UNDERGRADUATE AND GRADUATE CREDIT

**221 700. Practicum in Teaching Chemistry.** (1) I. 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. 221-700-2-1905

**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. 221-799-3-1905

#### 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. 221-899-4-1905

**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. 221-999-4-1905

#### 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. 221-271-1-1909

##### 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. 221-540-1-1909

**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. 221-545-1-1909

##### 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 lec. and six hours lab. a week. Pr.: Chem. 3 221-666-1-1909

**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 lec. and three hours lab. a week. Pr.: Chem. 666 or consent of instructor. 221-725-1-1909

**221 728. Chemistry of Analytical Reactions.** (2) II. A study of the inorganic and organic reagents of importance in analytical chemistry and their reactions in sensitive and selective methods of analysis. Pr.: Chem. 550, 597, 666 or equivalent courses. 221-728-0-1909

##### GRADUATE CREDIT

**221 901. Graduate Seminar in Analytical Chemistry.** (0-1) I, II. 221-901-0-1909

**221 942. Advanced Analytical Chemistry.** (3) I in odd years. Elemental and functional group analyses, nonaqueous solvent systems, gas analysis, kinetics, and thermal methods of analysis. Pr.: Chem. 3 221-942-0-1909

**221 943. Equilibria and Separations.** (1-4) II in even years. Theory of solution equilibria and physical and chemical methods of separation. Pr.: Chem. 3 221-943-1-1909

**221 944. Electroanalytical Chemistry.** (2-3) I in even years. Theory and applications of electrochemical methods; chronoamperometry, chronopotentiometry, cyclic voltammetry, coulometry, polarography, potentiometry, and instrumentation. Pr.: Chem. 3 221-944-1-1909

**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. 3 221-945-0-1909

**221 946. Principles and Techniques of Analytical Chemistry I.** (1-5) II of odd years. A lecture and laboratory course on emission spectroscopy, flame photometry, atomic absorption, and x-ray methods. Pr.: Chem. 3 221-946-1-1909

**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. 3 221-947-1-1909

**221 948. Computer Control of Chemical Instruments.** (3) The technique and use of a mini-computer in the laboratory environment, including interface hardware and software for digital and analog data acquisition and display and instrument control. Two hours lec. and three hours lab. a week. Pr.: Chem. 725. 221-948-1-1909

2. 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 are enrolled in the Accelerated Program by the Chemistry Department and are placed in special sections of Chem. I and Chem. II.

3. 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 Inorganic Chemistry

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**221 597. Inorganic Chemistry.** (3-4) I and alt. S. A survey course in modern inorganic chemistry. Four hours lec. a week. Pr.: Chem. 550, 595. 221-597-0-1906

### 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>3</sup> 221-710-0-1906

### 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>3</sup> 221-855-1-1906

**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. 221-876-0-1906

**221 902. Graduate Seminar in Inorganic Chemistry.** (0-1) I, II, S. 221-902-0-1906

**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>3</sup> 221-926-0-1906

**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. 221-929-0-1906

**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. 221-931-0-1906

**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. 221-935-0-1906

## 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. 221-190-0-1907

**221 191. Elementary Organic Chemistry Laboratory.** (2) I, II, S. Six hours lab. a week. Pr.: Chem. 190 or conc. enrollment. 221-191-1-1907

**221 350. General Organic Chemistry.** (3) I, II, S. A survey of types of organic reactions important to biological science areas including pre-veterinary, pre-medical, and certain agriculture and home economics programs. Conc. enrollment in Chem. 351 is urged. Three hours lec. a week. Pr.: Chem. 230. 221-350-0-1907

**221 351. General Organic Chemistry Laboratory.** (2) I, II, S. Six hours lab. a week. Pr.: Chem. 350 or conc. enrollment. 221-351-1-1907

### 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. 221-531-0-1907

**221 532. Organic Chemistry I Laboratory.** (2) I. Six hours lab. a week. Pr.: Chem. 531 or conc. enrollment. 221-532-1-1907

**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. 221-550-0-1907

**221 551. Organic Chemistry II Laboratory.** (2) I, II. Six hours lab. a week. Pr.: Chem. 550 or conc. enrollment. 221-551-1-1907

### 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>3</sup> 221-852-0-1907

**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>3</sup> 221-860-0-1907

**221 903. Graduate Seminar in Organic Chemistry.** (0-1) I, II. 221-903-0-1907

**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. 221-905-0-1907

**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>3</sup> 221-965-0-1907

**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. 221-967-0-1907

**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>3</sup> 221-970-0-1907

## 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. Three hours lec. a week. Pr.: Chem. 271, Math. 100. 221-500-0-1908

<sup>3</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).



**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. 221-535-1-1908

**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. 230, Math. 222, Phys. 214. 221-585-0-1908

**221 586. Physical Chemistry I Laboratory.** (2) I. Six hours lab. a week. Pr.: Chem. 250 or 271 and Chem. 585 or conc. enrollment. 221-586-1-1908

**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. 221-595-0-1908

**221 598. Physical Chemistry II Laboratory.** (2) II. Six hours lab. a week. Pr.: Chem. 595 or conc. enrollment. 221-598-1-1908

#### 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>3</sup> 221-720-1-1908

#### 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>3</sup> 221-801-0-1908

**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>3</sup> 221-802-0-1908

**221 854. Molecular Structure.** (3) I. Introduction to quantum mechanics and atomic and molecular spectroscopy. Three hours lec. a week. Pr.: Chem.<sup>3</sup> 221-854-0-1908

**221 904. Graduate Seminar in Physical Chemistry.** (0-1) I, II. Presentation of topics from literature in physical chemistry. 221-904-0-1908

**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. 221-950-0-1908

**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>3</sup> 221-955-0-1908

**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. 221-995-0-1908

**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. 221-996-0-1908

3. 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).

## COMPUTER SCIENCE

Paul S. Fisher, Head of Department

At KSU: Associate Professors Conrow,\* Fisher,\* Gallagher,\* and Hankley;\* Assistant Professors Calhoun,\* Miller, Shapiro, Sincovec,\* Unger, and Wallentine.\*

At KU: Professors Bavel,\* Bulgren,\* Horowitz,\* and Schweppe;\* Associate Professors Hetherington,\* Jones,\* Mansfield,\* and Tuggle;\* Assistant Professors Horgan,\* Lien,\* and Muchnick.

### 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, one language laboratory, 300, 305, 405, 420, 560, and 580, plus 15 additional hours 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

Data Organization and Manipulation — File management and data processing, information storage and retrieval, text processing

Graphics and Image Processing — Image generation and transformation, scene analysis.

#### Areas of Current and Essential Interest to Both Campuses

Numerical Analysis

Artificial Intelligence

Computer and Operating Systems.



**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

Information Systems Theory and Design — Analysis of information networks, information acquisition, social implications of information systems.

Students wishing to seek the Doctor of Philosophy degree in computer science should choose their 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) I, II, S. 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. Pr.: Algebra, plus conc. enrollment in one C.S. Language Lab. 286-200-1-0704

**286 201. FORTRAN Language Laboratory.** (1) I, II, S. Fundamentals of programming in FORTRAN; applications. Three hours lab. a week. Pr. or conc.: C.S. 200. 286-201-1-0704

**286 202. PL/1 Language Laboratory.** (1) I, II, S. Fundamentals of programming in PL/1; applications. Three hours lab. a week. Pr. or conc.: C.S. 200. 286-202-1-0704

**286 203. APL Language Laboratory.** (1) I, II. Fundamentals of programming in APL; applications. Three hours lab. a week. Pr. or conc.: C.S. 200. 286-203-1-0704

**286 204. SNOBOL Language Laboratory.** (1) Fundamentals of programming in SNOBOL; applications. Three hours lab. a week. Pr. or conc.: C.S. 200. 286-204-1-0704

**286 205. COBOL Language Laboratory.** (1) I, II. Fundamentals of programming in COBOL; applications. Three hours lab. a week. Pr. or conc.: C.S. 200. 286-205-1-0704

**286 206. BASIC Language Laboratory.** (1) I, II. Fundamentals of programming in BASIC; applications. Three hours lab. a week. Pr. or conc.: C.S. 200. 286-206-1-0204

**286 300. Algorithmic Processes.** (3) I, II. 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. 286-300-1-0704

**286 305. Computer Organization and Programming.** (4) I. 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. Pr. or conc.: E.E. 241. 286-305-1-0704

**286 306. Operating Systems Laboratory.** (3) II. Advanced programming laboratory for experience in O/S 360/370, job control language, utilities, and access methods. Pr.: C.S. 305. 286-306-1-0704

**286 397. Seminar in Computer Science.** (1-3). 286-397-0-0701

**286 405. Introduction to Programming Languages.** (3) I. Structure of algorithmic, conversational, list processing, and string manipulation languages; concepts and facilities of programming languages. Pr.: C.S. 300 or 790. 286-405-0-0704

**286 410. Discrete Systems Simulation.** (3) Introduction to discrete simulation languages and techniques. Pr.: One C.S. Language Lab. or C.S. 790 and Statistics 510. 286-410-1-0704

**286 420. Operating Systems I.** (3) II. 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. 286-420-1-0704

**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. 286-430-1-0704

**286 450. Computer Architecture Laboratory.** (2) II. Structure, implementation, and programming of various simple computer architectures and peripheral interfaces, including micro-processors and attached peripherals. One hour lec. and three hours lab. each week. Pr.: C.S. 305 and E.E. 241. 286-450-1-0799

**UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD**

**286 560. Data Structures.** (3) I, II. Study of linear and orthogonal lists, strings, arrays, and graphs; representation of such structures within the computer. Pr.: C.S. 300 or 790 and Math. 220. 286-560-1-0704

**286 580. Numerical Computing.** (3) I, II. 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 Math 224 or 551. 286-580-1-0704

**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. 286-590-0-0705

**286 597. Seminar in Computer Science.** (1-3). 286-597-0-0701

**GRADUATE AND UNDERGRADUATE CREDIT**

**286 640. Introduction to Software Engineering.** (3) I. Software design; program specification; proofs of programs; structured programming; top-down design; modular organization; program style, debugging, testing, and documentation; management of programming teams; aids for software construction; planning, estimates, and evaluation of performance; team project. Pr.: C.S. 300. 286-640-1-0704

**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 and E.E. 241. 286-650-1-0704

**286 658. Microcomputer Programming and Applications.** (2) I, II. Organization and programming of a typical microcomputer. One hour lec. and three hours lab. each week. Pr.: E.E. 241 and conc. enrollment in E.E. 648. 286-658-1-0704

**286 660. Data Structures and Information Storage and Retrieval.** (3) I, II. Utilization and organization of structured information, and representation of data. Pr.: C.S. 300. 286-660-0-0702

**286 670. Discrete Computational Structures.** (3) I. Introduction to theoretical foundations of computer science; computational and representational aspects of graphs, formal languages, Boolean algebras, propositional calculus, combinatorics, and discrete probability. Pr.: C.S. 300. 286-670-0-0702

**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. 580. 286-680-1-0704

**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 and Linguistics 280 or 780. 286-690-1-0704

**286 700. Translator Design I.** (3) Language structure and meaning; associated recognition algorithms, and interpreters. Emphasis on construction of a translator and an interpreter for a programming language. Pr.: C.S. 405 and 560. 286-700-1-0704

**286 710. Computer Simulation Experiments.** (3) I. Digital computer simulations will be programmed and used to predict data and test hypotheses. Pr.: C.S. 410. 286-710-1-0704

**286 720. Operating Systems II.** (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 and 560. 286-720-1-0704

**286 730. Artificial Intelligence.** (3) Application of heuristics to problem solving; perceptrons and pattern recognition; learning and self-evolving programs. Pr.: C.S. 430 and 560. 286-730-1-0704

**286 735. Decision Processing.** (3) Pattern recognition by metric and linguistic techniques, feature extraction, clustering techniques. Pr.: One C.S. Language Lab. or 790 and Math 551 and Stat. 510. 286-735-0-0702

**286 750. Advanced Computer Architecture Experiments.** (3) Students will investigate characteristics of various computers including those with execution support of multi-processing, multi-programming, micro-programmable, high-level language, stack processing, and communication architectures. Two hours lec. and three hours lab. each week. Pr.: C.S. 450 and E.E. 641. 286-750-1-0799

**286 760. Information Organization and Retrieval.** (3) I. 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. 286-760-0-0702

**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 lec., two hours lab. a week. Pr.: C.S. 560. 286-765-2-0703

**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. and Math. 555 or C.S. 580 and Math. 240 plus concurrent enrollment in Math. 780. 286-780-1-0704

**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. 286-785-1-0704

**286 790. Intensive Computer Science: Concepts.** (3) I, II, S. Intensive course in design of algorithms, computer programming, and advanced computational techniques for students with minimal background in Computer Science. Meets four hours each week. Pr.: One C.S. Language and be a computer science major. 286-790-1-0704

**286 798. Topics in Computer Science.** (Credit arranged) I, II, S. 286-798-3-0701

## GRADUATE CREDIT

**286 800. Theory of Parsing.** (3) Introduction to formal language and automata theory; theoretical study of parsing techniques. Pr.: C.S. 405 and 670. 286-800-0-0702

**286 805. Semantics of Programming Languages.** (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. 405. 286-805-0-0701

**286 820. Introduction to Operating Systems Theory.** (3) Theoretical treatment of process synchronization, multiprocessors, resource allocation, scheduling theory, evaluation techniques for hierarchical memory and machines. Pr.: C.S. 405, 420, and 560. 286-820-0-0705

**286 830. Computer Graphics and Image Processing.** (3) Computer representation and display of line drawing and contour images; man-machine interaction; transformations on images, clipping, hidden line removal, structured image files; design of image processing software. Pr.: C.S. 201 and Math. 551. 286-830-1-0704

**286 840. Advanced Concepts in Software Engineering.** (3) Software system design and construction, descriptive and definitional tools, implementation techniques, and performance evaluation of software systems. Pr.: C.S. 405, 420, and 560. 286-840-0-0704

**286 870. Automata and Computability I.** (3) Elements of abstract algebra; review of finite automata; recursive functions and programmed machines; computable functions, loop programs and primitive recursive functions, theses of Turing and Church. Pr.: C.S. 700. 286-870-0-0799

**286 875. Automata and Computability II.** (3) Problems in unsolvability; topics in computability; cellular automata; student produces term paper or project. Pr.: C.S. 870. 286-875-0-0799

**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. 286-890-0-0799

**286 891. Intensive Computer Science: Applications.** (3) I, II, S. Intensive course in design of algorithms, programming, JCL, and program libraries. Meets four hours each week. Not for credit for C.S. majors. 286-891-1-0704

**286 897. Seminar in Computer Science.** (1-3) I, II. 286-897-0-0701

**286 898. Master's Report in C.S.** (1-2) I, II, S. 286-898-3-0701

**286 899. Research in Computer Science.** (1-6) I, II, S. 286-899-4-0701

**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. 286-900-0-0702

**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 and 805 and Stat. 510. 286-920-0-0701

**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. 720 and 805 and E.E. 641. 286-925-0-0701

**286 999. Research in Computer Science.** (Credit arranged) I, II, S. 286-999-4-0701



## 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, and Nafziger,\* Assistant Professors Akkina,\* Babcock, Gormely,\* Haggart, Kennedy, and Olson,\* Instructor Bradley; 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.

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 84) 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 505 and 506 cannot be counted in fulfillment of this requirement, (3) Stat. 330 or 350, and (4) one of the following: Math 220 or 500; Bus. Admin. 260; Stat. 351, 702, or 703.

**Secondary Education Certification.** A student majoring in economics may also prepare for teacher certification at the secondary level (see page 186). This program leads to the Bachelor of Science degree (see page 84). 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 186).

**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. 642, 643; Pol. Sc. 681; B.A. 530, 630, 631.

## Graduate Credits Available to Undergraduates

A student who begins graduate work after completing the B.A. or B.S. degree generally requires more than one year to complete work for a master's degree. However, a five-year program leading to a B.A. in Economics or to a B.S. in Agricultural Economics at the end of four years and a Master of Arts in Economics or a Master of Science in Agricultural Economics at the end of five years is available for promising undergraduate students. Students who have completed the sophomore year and have outstanding scholastic records (GPA 3.2 or higher) 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.A., M.A. and B.S., 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.

### 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. 225-110-0-2204



**225 111. Economics I Honors.** (3) I, II. Course description same as Econ. 110. Pr.: Open to students in Honors Program. 225-111-0-2204

**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. 225-120-0-2204

**225 229. Honors Seminar Economics.** (1) I, II. Readings and discussions. Open to students in the Honors Program not majoring in economics. 225-229-0-2204

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**225 505. 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. 505, Soc. 505, Anthro. 505. 225-505-0-2204

**225 506. 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. 506, Soc. 506, Anthro. 506. 225-506-0-2204

**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. 225-510-0-2204

**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. 225-520-0-2204

**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. 225-530-0-2204

**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.: Econ. 110 and permission of instructor. 225-532-0-2204

**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. 225-555-0-2204

#### UNDERGRADUATE AND GRADUATE CREDIT

**225 620. Labor Economics.** (3) I, S. Economics of the labor market-labor force composition and trends, structure and characteristics of labor markets, wages, employment and unemployment; economics of trade unions; theories of the labor movement and history of trade unions in the U.S.; current issues. Pr.: Econ. 120 or consent of instructor. 225-620-0-2204

**225 627. Contemporary Labor Problems.** (3) II. Emphasis on current research and public policies dealing with such matters as full employment, poverty and discrimination, impact of automation and technological change on the labor force, work orientations, women in the work force, labor market problems of minority groups, training, retraining, and

education. Pr.: Econ. 620 or consent of instructor. 225-627-0-2204

**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. 225-631-0-2204

**225 633. Public Finance.** (3) I, II, S. Rationale for the public sector; principles of efficient government spending and regulation (e.g., pollution control); principles and instruments of taxation and revenue sharing. Pr.: Econ. 110. 225-633-0-2204

**225 636. Economic Systems.** (3) I. A survey of Marxian economics, major perspectives on U.S. capitalism, market socialism, and the Soviet, Chinese and other communist economies. 225-636-0-2204

**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. 225-640-0-2204

**225 681. International Trade.** (3) I, some S. Principles of international trade and finance, including production, exchange, commercial policy, resource movements, balance of payments, foreign currency markets, and policies for internal and external balance. Pr.: Econ. 110. 225-681-0-2204

**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. 225-682-0-2204

**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. 225-686-0-2204

**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. 225-690-0-2204

**225 699. Seminar in Economics.** (1-3) Offered on sufficient demand. Seminars of special interest will be offered on demand. Pr.: Econ. 120. 225-699-0-2204

**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., and one Stat. course. 225-730-0-2204

**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. 225-735-0-2204

**225 740. Managerial Economics.** (3) Offered on sufficient demand. A study of maximizing an individual business firm's profits under conditions of (a) fixed supply and (b) variable supply for (1) a fixed time period and (2) multiple time periods. A critical appraisal will be made of efforts of business firms to increase profits by affecting the position and slope of the demand schedule for their products by different patterns of expenditure or advertising and selling. Pr.: Econ. 520. 225-740-0-2204

**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. 225-795-3-2204



**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. 225-801-0-2204

**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. 225-805-0-2204

**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. 225-810-0-2204

**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. 225-815-0-2204

**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. 225-823-0-2204

**225 832. Public Sector Analysis I.** (3) II, odd-numbered years. Conditions for economic efficiency in the public sector; public good production functions; systems analysis: cost-benefit and cost-effectiveness studies; non-market decision-making. Pr.: 225 633 and 815. 225-832-0-2204

**225 833. Public Sector Analysis II.** (3) II, even-numbered years. Impact of public sector on distribution of income; allocation effects of taxation; intergovernmental fiscal relations; dynamics of growth in the public sector; policy implications of public sector analysis. Pr.: 225 815 and 832. 225-833-0-2204

**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. 225-860-0-2204

**225 880. Seminar in Economics.** (3) I, II. Special topics in economic theory. Pr.: Graduate standing. 225-880-0-2204

**225 898. Research in Economics.** MA — Master's Report. 225-898-4-2204

**225 899. Research in Economics.** MA — Research for Master's Thesis. 225-899-4-2204

**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. 225-905-0-2204

**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. 225-920-0-2204

**225 925. Location of Economic Activities.** (3) II. An examination of the theory of location including central place theory, location of the individual producer, industrial location patterns, and urban land use models. Also includes application of theoretical models to current urban problems. 225-925-0-2204

**225 935. Econometric Methods.** (3) I. Quantitative methods of research used in economics. Pr.: Econ. 730 or consent of instructor. 225-935-0-2204

**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. 225-940-0-2204

**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. 225-945-0-2204

**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. 225-955-0-2204

**225 999. Research in Economics.** PhD — Research for PhD Dissertation. 225-999-4-2204

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**ENGLISH**

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Richard D. McGhee,\* Head of Department

Mary Frances White,\* Assistant Head

Professors Higginson,\* Moses,\* Noonan,\* and Rogerson,\* Associate Professors Adams,\* Ansdell,\* Carpenter,\* Eitner,\* Johnston,\* Koch,\* McCarthy,\* McGhee,\* Rees,\* and White,\* Assistant Professors Ahearn, Brondell,\* Cohen, Conrow,\* Donnelly,\* Evans, Gillespie, Grindell,\* Houser,\* Matherne, Nyberg,\* H. Schneider, M. Schneider,\* and Williams; Instructors Baker, Bussing, Clark, Geissler, Pelischek, and Rochat; Emeritus: Professors Aberle and Davis; Associate Professor Jones; Assistant Professors Glenn and Laman; Instructors Bergman and 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. 499) 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. 499) 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: Eng. 210, 220, 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 Eng. 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 Chairman, Graduate Committee, 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. 229-030-1-1501

**229 075. English for Foreign Students.** (3) I, II, S. Review of English structure for students whose first language is not English; designed to improve understanding and written expression. 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. 229-075-0-1508

**229 100. English Composition I.** (3) I, II, S. 229-100-0-1501

**229 110. English Composition IH.** (3) I, II, S. 229-110-0-1501

**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. 221-111-0-1501

**229 120. English Composition II.** (3) I, II, S. Continues Engl. 100. 229-120-0-1501

**229 125. English Composition IIH.** (3) II. Continues Engl. 110. 229-125-0-1501

**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. 229-126-0-1501

**229 200. English Composition III.** (3) I, II, S. Advanced exposition and argumentation. Pr.: Engl. 120, 125 or 126. 229-200-0-1501

**229 210. The Uses of Poetry.** (1) I, II, S. Cr./No Cr. only. Not for major credit. To provide the experience of poetry read for pleasure, for knowledge, and for personal fulfillment. Repeatable once. 229-210-0-1502

**229 220. Fiction into Film.** (2) I, II, S. Cr./No Cr. only. Discussions of film adaptation of works of literature. Not for major credit. 229-220-0-1501

**229 230. Humanities: Classical Cultures.** (3) I, S. 229-230-0-4901

**229 231. Humanities: Medieval and Renaissance.** (3) II, S. 229-231-0-4901

**229 233. Humanities: Baroque and Enlightenment.** (3) I, S. 229-233-0-4901

**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. 229-234-0-4901

**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. 229-260-0-1502

**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. 229-265-0-1502

**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. 229-280-0-1502

**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. 229-285-0-1502

**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. 229-310-0-1501



**229 320. Introduction to the Short Story.** (3) I, II, S. American, British and Continental stories are studied. Pr.: Engl. 120, 125 or 126. 229-320-0-1501

**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. 229-340-0-1502

**229 345. Introduction to Drama.** (3) I, II. Study of drama from classical times to the present. Pr.: Engl. 120, 125 or 126. 229-345-0-1502

**229 350. Introduction to Shakespeare.** (3) I, II, S. Study of representative comedies, histories and tragedies. Pr.: Engl. 120, 125 or 126. 229-350-0-1502

**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. 229-360-0-1502

**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. 229-365-0-1502

**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. 229-370-0-1502

**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. 229-375-0-1502

**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. 229-387-0-1501

**229 388. Books and Men II.** (3) I, II, S. Continues Engl. 387. Not for English majors. Pr.: Engl. 120, 125 or 126. 229-388-0-1501

**229 395. Topics in English.** (0-3) I, II, S. Selected studies in literature and language. Pr.: Consent of instructor. 229-395-0-1501

**229 399. Honors Seminar in English.** (1-3) 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. 229-399-0-1501

**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. 229-400-0-1501

**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. 229-405-0-1507

**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. 229-410-0-1507

**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. 229-490-0-4901

**229 492. Humanities Seminar.** (3) I, II. Study in depth of selected major figures and movements in Western arts, ideas, and literature. Offered each semester within one of the chronological periods of the introductory courses. Pr.: Appropriate introductory humanities course (or an equivalent background, such as courses in western civilization, art, or world literature, with consent of instructor). 229-492-0-1501

**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. 229-499-0-1502

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**229 500. Introduction to Creative Writing.** (3) I, II, S. For those beginning to practice the craft of imaginative writing; to be sectioned according to genre, such as poetry, short story, the novel. Pr.: Engl. 120, 125, or 126. 229-500-0-1502

**229 505. Themes in Literature.** (1-3) I, II, S. Explorations of the literary treatment of important and recurring themes. Pr.: Engl. 120, 125, or 126. 229-505-0-1502

**229 510. Literary Kinds.** (1-3) I, II, S. Examinations of such topics as the characteristics, the growth and development or the uses of specified literary genres. Pr.: Engl. 120, 125, or 126. 229-510-0-1502

**229 515. Literature and Society.** (1-3) I, II, S. Language and literature in relation to social and cultural patterns and influences. Pr.: Engl. 120, 125, or 126. 229-515-0-1502

**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. 229-530-0-1505

**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. Primarily for teachers of elementary grades and students of child guidance. Pr.: Engl. 120, 125 or 126. 229-540-0-1502

**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. 229-545-0-1502

**229 560. American Folklore and Folk Literature.** (3) I, II, S. Focus on definition, form, and function of folktales and anecdotes, legends, proverbs and riddles, beliefs and customs, folklife and Anglo-American balladry. Pr.: Junior standing. 229-560-0-1502

**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. 229-570-0-1504

**229 580. The Epic Tradition.** (3) Greek and Roman masterpieces in translation as background for the study of literature. Pr.: Junior standing. 229-580-0-1504

#### UNDERGRADUATE AND GRADUATE CREDIT

**229 610. The Folk Tale.** (3) II. Myths, legends, folktales of Europe and America. Half of course devoted to American Plains Indian oral literature, especially that dealing with cosmology and trickster tales. Pr.: Junior standing. 229-610-0-1502

**229 625. Medieval Narrative.** (3) II. A survey of non-Chaucerian literature, with stress on the Arthurian romances. Pr.: Engl. 120, 125 or 126. 229-625-0-1502

**229 630. Chaucer.** (3) I, II, S. Pr.: Engl. 120, 125 or 126. 229-630-0-1502

**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. 229-640-0-1502

**229 642. Spenser.** (3) II in alternate years. Pr.: Engl. 120, 125 or 126. 229-642-0-1502



- 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. 229-645-0-1502
- 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. 229-650-0-1502
- 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. 229-652-0-1502
- 229 660. Seventeenth Century Literature.** (3) II, S. A survey of the principal non-dramatic writers, apart from Milton. 1600-1660. Pr.: Junior standing. 229-660-0-1502
- 229 670. Milton.** (3) II, S. Pr.: Junior standing. 229-670-0-1502
- 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. 229-675-0-1502
- 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.: Junior standing. 229-680-0-1502
- 229 685. Eighteenth Century II.** (3) II, S. The age of Dr. Johnson and the beginnings of Romanticism. Pr.: Junior standing. 229-685-0-1502
- 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. 229-690-0-1502
- 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. 229-699-0-1501
- 229 700. English Novel I.** (3) I, S. A survey of British fiction from Defoe to the Brontës. Pr.: Junior standing. 229-700-0-1502
- 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. 229-701-0-1502
- 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. 229-705-0-1502
- 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. 229-709-0-1502
- 229 710. Nineteenth Century American Poetry.** (3) II, S. Emphasis on Poe, Whitman and Dickinson. Pr.: Junior standing or consent of instructor. 229-710-0-1502
- 229 715. Nineteenth Century American Fiction I.** (3) I, S. Emphasis on Brown, Cooper, Poe, Hawthorne and Melville. Pr.: Engl. 280. 229-715-0-1502
- 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. 229-718-0-1502
- 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. 229-720-0-1502
- 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. 229-725-0-1502
- 229 730. American Humor and Satire.** (3) II, S. Emphasis on works produced in the nineteenth and twentieth centuries. Pr.: Junior standing. 229-730-0-1502
- 229 740. Twentieth Century English Novel.** (3) II. British fiction from Conrad and Joyce to Greene and Waugh. Pr.: Engl. 120, 125 or 126. 229-740-0-1502
- 229 744. Twentieth Century American Novel.** (3) I, S. The American novel from Dreiser to figures of the 1940s. Pr.: Junior standing, Engl. 285, or consent of instructor. 229-744-0-1502
- 229 745. Twentieth Century American Short Story.** (3) II, S. The development of the form since 1900. Pr.: Engl. 120, 125 or 126. 229-745-0-1502
- 229 747. American Novel, 1950-1970.** (3) II in alternate years. A study of distinctive qualities of selected American novels since 1950. Pr.: Junior standing, one course in American literature, or consent of instructor. 229-747-0-1501
- 229 750. Twentieth Century English Poetry.** (3) I. Development of English poetry from Hardy and Yeats to the present. Pr.: Engl. 265. 229-750-0-1502
- 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. 229-755-0-1502
- 229 760. Twentieth Century English Drama.** (3) I, S. British drama from Wilde and Shaw to Pinter and his contemporaries. Pr.: Junior standing. 229-760-0-1502
- 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. 229-765-0-1502
- 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 or consent of instructor. 229-775-0-1507
- 229 790. History of the English Language.** (3) II, S. The development of British English, with digressions. Pr.: Senior standing or consent of instructor. 229-790-0-1505
- 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. 229-795-0-1502
- 229 799. Problems in English.** (Variable credit) I, II, S. Studies in major authors, genres and periods of English and American literature and language. Pr.: Background of courses needed for problem undertaken. 229-799-3-1501

#### 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. 229-801-0-1502
- 229 810. Old English.** (3) I, S. The elements of Old English grammar, with readings in prose and poetry. Pr.: Consent of instructor. 229-810-0-1505
- 229 811. Old English Poetry.** (3) II, S. Pr.: Engl. 810 or consent of instructor. 229-811-0-1502
- 229 812. Middle English Poetry.** (3) I. Pr.: Engl. 790 or consent of instructor. 229-812-0-1502
- 229 820. Selected Topics in the Study of Language.** (3) Pr.: Engl. 790 or consent of instructor. 229-820-0-1505
- 229 830. Chaucer Seminar.** (3) Pr.: Engl. 630. 229-830-0-1502
- 229 850. Shakespeare Seminar.** (3) Pr.: Engl. 650 or 652. 229-850-0-1502
- 229 870. Milton Seminar.** (3) Pr.: Engl. 670 or consent of instructor. 229-870-0-1502
- 229 890. Topics in Poetry.** (3) Intensive study of a poet or group of poets, either British or American. Pr.: Consent of instructor. 229-890-0-1502
- 229 892. Topics in Drama.** (3) Intensive study of a dramatist or group of dramatists, either British or American. Pr.: Consent of instructor. 229-892-0-1502



**229 894. Topics in Fiction.** (3) Intensive study of a novelist or group of novelists, either British or American. Pr.: Consent of instructor. 229-894-0-1502

**229 898. Master's Report.** (2) I, II, S. 229-898-4-1501

**229 900. Bibliography and Methods of Research.** (3) I, S. An introduction to textual, bibliographic and professional problems, required of Ph.D. candidates. 229-900-0-1502

**229 940. Studies in Sixteenth Century Literature.** (3) Pr.: Consent of instructor. 229-940-0-1502

**229 950. Studies in Seventeenth Century Literature.** (3) Pr.: Consent of instructor. 229-950-0-1502

**229 960. Studies in Eighteenth Century Literature: British.** (3) Pr.: Consent of instructor. 229-960-0-1502

**229 965. Studies in Eighteenth Century Literature: American.** (3) Pr.: Consent of instructor. 229-965-0-1502

**229 970. Studies in Nineteenth Century Literature: British.** (3) Pr.: Consent of instructor. 229-970-0-1502

**229 975. Studies in Nineteenth Century Literature: American.** (3) Pr.: Consent of instructor. 229-975-0-1502

**229 980. Studies in Twentieth Century Literature: British.** (3) Pr.: Consent of instructor. 229-980-0-1502

**229 985. Studies in Twentieth Century Literature: American.** (3) Pr.: Consent of instructor. 229-985-0-1502

**229 999. Research in English.** (Variable credit) I, II, S. Pr.: Sufficient training to carry on the research undertaken. 229-999-4-1501

## Courses in Linguistics

### UNDERGRADUATE AND GRADUATE CREDIT

**229 681. General Phonetics.** (3) 229-681-1-1502

**229 780. Introduction to Linguistics.** (3) I, II, S. Same as Speech and Modern Languages 780. 229-780-0-1502

**229 781. Introduction to Historical Linguistics.** (3) II. Same as Speech and Modern Languages 781. 229-781-0-1502

**229 782. Language Typology.** (3) Same as Speech and Modern Languages 782. 229-782-0-1502

**229 783. Phonology I.** (3) Same as Speech and Modern Languages 783. 229-785-0-1502

**229 784. Phonology II.** (3) Same as Speech and Modern Languages 784. 229-784-0-1502

**229 785. Syntax I.** (3) Same as Speech and Modern Languages 785. 229-785-0-1502

**229 786. Syntax II.** (3) Same as Speech and Modern Languages 786. 229-786-0-1502

**229 787. Advanced Syntax.** (3) Same as Speech and Modern Languages 787. 229-787-0-1502

**229 788. Advanced Phonology.** (3) Same as Speech and Modern Languages 788. 229-788-0-1502

**229 789. Topics in Linguistics.** (3) Same as Speech and Modern Languages 789. 229-789-0-1502

**229 791. Methods and Techniques of Learning a Second Language.** (3) Same as Speech and Modern Languages 791. 229-791-0-1502

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## GEOGRAPHY

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W. R. Siddall,\* Head of Department

Professor Siddall,\* Associate Professors Kromm,\* and Stover,\* Assistant Professors Bussing,\* Self,\* Seyler,\* and White; Emeritus: Professor Stacey.

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 with 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 world-wide political, social, and economic conditions.

### Undergraduate Study

Requirements for a major in geography under the curriculum leading to the Bachelor of Science degree (see page 84) are as follows: Geography 100 or 200; 220; two out of three of 420, 440, and 450; 470; 480; one course at the 600 level; one course at the 700 level; additional courses at the 600 level or above to make a total of 28 hours.

The student also has the option of majoring in geography under a curriculum leading to a Bachelor of Arts degree. The geography requirements are the same, although the college requirements differ as described elsewhere (see page 84).

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.

Students may choose, in consultation with their advisers, 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. 235-100-0-2206

**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. 235-120-0-2206

**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. 235-200-0-2206

**235 220. Environmental Geography I.** (4) I, II, S. A comprehensive survey of the natural environment focusing on contemporary issues such as air pollution, water resource depletion, soil erosion, natural hazards, lack of open space, and environmental quality. Three hours lec. and two hours lab. a week. 235-220-1-1917

**235 299. Honors Seminar in Geography.** (Var.) Selected topics. Open to non-majors in the Honors Program. 235-299-0-2206

**235 390. Experimental Studies in Geography.** (1-6). Experimental and interdisciplinary studies in geography. Topics selected in consultation with instructor. Pr.: Permission of instructor. 235-390-0-2206

**235 420. Environmental Geography II.** (4) I, II. Advanced inquiry into certain aspects of the natural environment in relation to man. Three hours lec. and two hours lab. a week. Pr.: 235 220. 235-420-1-1917

**235 440. Geography of Natural Resources.** (3). The distribution, significance and environmental consequences of world agriculture, fishing, forestry and mining, emphasizing the principles which account for the spatial variation in the production and consumption of natural resources. 235-440-0-2206

**235 450. Geography of Economic Behavior.** (3). The location of manufacturing industries and patterns of commercial activity. Case studies and simulations are utilized with emphasis on modern concepts of site selection and community development. 235-450-0-2206

**235 460. Future Worlds.** (3). Alternative future distributions of population, pollution, resource depletion, economic development and human conflict will be treated in lectures and reading, and discussed by representatives of business, politics, religion and academia. 235-460-0-2206

**235 470. Cartography.** (3) I. Theory, interpretation, and design and drafting of maps, with emphasis on presenting quantitative data. 235-470-1-2206

**235 480. Pro-Seminar in Geography.** (2) A survey of geography as a profession — its philosophy and its methodology. Graduation requirement for all undergraduate majors in geography. Pr.: Four courses in geography or consent of instructor. 235-480-0-2206

**235 490. Problems in Geography.** Credit arranged. I, II, S. Pr.: Consent of instructor. 235-490-4-2206

### 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. 235-600-0-2206

**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. 235-620-0-2206

**235 640. Geography of Europe.** (3) People and their environment, their cultures, problems and prospects in Europe west of the Soviet sphere; trends of development as affected by changing political and economic factors. 235-640-0-2206

**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. 235-650-0-2206

**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. 235-670-0-2206

**235 680. Seminar in Regional Geography.** (1-3) Pr.: Consent of instructor. 235-680-0-2206



**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. 235-700-0-2206

**235 710. Geography of Hunger.** (3). The problem of an adequate food supply for a rapidly growing world population; food deficit and surplus areas, possibilities of increased production, problems of distribution, and the future outlook. 235-710-0-2206

**235 720. 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.: Junior standing or consent of instructor. 235-720-0-2206

**235 730. 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. 235-730-0-2206

**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.: Junior standing or consent of instructor. 235-740-0-2206

**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.: Junior standing or consent of instructor. 235-750-0-2206

**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.: Junior standing or consent of instructor. 235-760-0-2206

**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 or consent of instructor. 235-770-0-2206

**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. Pr.: Junior standing or consent of instructor. 235-780-0-2206

**235 790. Seminar in Cultural-Economic Geography.** (1-3) Pr.: Consent of instructor. 235-790-0-2206

## 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. 235-800-0-2206

**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. 235-820-0-2206

**235 840. Seminar in Current Geographical Research.** (0) II. Department-wide seminar required of all graduate students. 235-840-0-2206

**235 850. Topics in Environmental Geography.** (1 to 3). Pr.: Consent of instructor. 235-850-3-2206

**235 860. Topics in Economic Geography.** (1 to 3). Pr.: Consent of instructor. 235-860-3-2206

**235 870. Topics in Cultural Geography.** (1 to 3). Pr.: Consent of instructor. 235-870-3-2206

**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. 235-898-4-2206

**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. 235-899-4-2206

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## GEOLOGY

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Page C. Twiss,\* Head of Department

Professors Beck,\* Chelikowsky,\* Shenkel,\* Twiss,\* and Walters;\* Associate Professors Chaudhuri and West;\* Assistant Professors Cullers,\* Riseman,\* and Whittemore.

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. 113 and 114; 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. 113 and 114; 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. 213, 214, 551; 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, 130, 512, 520, and 560; Geog. 220; Math. 100 and 150; Chem. 210, 230, and 250; Biol. 198; Phys. 113, 114, 191, and 193.

**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. 200, 520, 560, 561, 630, 703, and 718.

### 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. The Graduate Record Examination (verbal, quantitative, and advanced geology sections) is required for entrance. Additional requirements of the Graduate School are listed in the appropriate section of this catalog.

Graduate degrees are essential for careers as professional geologists in business, government, or higher education. The minimum requirement for the M.S. in Geology is 30 semester hours which includes at least two courses in supporting areas, other than geology and 6 hours of research leading to successful completion of a thesis.

Research facilities include a six-inch, 60-degree solid source mass spectrometer, hydrothermal equipment, emission spectrograph, x-ray diffractometer and spectrograph, atomic absorption/flame emission spectrophotometer, cathode luminescence microscope, 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. 234-100-0-1914

**234 105. Oceanography.** (3) I, II, S. The oceans: their boundaries, contents and processes. Three hours rec. a week. 234-105-0-1919

**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. 234-110-0-1914

**234 120. Environmental Geology.** (2) II. Influence of earth processes on human activity and the geological consequences of the use of the environment. Two hours rec. a week. 234-120-0-1914

**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. 234-130-1-1914

**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. 234-200-1-1914

**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. 234-310-0-1914

**234 399. Honors Seminar in Geology.** (1-3) I or II. Selected topics. Open to non-majors in the Honors Program. 234-399-0-1914

#### 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. 234-506-1-1917

**234 512. Earth Science.** (3) 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. a week. Pr.: Geol. 100 or Geog. 220 or junior standing. 234-512-1-1917

**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. 234-520-1-1914

**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. 234-540-0-1914

**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. 234-560-1-1914

**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. 234-561-1-1914



**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. 234-570-1-1914

**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. 234-580-1-1918

**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. 234-581-1-1918

#### 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. 234-630-1-1914

**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. 234-702-1-1914

**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. 234-703-1-1914

**234 704. Paleoecology.** (3) I or II. Application of biological, physical, and chemical factors in modern marine environments to the quantitative study of the structure and dynamics of fossil populations and communities. Two hours rec. and three hours lab. a week. Pr.: Geol. 580 or consent of instructor. 234-704-1-1918

**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. 234-707-1-1915

**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. 234-708-1-1914

**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. 234-709-1-1914

**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. 234-710-1-1914

**234 711. Water Resources Geochemistry.** (2) I or II. Geochemistry of ground and surface waters; emphasis on mineralogic and hydrologic controls on inorganic constituents and properties. Two hours rec. a week and one field trip a semester. Pr.: Geol. 707 or Agron. 605 or 705 or consent of instructor. 234-711-0-1915

**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. 234-712-0-1915

**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. 234-714-0-1915

**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. 234-716-0-1914

**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. 234-718-2-1914

**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. 234-720-0-1914

**234 740. Regional Geology.** (3) I or II. Structure and stratigraphy of the major tectonic units of North America. Pr.: Geol. 630, 703. 234-740-0-1914

**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. 234-770-1-1914

**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. 234-790-3-1914

#### GRADUATE CREDIT

**234 800. Graduate Seminar in Geology.** Variable credit. I, II. Topics in geology, geochemistry and geophysics. 234-800-3-1914

**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. 234-801-0-1918

**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. 234-802-0-1914

**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. 234-804-1-1914

**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. 234-805-1-1914

**234 806. Sedimentary Petrology I.** (3) I. Petrography, classification, and origin of mudrocks, sandstones, and conglomerates. Two hours rec. and three hours lab. a week. Pr.: Geol. 708. 234-806-1-1914

**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. 234-807-1-1914

**234 810. Isotope Geology I.** (3) I. Principles, techniques and applications of natural radioactive isotopes to geochronology; application of isotopes to problems of petrogenesis. Three hours rec. a week. Pr.: Geol. 709 or consent of instructor. 234-810-0-1914

**234 840. Planetology.** (3) II. Geologic principles applied to a study of the solar system. Pr.: Geol. 630, 714 or consent of instructor. 234-840-0-1914

**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. 234-870-0-1914



**234 880. Clay Mineralogy.** (3) II. Geologic occurrences, physical properties, atomic structures and the identification of clay minerals, including thermal analytical methods and the study of X-ray diffraction patterns. Two hours rec. and three hours lab. a week. Pr.: Consent of instructor. 234-880-1-1914

**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 Graduate School, with sufficient training to undertake research in specific area. 234-899-4-1914

## HEALTH, PHYSICAL EDUCATION, AND RECREATION\*

Charles B. Corbin, Head of Department

Professor Corbin;\* Associate Professors McKinney,\* Lindley,\* and Wauthier;\* Assistant Professors Beitz, Cox,\* Gench, Laurie, Mahler, Merriman,\* Noble,\* Snyder,\* Thompson, and Zuti;\* Instructors Bolan, and Poole; Emeritus: Professors Evans and Geyer.

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, dance, exercise science, 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

Freshmen 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 261 069). After completion of Concepts in Physical Education and one other non-credit class students are encouraged to enroll in one credit hour course (261 101 through 261 170), 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 84.

II. Professional Education Requirements

(For those seeking teacher certification)

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 Core (to be taken by all majors)

<b>Core:*</b>		
261 201	Personal and Community Health .....	3
261 555	Community Health .....	3
261 780	Seminar in Health Education .....	3
or		
261 583	Current Health Issues .....	3
261 376	First Aid — Multimedia .....	1
261 377	First Aid — Multimedia Instructor .....	1
261 765	Human Sexuality (or 620 765) .....	3
261 747	Drugs and the Student .....	3

\*Students in Allied Health specialization substitute 261 740 Administration of Health Care Programs (3) and 261 550 Health Appraisal (3) for 261 765 and 261 747.

### IV. Health Specialization Areas

To earn a major in Health, a student must complete one of the following in addition to the Health Major Core:

#### A. Elementary Health Education Specialization:\*

261 381	Health for Elementary Teachers .....	3
261 378	First Aid (Basic Instructors) .....	1
261 515	Health Appraisal .....	3
415 779	Primary School Education .....	3

#### Two courses to be selected from the following:

415 780	Kindergarten Education .....	3
215 303	Ecosystems Aid Society .....	3
273 280	Psych. of Childhood & Adolescence .....	3
273 622	Psych. of Exceptional Children .....	3
273 505	Abnormal Psychology .....	3
261 462	Practicum in Health .....	2

#### Six hours of health-related electives to be selected from the following:

215 310	Biology & the Future of Man .....	3
273 420	Personality Development .....	3
640 132	Basic Nutrition .....	3
620 332	Concepts in Family Health .....	3
261 780	Seminar in Health Education .....	3
261 583	Current Health Issues .....	3

#### B. Secondary Health Education Specialization:\*

261 462	Practicum in Health .....	2
261 378	First Aid — Basic Instructors .....	1
640 132	Basic Nutrition .....	3
261 550	Health Appraisal & Counseling .....	3

#### Two courses selected from the following:

620 230	Intro. to Human Development .....	3
273 280	Psychology of Childhood & Adolescence .....	3
415 325	Safety .....	3
620 332	Concepts in Family Health .....	3
261 780	Seminar in Health Education .....	3
261 583	Current Health Issues .....	3
261 550	Health Appraisal .....	3

#### Six hours of health-related electives to be selected from the following:

273 420	Personality Development .....	3
277 411	Social Problems .....	3
273 550	Group Dynamics .....	3
620 650	The Family .....	3
630 110	Consumer Action .....	3
215 303	Ecosystems and Society .....	3

#### C. Community Health Specialization:\*\*

415 316	Media .....	1
277 411	Social Problems .....	3
289 630	Public Relations .....	3
273 435	Social Psychology .....	3
261 585	Field Experience in Health .....	3
221 190	Elementary Organic Chemistry .....	3
221 191	Elementary Organic Chemistry Lab. ....	2
or		
221 230	Chemistry II .....	3
221 250	Chemistry II Lab. ....	2

\*For teacher certification — The following Natural Science courses should be taken:

215 198	Principles of Biology .....	4
215 240	Structure & Function of the Human Body .....	6
215 310	Physical Science elective .....	3
215 310	Biology and the Future of Man .....	3

#### \*\*Natural Sciences:

The following natural science courses should be taken:

215 198	Principles of Biology .....	4
215 240	Structure & Function of the Human Body .....	6
215 220	Bacteriology and Man .....	3
221 210	Chemistry I .....	5



**Three courses selected from the following:**

410 680	Introduction to Adult Education .....	3
405 215	Educational Psychology I .....	3
277 641	Social Gerontology .....	3
269 704	Interest Groups & Political Opinion .....	3
215 303	Ecosystems and Society .....	3
261 550	Health Appraisal .....	3
215 555	Microbiology .....	4

**Six hours of health-related electives to be selected from the following:**

289 635	Public Information Methods .....	3
277 531	Urban Sociology .....	3
620 332	Concepts in Family Health .....	3
640 132	Basic Nutrition .....	3
277 450	Group Process & Social Behavior .....	3
277 631	Community Organization & Leadership .....	3
215 520	Microbiology of Foods .....	3

**D. Health Care Administration Specialization: \*\*\***

550 609	Occupations Safety Aid Health .....	3
261 585	Field Experience & Internship .....	8
277 641	Social Gerontology .....	3
269 507	Intro. to Public Administration .....	3

**Two courses from the following:**

640 132	Basic Nutrition .....	3
620 230	Intro. to Human Development .....	3
289 630	Public Relations .....	3
410 680	Intro. to Adult Education .....	3
225 110	Economics I .....	3

**Four courses from the following:**

305 260	Fundamentals of Accounting .....	4
305 292	Business Law I .....	3
305 391	Administrative Communications .....	3
305 270	Managerial and Cost Controls .....	3
305 420	Management Concepts .....	3
305 520	Organizational Behavior .....	3
305 530	Labor Legislation .....	3
305 531	Personnel and Wage Administration .....	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 84.

II. Professional Education Requirements

**A. For Those Seeking Teacher Certification**

1. Educational Psychology I and II, 6 hours
2. Health Education Professional Semester Teaching Participation—8 hours  
(Must be done in area of specialization.)  
Principles of Education (415 451 or 415 300)—3 hours  
Educational Sociology—3 hours  
Methods (Health) (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 (to be taken by all majors)

261 001	Concepts in Physical Education .....	0
	Lifetime Sport .....	0

**\*\*Secondary Physical Education specialization:** Must take four lifetime sports in addition to the lifetime sport requirement in the physical education core. Courses must be reported for CR/ NCR, but may be taken for zero or one credit. Courses must be chosen from approved list.

**Core Courses (to be taken by all majors):**

261 201	P & C Health .....	3
261 206	Introduction to Physical Education .....	3
261 230	Social Dimensions .....	3
261 290	Kinesiology .....	3
261 376	First Aid—Multimedia .....	1
261 377	First Aid—Multimedia Instructor .....	1
261 378	First Aid—Basic Instructor .....	1
261 565	Exercise Physiology .....	4
261 570	Motor Behavior .....	3
261 710	Tests and Measurements .....	3

**\*\*\* Natural Sciences**

The following courses should be taken:

215 198	Principles of Biology .....	4
285 350	Business & Economic Statistics .....	3
	Two other courses one of which has a prerequisite in the same department in which it is located .....	6

**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

**A. Elementary Physical Education Specialization**

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

**B. Secondary Physical Education Specialization**

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
261 460	Practice Teaching .....	3

**C. Non-Teaching Physical Education Specialization****1. Dance Specialization:**

284 261	Fundamentals of Acting .....	3
284 565	Fundamentals of Directing .....	3
284 165	Appreciation of Theatre .....	2
284 370	Dramatic Structure .....	3
284 260	Stage Movement .....	3
284 560	Advanced Stage Movement .....	3
261 021	(121) Beginning Modern Dance .....	0-1
261 060	(160) Beginning Ballet .....	0-1
261 323	Tech. of Inter. Modern Dance .....	2*
261 324	Tech. of Adv. Modern Dance .....	2*
or		
261 325	Tech. of Inter. Ballet .....	2*
261 326	Tech. of Adv. Ballet .....	2*
261 500	Methods & Materials of Dance .....	3
261 501	Dance Composition .....	3
241 744	History of the Dance .....	3

\* Each must be taken twice.

**2. Exercise Science Specialization:**

261 307	Techniques of Training & Conditioning .....	2
261 759	Organ., Impie., & Admin. of Exercise Prog. ....	4
261 792	Internship in Recreation .....	8

**3. General Non-Teaching Specialization:**

Any 15 hours of physical education courses numbered 300 or higher.

**Recreation Major.** For a degree in recreation students should take the following:

I. General Education Requirements — see Bachelor of Science Degree, page 84.

II. Directed Field Experience (Internship Semester)

261 715	Community Recreation .....	3
261 725	Recreation Administration .....	3
261 792	Internship in Recreation .....	8
261 791	Seminar in Recreation .....	2

Student must meet the following qualifications:

A. Overall 2.2 GPA in all course work attempted at KSU, 2.5 GPA in recreation major courses or in exercise science specialization.

B. Recommended by major adviser.

C. Recreation majors must have satisfactory pre-internship experience in leisure/ recreation field, minimum of 280 hours during college/ university preparation. Students in non-teaching specializations must have met all specialization requirements.

D. Physical examination required.

**III. Recreation Major Requirements**

261 390	Prin. & Phil. of Recreation .....	3
261 320	Recreation Leadership .....	3
261 373	First Aid (Multimedia) .....	1
261 382	Camp Counseling .....	3
261 480	Observation and Participation in Recreation .....	2

Select 9 hours from each of the following areas. Lists of approved courses are available:

1. Program skills in Arts, Crafts, Drama, and Music.
2. Program skills in games, sports, aquatics, dance, exercise sciences, and outdoor activities.
3. General Program skills.



**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		
261 373	First Aid (Multimedia) .....	1
or		
261 376	First Aid (Multimedia) .....	1
Four hours elected from the following:		
261 302	Tech. of Basketball .....	2
261 305	Tech. of Football .....	2
261 301	Tech. of Gymnastics .....	2
261 298	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 Health, Physical Education and Recreation is offered in the Department of Health, Physical Education and Recreation.

Prerequisite to the work in the graduate program is an undergraduate major in Health, 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 an oral comprehensive examination. A minimum of 18 semester hours must be earned in the Department of Health, Physical Education and Recreation.

## 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). 261-001-1-0835  
**261 002. Concepts in Physical Education.** (Majors) (0). 261-002-1-0835  
**261 003. Concepts in Physical Education** (Honors) (0). 261-003-1-0835

### Lifetime Sports

- 261 004. Adaptive Physical Education.** (0). 261-004-1-0835  
**261 005. Beginning Swimming.** (0). 261-005-1-0835  
**261 006. Intermediate Swimming.** (0). 261-006-1-0835  
**261 007. Advanced Swimming.** (0). 261-007-1-0835

- 261 008. Diving.** (0). 261-008-1-0835  
**261 009. Synchronized Swimming.** (0). 261-009-1-0835  
**261 010. Beginning Scuba Diving.** (0). 261-010-1-0835  
**261 011. Advanced Scuba Diving.** (0). 261-011-1-0835  
**261 012. Senior Life Saving.** (0). 261-012-1-0835  
**261 013. Wrestling.** (0). 261-013-1-0835  
**261 014. Weight Training.** (0). 261-014-1-0835  
**261 015. Crew.** (0). 261-015-1-0835  
**261 016. Calisthenics and Fitness Conditioning.** (0). 261-016-1-0835  
**261 017. Folk Dance.** (0). 261-017-1-0835  
**261 018. Social Dance.** (0). 261-018-1-0835  
**261 019. Square Dance.** (0). 261-019-1-0835  
**261 021. Beginning Modern Dance.** (0). 261-021-1-0835  
**261 022. Water Polo.** (0). 261-022-1-0835  
**261 024. Tumbling and Trampoline.** (0). 261-024-1-0835  
**261 025. Beginning Gymnastics and Apparatus.** (0). 261-025-1-0835  
**261 026. Advanced Gymnastics and Apparatus.** (0). 261-026-1-0835  
**261 027. Beginning Bowling.** (0). 261-027-1-0835  
**261 028. Advanced Bowling.** (0). 261-028-1-0835  
**261 029. Beginning Golf.** (0). 261-029-1-0835  
**261 030. Advanced Golf.** (0). 261-030-1-0835  
**261 031. Fencing.** (0). 261-031-1-0835  
**261 032. Billiards and Snooker.** (0). 261-032-1-0835  
**261 033. Table Tennis.** (0). 261-033-1-0835  
**261 034. Horse Shoes.** (0). 261-034-1-0835  
**261 035. Beginning Tennis.** (0). 261-035-1-0835  
**261 036. Advanced Tennis.** (0). 261-036-1-0835  
**261 037. Beginning Badminton.** (0). 261-037-1-0835  
**261 038. Advanced Badminton.** (0). 261-038-1-0835  
**261 039. Archery.** (0). 261-039-1-0835  
**261 040. Field Archery.** (0). 261-040-1-0835  
**261 041. Beginning Riflery.** (0). 261-041-1-0835  
**261 042. Advanced Riflery.** (0). 261-042-1-0835  
**261 043. Roller Skating.** (0). 261-043-1-0835  
**261 044. Handball.** (0). 261-044-1-0835  
**261 045. Paddleball-Racquetball.** (0). 261-045-1-0835  
**261 047. Soccer.** (0). 261-047-1-0835  
**261 048. Power Volleyball.** (0). 261-048-1-0835  
**261 049. Cycling.** (Bicycle). (0). 261-049-1-0835  
**261 050. Jogging.** (0). 261-050-1-0835  
**261 051. Water Skiing.** (0). 261-051-1-0835  
**261 052. Camping.** (0). 261-052-1-0835  
**261 053. Hiking.** (0). 261-053-1-0835  
**261 054. Bait and Fly Casting.** (0). 261-054-1-0835  
**261 055. Angling.** (Fishing). (0). 261-055-1-0835  
**261 056. Canoeing.** (0). 261-056-1-0835  
**261 057. Field Hockey.** (0). 261-057-1-0835  
**261 058. Judo.** (0). 261-058-1-0835  
**261 059. Trap Shooting.** (0). 261-059-1-0835  
**261 060. Beginning Ballet.** (0). 261-060-1-0835  
**261 061. Skiing.** (0). 261-061-1-0835  
**261 062. Orienteering.** (0). 261-062-1-0835  
**261 063. Sailing.** (0). 261-063-1-0835  
**261 064. Self Defense.** (0). 261-064-1-0835  
**261 067. Beginning Western Horsemanship.** (0). 261-067-1-0835  
**261 069. Beginning English Horsemanship.** (0). 261-069-1-0835



The following undergraduate courses in physical education may be taken for elective credit.

- 261 101. **Concepts in Physical Education.** (1). 261-101-1-0835
- 261 102M. **Concepts in Physical Education (Majors).** (1). 261-102-1-0835
- 261 103H. **Concepts in Physical Education (Honors).** (1). 261-103-1-0835
- 261 104. **Adaptive Physical Education.** (1). 261-104-1-0835
- 261 105. **Beginning Swimming.** (1). 261-105-1-0835
- 261 106. **Intermediate Swimming.** (1). 261-106-1-0835
- 261 107. **Advanced Swimming.** (1). 261-107-1-0835
- 261 108. **Diving.** (1). 261-108-1-0835
- 261 109. **Synchronized Swimming.** (1). 261-109-1-0835
- 261 110. **Beginning Scuba Diving.** (1). 261-110-1-0835
- 261 111. **Advanced Scuba Diving.** (1). 261-111-1-0835
- 261 112. **Senior Life Saving.** (1). 261-112-1-0835
- 261 113. **Wrestling.** (1). 261-113-1-0835
- 261 114. **Weight Training.** (1). 261-114-1-0835
- 261 115. **Crew.** (1). 261-115-1-0835
- 261 116. **Calisthenics and Fitness Conditioning.** (1). 261-116-1-0835
- 261 117. **Folk Dance.** (1). 261-117-1-0835
- 261 118. **Social Dance.** (1). 261-118-1-0835
- 261 119. **Square Dance.** (1). 261-119-1-0835
- 261 121. **Beginning Modern Dance.** (1). 261-121-1-0835
- 261 122. **Water Polo.** (1). 261-122-1-0835
- 261 124. **Tumbling and Trampoline.** (1). 261-124-1-0835
- 261 125. **Beginning Gymnastics and Apparatus.** (1). 261-125-1-0835
- 261 126. **Advanced Gymnastics and Apparatus.** (1). 261-126-1-0835
- 261 127. **Beginning Bowling.** (1). 261-127-1-0835
- 261 128. **Advanced Bowling.** (1). 261-128-1-0835
- 261 129. **Beginning Golf.** (1). 261-129-1-0835
- 261 130. **Advanced Golf.** (1). 261-130-1-0835
- 261 131. **Fencing.** (1). 261-131-1-0835
- 261 132. **Billiards and Snooker.** (1). 261-132-1-0835
- 261 133. **Table Tennis.** (1). 261-133-1-0835
- 261 134. **Horse Shoes.** (1). 261-134-1-0835
- 261 135. **Beginning Tennis.** (1). 261-135-1-0835
- 261 136. **Advanced Tennis.** (1). 261-136-1-0835
- 261 137. **Badminton.** (1). 261-137-1-0835
- 261 138. **Advanced Badminton.** (1). 261-138-1-0835
- 261 139. **Archery.** (1). 261-139-1-0835
- 261 140. **Field Archery.** (1). 261-140-1-0835
- 261 141. **Beginning Riflery.** (1). 261-141-1-0835
- 261 142. **Advanced Riflery.** (1). 261-142-1-0835
- 261 143. **Roller Skating.** (1). 261-143-1-0835
- 261 144. **Handball.** (1). 261-144-1-0835
- 261 145. **Paddleball-Racquetball.** (1). 261-145-1-0835
- 261 147. **Soccer.** (1). 261-147-1-0835
- 261 148. **Power Volleyball.** (1). 261-148-1-0835
- 261 149. **Cycling.** (Bicycle). (1). 261-149-1-0835
- 261 150. **Jogging.** (1). 261-150-1-0835
- 261 151. **Water Skiing.** (1). 261-151-1-0835
- 261 152. **Camping.** (1). 261-152-1-0835
- 261 153. **Hiking.** (1). 261-153-1-0835
- 261 154. **Bait and Fly Casting.** (1). 261-154-1-0835
- 261 155. **Angling.** (Fishing). (1). 261-155-1-0835
- 261 156. **Canoeing.** (1). 261-156-1-0835
- 261 157. **Field Hockey.** (1). 261-157-1-0835

- 261 158. **Judo.** (1). 261-158-1-0835
- 261 159. **Trap Shooting.** (1). 261-159-1-0835
- 261 160. **Ballet.** (1). 261-160-1-0835
- 261 161. **Skiing.** (1). 261-161-1-0835
- 261 162. **Orienteering.** (1). 261-162-1-0835
- 261 163. **Sailing.** (1). 261-163-1-0835
- 261 164. **Self Defense.** (1). 261-164-1-0835
- 261 167. **Beginning Western Horsemanship** (1). 261-167-1-0835
- 261 168. **Advanced Western Horsemanship.** (1). 261-168-1-0835
- 261 169. **Beginning English Horsemanship.** (1). 261-169-1-0835
- 261 170. **Advanced English Horsemanship.** (1). 261-170-1-0835

The following courses may be taken by students majoring in physical education or other students meeting prerequisite requirements.

- 261 200. **Concepts of Adult Physical Fitness.** (2) A study of the facts about the effects of regular exercise on physical fitness and health. 261-200-0-0835
- 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. 261-202-0-0835
- 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. 261-206-0-0835
- 261 210. **Drill Team Fundamentals.** (2) The organization, instruction and routines suitable for junior and senior high school drill teams. 261-210-1-0835
- 261 215. **Techniques of Officiating Team Sports.** (2). Principles and practices of officiating team sports. 261-215-1-0835
- 261 216. **Techniques of Officiating Individual Sports.** (2). Principles and practices of officiating individual sports. 261-216-1-0835
- 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. 261-230-0-0835
- 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 rec., four hours lab. 261-241-1-0835
- 261 242. **Gymnastics for the Secondary Schools.** (3). Theory and practice of tumbling and gymnastics. One hour lec. and four labs a week. Required for secondary program. 261-242-1-0835
- 261 250. **You and Your Sexuality.** (3). Study of the role and meaning of human sexuality in relation to oneself as well as in interrelationships with others. Limited to freshmen and sophomores only. (Same as 620 250). 261-250-0-0835
- 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. 261-251-1-0835
- 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. 261-252-1-0835



**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. 261-266-1-0835

**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 rec., four hours lab. Required for elementary program. 261-280-1-0835

**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 rec., two hours lab. Pr.: Biology 240. 261-290-1-0835

**261 298. Techniques of Wrestling.** (2). Study of rules, theory and practices; methods of coaching. Pr.: HPER 230 or 202 or consent of head of department. 261-298-1-0835

**261 299. Techniques of Swimming.** (2). Study of rules, theory and practices; methods of coaching. Pr.: HPER 230 or 202 or consent of head of department. 261-299-1-0835

**261 300. Techniques of Volleyball.** (2). Study of rules, theory, and practices; methods of coaching. Pr.: HPER 230 or 202, or consent of head of department. 261-300-1-0835

**261 301. Techniques of Gymnastics.** (2). Study of rules, theory, and practices; methods of coaching. Pr.: HPER 230 or 202, or consent of head of department. 261-301-1-0835

**261 302. Techniques of Basketball.** (2). Study of rules, theory and practices; methods of coaching. Pr.: HPER 230 or 202, or consent of head of department. 261-302-1-0835

**261 303. Techniques of Baseball.** (2). Study of rules, theory, and practices; methods of coaching. Pr.: HPER 230 or 202, or consent of head of department. 261-303-1-0835

**261 304. Techniques of Track and Field.** (2). Study of rules, theory, and practices; methods of coaching. Pr.: HPER 230 or 202, or consent of head of department. 261-304-1-0835

**261 305. Techniques of Football.** (2). Study of rules, theory and practices; methods of coaching. Pr.: HPER 230 or 202, or consent of head of department. 261-305-1-0835

**261 309. Techniques of Tennis and Golf.** (2). Study of rules, theory, and practices; methods of coaching. Pr.: HPER 230 or 202, or consent of head of department. 261-309-1-0835

**261 315. Treatment of Athletic Injuries.** (3). Principles and practices of massage, taping and care of minor athletic injuries. Pr.: Junior standing and 261 202 or 261 565. 261-315-0-0835

**261 323. Techniques of Intermediate Modern Dance.** (2). Pr.: 261 021 or 261 121, 261 060 or 261 160, and/or consent of instructor. May be repeated for a total of six hours. 261-323-1-0835

**261 324. Techniques of Advanced Modern Dance.** (2). Pr.: 261 323 (four hours) and/or consent of instructor. May be repeated for a total of eight hours. 261-324-1-0835

**261 325. Techniques of Intermediate Ballet.** (2). Pr.: 261 060 or 261 160 and 261 021 or 261 121 and/or consent of instructor. May be repeated for a total of six hours. 261-325-1-0835

**261 326. Techniques of Advanced Ballet.** (2). Pr.: 261 325 (four hours) and/or consent of instructor. May be repeated for a total of eight hours. 261-326-1-0835

**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. 261-331-1-0835

**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 Health, Physical Education and Recreation. Pr.: A current senior lifesaving certificate. 261-341-1-0835

**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 Health, Physical Education and Recreation only. Pr.: A current senior lifesaving certificate. 261-345-1-0835

**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. 261-355-1-0835

**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. 261-359-0-0835

**261 360. Dance Composition.** (3). Study of techniques of choreography. Emphasis is placed on practical application. One hour rec., 4 hours lab. per week. Pr.: 261 500. 261-360-1-0835

**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 rec. and two hours lab. a week. Pr.: Sophomore standing and Education 202 or consent of instructor. Not open to majors in Health, Physical Education and Recreation. 261-379-1-0835

**261 399. Honors Seminar in Physical Education.** (1-3). Selected topics in physical education. Open to non-majors in the Honors Program. 261-399-4-0835

**261 460. Practice Teaching in Physical Education.** (2). Supervised students assist in basic physical education classes. Four hours lab. a week. Pr.: Junior standing. 261-460-2-0835

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**261 500. Methods and Materials of Dance.** (3). A theoretical and practical investigation of literal and abstract materials for the dance; methods of dance. One hour rec., four hours lab. per week. Pr.: 261 324 (four hours) or 261 326 (four hours). 261-500-0-0835

**261 530. Minority Groups in Sports.** (3). The contributions, problems, and discrimination of minority groups in sport. Pr.: 277 211, 261 230, 273 435, or 241 539. 261-530-0-0835

**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; HPER 290, or consent of instructor. 261-561-0-0835

**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. 240 or consent of instructor. 261-565-1-0835

**261 566. Methods and Materials of Dance.** (3). History of the dance; methods of dance. One hour rec. and three hours lab. a week. Pr.: Semester each of beginning and intermediate dance. 261-566-1-0835

**261 567. 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. Pr.: Junior standing and 261 202 or 261 565. 261-567-0-0835



**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. 261-570-1-0835

**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. 261-586-0-0835

**261 599. Independent Studies in Health, Physical Education and Recreation.** (1-3). Selected topics in health, physical education and recreation. Maximum of three hours applicable toward a degree. Pr.: Consent of department head. 261-599-3-0835

#### 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. 261-700-0-0835

**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.: HPER 570. 261-701-0-0835

**261 710. Tests and Measurements in Physical Education.** (3). Techniques of measuring and evaluating, including elementary statistical procedures, the preparation and administration of skill and written tests, and the use of other evaluative materials. Pr.: 261 208, 261 252, 261 355, 261 241 or 261 331, 261 266, 261 251, 261 242. 261-710-0-0835

**261 718. Film Analysis of Sport.** (3). The analysis of human movement using film, tape and other related aids. Pr.: 261 290. 261-718-0-0835

**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. 261-730-0-0835

**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. 261-731-0-0835

**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. 261-732-0-0835

**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 745). Pr.: Sociology 211 or consent of instructor. 261-745-0-0835

**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. 261-750-0-0835

**261 759. Organization, Implementation, and Administration of Exercise Programs.** (4). A study of the organization, implementation and administration of exercise programs, which include physical fitness testing, budgeting, equipment, legal aspects, publicity, public relations program management, and theory and practical use of various exercise regimes. Three hours rec. and two hours lab. a week. Pr.: 261 565 and consent of instructor. 261-759-0-0835

**261 775. Seminar in Physical Education.** Credit arranged. Recent trends and problems in physical education. Pr.: Senior standing and consent of instructor. 261-775-0-0835

**261 799. Problems in Health, Physical Education and Recreation.** Credit arranged. Pr.: Background of courses needed for problem undertaken. 261-799-3-0835

#### 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.: HPER 565. 261-800-1-0835

**261 801. Motor Behavior Seminar.** (3). Current trends, problems and topics related to psychomotor learning, motor development and the psychology of coaching. Pr.: 261 570. 261-801-0-0835

**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.: HPER 710. 261-810-0-0835

**261 815. Research Methods in Health, Physical Education and Recreation.** (3). A study of techniques of research including the design of experiments and the use of appropriate statistics. 261-815-0-0835

**261 820. Supervision of Physical Education.** (3). A study of the objectives, organization, and methods of supervising elementary and secondary physical education programs. 261-820-0-0835

**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.: HPER 290. 261-825-0-0835

**261 896. Topics in Health, Physical Education and Recreation.** (1-4). 261-896-3-0835

**261 897. Research in Health, Physical Education and Recreation.** Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken. 261-897-4-0835

**261 898. Master's Report** (1-4). 261-898-4-0835

**261 899. Master's Thesis** (1-6). 261-899-3-0835

#### 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. 261-201-0-0835

**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 Health, Physical Education and Recreation. 261-373-1-0835

**261 375. First Aid (Multimedia).** (1) 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. For majors in the Department of Health, Physical Education and Recreation only. 261-375-1-0835

**261 377. First Aid (Multimedia Instructors).** (1). Education in methods of teaching the American Red Cross Multimedia first aid course. Upon successful completion of the course the student is certified as a multimedia instructor. For majors in the Department of Health, Physical Education and Recreation only. Pr.: Current certification in multimedia first aid. 261-377-1-0835

**261 378. First Aid (Basic Instructors).** (1). Training in methods of teaching basic first aid measures to young children. For majors in Department of Health, Physical Education and Recreation only. Pr.: Current certification in first aid (multimedia) or current teaching certificate in any teaching field. 261-378-1-0835



**261 381. Health for Elementary Teachers.** (3). To assist the student in the development of the understandings and competencies essential for the teaching of health in elementary schools. 261-381-0-0835

**261 462. Practicum in Health.** (2). Supervised students assist in personal health classes. Four lab. hours a week. Pr.: Junior standing. 261-462-2-0835

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**261 550. Health Appraisal.** (3). Study of health appraisal information, correction and follow-up procedures needed for screening and identifying health problems and concerns. Pr.: 261 201; 273 110. 261-550-0-0835

**261 555. Community Health.** (3). Identification of local, state, and national health problems; programs and agencies designed to meet these problems. Emphasis on principles, objectives, and methods of community health planning. Pr.: 261 201 and 215 198. 261-555-0-0837

**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.: Junior standing. 261-583-0-0835

**261 585. Field Experience and Internship in Health.** (3-8). Observation and participation in activities of a public health agency either official, voluntary, or private. Internship may also be in nursing home and hospital setting. Planning and supervision of experience is done jointly by university staff members and agency representatives; can be repeated once. Pr.: Must notify instructor semester before taking class and 261 555. 261-585-2-0837

#### UNDERGRADUATE AND GRADUATE CREDIT

**261 740. Administration of Health Care Programs.** (3). Organization and administration of school health programs concerning health services, health instruction, and health environment. Emphasis will also be placed on various community health agencies such as public, private and voluntary. Two recitations and two lab. hours a week. Pr.: 261 583 or 261 555. 261-740-0-0835

**261 747. Drugs and the Student.** (3). Current problems and programs relative to drug use, abuse, and control. Pr.: 261 201, 273 110 and restricted to students with senior standing in Health, Physical Education and Recreation. 261-747-0-0837

**261 765. Human Sexuality.** (3). Focus on implications of personal and familial aspects of human sexuality throughout the life cycle. Pr.: 620 350 or 215 240. 261-765-0-0837

**261 780. Seminar in Health Education.** Credit arranged. Recent trends and problems in health education. Pr.: HPER 486 and consent of instructor. 261-780-0-0835

#### Courses in Recreation

##### UNDERGRADUATE CREDIT

**261 220. Recreational Games.** (2). Lead-up and recreational games suitable for use in both recreation and school settings. Four hours lab. a week. 261-220-0-0835

**261 320. Recreational Leadership.** (3). Principles and methods of organizing communities for leisure activities. 261-320-0-0835

**261 382. Camp Counseling.** (3). Basic principles and skills in camping for future counselors. Pr.: Sophomore standing or consent of instructor. 261-382-0-0835

**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. 261-390-0-0835

**261 480. Observation and Participation in Recreation.** (2). Observation and limited participation with recreational

agency. Pr.: Recreation specialization, junior standing. 261-480-2-0835

#### UNDERGRADUATE AND GRADUATE CREDIT

**261 715. Community Recreation.** (3). A study of the program forms and structures related to public, voluntary, military, private, and commercial agencies. Pr.: Junior standing and consent of instructor. 261-715-0-0835

**261 720. Organization and Administration of Intramural Programs.** (3). Policies and procedures in organizing and administering an intramural program. 261-720-0-0835

**261 725. Recreation Administration.** (3). Development and evaluation of recreation administrative patterns, programs, and structure. Pr.: Junior standing and consent of instructor 261-725-0-2103

**261 791. Seminar in Recreation.** (1-3). Designed for recreation specialists. Discussion of current research and innovations. Evaluation of recreational programs. Small group interaction. May be taken with Internship in Recreation. 261-791-2-0835

**261 792. Internship in Recreation.** (8). Supervised experiences 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 adviser: a) summer assignment in an approved agency with concurrent enrollment in the summer school course designation; b) half-time assignment during a full semester, or full-time assignment during a semester in an approved or supervised recreation job, both with concurrent enrollment in the course designation. May be repeated once. Pr.: Undergraduate students: Senior standing and consent of instructor. Graduate students: 261 791 (may be taken concurrently) and consent of instructor. 261-792-2-0835

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#### HISTORY

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Joseph M. Hawes,\* Head of Department

Professors Carey,\* Higham,\* Linder,\* Socolofsky,\* and Wilcoxon;\* Associate Professors Crawford,\* Hawes,\* Jones,\* Kaufman,\* Kipp,\* Kren,\* Page,\* and Zieger;\* Assistant Professors Donovan,\* Ferguson,\* Frey,\* Gray,\* Hamscher,\* McCulloh,\* Mrozek,\* and Nieman;\* Emeritus: Professors Parrish,\* Sageser,\* and Sweedlun;\* Associate Professors Alsop\* and Riggs.\*

History is the common possession of mankind. In the words of historian Carl Becker, "The value of history is . . . not scientific but moral: by liberalizing the mind, by deepening the sympathies, by fortifying the will, it enables us to control, not society, but ourselves,—a much more important thing; it prepares us to live more humanely in the present and to meet rather than to foretell the future." Historical understanding is the basic attribute of the educated person.

Business, government and professional practice in other fields as well as the traditional academic and archival callings offer opportunities for the effective and satisfying use of a background in historical methodology. An introduction to the historian's wide-ranging concern with the numerous and interrelated aspects of human culture—including social, economic, intellectual and religious, to name but a few—is a useful experience for any man or woman contemplating a career which will influence the course of events in a complex society. Within their broad spectrum of topics and approaches, historical studies emphasize a process of disciplined thinking, training the mind to assess evidence and reach rational con-



clusions. Career opportunities for people with training in history are as broad as the need for that kind of thinking.

The history program at Kansas State appeals not only to majors but to all students seeking a rewarding educational experience. The curriculum includes courses in traditional and non-traditional fields of interest taught by a nationally respected faculty willing to try new and innovative teaching techniques. A program of speakers, seminars, colloquia and films supplements the curriculum to stimulate student interest in the discipline of history and its media of expression.

### 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. 127 and 128), a minimum of 18 hours in courses numbered 500 and above and Hist. 397 in the junior 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. 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.

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 cooperates with a number of other Departments in the South Asia Program, which is described in detail on page 88. 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, currently 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

**241 100. Introduction to History.** (3). What history is, how it is produced and what its functions are. Designed for freshmen who want an introductory course which explains the methodology, purposes and career options of the discipline. 241-100-0-2205

**241 101. Western Civilization: The Rise of Europe.** (3). Major trends in western history from the beginnings of European civilization to the end of the 17th century. The scope of this course includes classical antiquity, the Middle Ages, the Renaissance, the Reformation and early modern Europe, but chronological and topical emphases vary with individual sections. Required of all majors in History. Pr.: Not open to juniors and seniors except with consent of instructor. 241-101-0-2205

**241 102. Western Civilization: The Modern Era.** (3). Principal developments in western civilization from the beginning of the 18th century to the present. The scope of the course includes the Enlightenment, the French Revolution, the Industrial Revolution, nationalism, imperialism, communism, fascism and the two World Wars, but chronological and topical emphases vary with individual sections. Required of all History majors. Pr.: Not open to juniors and seniors except with consent of instructor. 241-102-0-2205

**241 103. Western Civilization: The Rise of Europe, Honors.** (4). Major trends in western history from the beginnings of European civilization to the end of the 17th century. The scope of this course includes classical antiquity, the Middle Ages, the Renaissance, the Reformation and early modern Europe, but chronological and topical emphases vary with individual sections. Pr.: For freshmen and sophomores in the Honors Program. 241-103-0-2205

**241 104. Western Civilization: The Modern Era, Honors.** (4). Principal developments in western civilization from the beginning of the 18th century to the present. The scope of the course includes the Enlightenment, the French Revolution, the Industrial Revolution, nationalism, imperialism, communism, fascism and the two World Wars, but chronological and topical emphases vary with individual sections. Pr.: For freshmen and sophomores in the Honors Program. 241-104-0-2205

**241 127. Far Eastern Civilization I.** (3). The culture, history and traditions of China, Japan, Korea, Taiwan and Indochina. 241-127-0-2205

**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. 241-128-0-2205

**241 251. History of the United States to 1877.** (3). Includes ethnic, social, military, political, economic, diplomatic and ideological themes. The chronological emphasis varies with instructor. The aim of the course is to achieve a broad understanding of American civilization to 1877. 241-251-0-2205



**241 252. History of the United States since 1877.** (3). Ethnic, social, political, economic and diplomatic history. The goal of the course is to achieve a broad understanding of American civilization since 1877. 241-252-0-2205

**241 253. History of the United States to 1877, Honors.** (4). Focuses on selected topics and normally does not attempt complete chronological coverage. Class activity emphasizes reading, discussion, written work and individual consultation. Pr.: For freshmen and sophomores in the Honors Program. 241-253-0-2205

**241 254. History of the United States since 1877, Honors.** (4). Focuses on selected topics and normally does not attempt complete chronological coverage. Class activity emphasizes reading, discussion, written work and individual consultation. Pr.: For freshmen and sophomores in the Honors Program. 241-254-0-2205

**241 299. Honors Seminar in History.** (3). Selected topics in history. May be repeated once for credit. Pr.: Membership in Honors Program or consent of instructor. 241-299-0-2205

**241 397. Junior Seminar.** (3). Provides for the study of the historical method for students in their junior year. Emphasis upon both research techniques and writing. 241-397-0-2205

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**241 501. Heritage of the Western World.** (3). The heritage and legacies of western civilization especially designed for the non-major; the emphasis is upon broad themes in the evolution of the political, economic, social, cultural and ideological inheritance. May not be used to fill major requirement in History. Pr.: Sophomore standing. 241-501-0-2205

**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. 505, P.Sci. 505, Soc. 505, Anthro. 505.) 241-505-0-2205

**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. 506, P.Sci. 506, Soc. 506, Anthro. 506.) 241-506-0-2205

**241 509. History of Childhood.** (3). Examines some theoretical positions on childhood (Freud, Erikson, DeMause, Rheingold and others), and then attempts to determine what it meant to be a child at various times in the past, from Greek and Roman antiquity to 20th century Europe and America. Concentrates on such questions as infanticide, child beating, toilet training, swaddling and methods of schooling, as well as the impact of religious and secular ideologies on the theory and practice of child-raising. Pr.: Sophomore standing. 241-509-0-2205

**241 511. History of Dance in Its Cultural Setting.** (3) II. The study of developments and changes in the style, technique and purpose of ceremonial and theatrical dancing from the Greeks to the present. Emphasis on the interaction between this art and the total culture — social, religious, artistic and political — in which it is performed. Pr.: Sophomore standing. 241-511-0-2205

**241 513. Battles and Leaders.** (3) I. The course will emphasize military organization, tactics and strategy, generalship and grand strategy, manpower and logistics and the wartime ramifications of war on land, at sea and in the air. Pr.: Sophomore standing. 241-513-0-2205

**241 515. History of Sport.** (3). The historical development of sport (especially in Europe and North America) including the growth of competition, the rise of mass spectator sports, elitism and the changing function of sport. History of sport as

business and history of the relationship between sport and other institutions. (Same as HPER 261 515.) Pr.: Sophomore standing. 241-515-0-2205

**241 525. Colonial America.** (3). About 1450 to 1763. Includes the European background of North American colonization, the rivalry for new world empire, 17th century English colonial foundations, and development of the various colonial societies. Pr.: Sophomore standing. 241-525-0-2205

**241 526. The American Revolution.** (3). 18th century colonial background of the Revolution and the revolutionary era itself, 1763-1789. Stresses ideological and other causes of the Revolution, the course of the war, its social results, the Confederation and its demise. Pr.: Sophomore standing. 241-526-0-2205

**241 527. The Early National Period.** (3). Foundations of the new nation from the adoption of the Constitution to the conclusion of the War of 1812, approximately 1789-1815. Stresses the contest between Hamiltonians and Jeffersonians for philosophical dominance of institutions; other topics include diplomacy, westward expansion, military developments, the social and intellectual life of the era. Pr.: Sophomore standing. 241-527-0-2205

**241 528. The Age of Jackson.** (3). 1815-1848. Political party instability in the aftermath of the War of 1812, emergence of modern political parties in the 1830s and 1840s, the transportation revolution and growth of societal interdependence, the nature of antebellum reform. Emphasis is on the problem of social order and the relation of the individual to society in a period of rapid and fundamental change. Pr.: Sophomore standing. 241-528-0-2205

**241 529. Civil War and Reconstruction.** (3). 1848-1877. Examination of the sectional controversy, the failure of the political system to resolve peacefully the conflict between North and South, the resort to arms, the nature of the post-war settlement. Emphasis is on the attempt of mid-19th-century American leaders to deal with the complex problems of slavery and race. Pr.: Sophomore standing. 241-529-0-2205

**241 530. Populism and the Progressive Movement.** (3). "The Gilded Age," "Populism," and "The Progressive Movement" as significant developments in the American scene, 1877-1914, provide the emphasis for this course. An understanding of the nature of American life, with concentration on activities of "typical" Americans, is a major goal of this course. Pr.: Sophomore standing. 241-530-0-2205

**241 531. The United States in the Twentieth Century.** (3). 1917 to the present. Efforts are made to deal with ethnic, cultural and social as well as political, economic and diplomatic themes. Pr.: Sophomore standing. 241-531-0-2205

**241 535. History of the South.** (3). Survey of southern history from the colonial period to the present. Origins and growth of slavery and the plantation system, the nature of society in the slave South, the impact of the Civil War and emancipation on southern society, the emergence of the "New South" in the late 19th and early 20th centuries. Pr.: Sophomore standing. 241-535-0-2205

**241 539. Black American History.** (3). Blacks in America from the 17th century to the present, with special emphasis on political, social, economic, and intellectual developments in the role of the Black American and his contributions to American life and culture. Pr.: Sophomore standing. 241-539-0-2205

**241 541. Women in American History.** (3) I. An overview of women in the history of the United States, emphasizing both important individual women and the changing position of women in American society. Pr.: Sophomore standing. 241-541-0-2205

**241 543. History of United States Foreign Policy to 1900.** (3). The evolution of United States foreign policy from its origins through the promulgation of the Open Door Notes of 1899 and 1900. Stresses the continuity and intellectual foundations of foreign policy. Emphasizes territorial and foreign com-



mercial expansion. Pr.: Sophomore standing. 241-543-0-2205

**241 544. History of United States Foreign Policy since 1900.** (3) II. The emergence and development of the United States as a world power. Focuses on America's response to war and revolution, including the Mexican, Russian and Chinese Revolutions, the diplomacy of World Wars I and II, and the Korean and Vietnamese wars. Pr.: Sophomore standing. 241-544-0-2205

**241 548. American Business History.** (3). The rise and development of the major commercial, financial, industrial and transportation enterprises in the United States from the colonial period to the present. Emphasizes the gradual specialization of business through the Civil War, the movement from specialization to combination and integration along vertical/horizontal lines, the conglomerate movement and the development of multinational enterprises after World War II. Pr.: Sophomore standing. 241-548-0-2205

**241 550. American Economic History.** (3). Development of the American economy from colonial times to the present including colonial agriculture and mercantilism, the emergence of the factory system, industrial capitalism, large scale business and agricultural enterprises, classical and Keynesian economics. Pr.: Sophomore standing. 241-550-0-2205

**241 552. American Social History.** (3). Evolution and development of American social institutions, including marriage, sexual customs, ethnicity and community problems. Also emphasizes the different methodologies used in writing social history. Pr.: Sophomore standing. 241-552-0-2205

**241 555. American Constitutional History.** (3). Survey of constitutional and legal development from colonial times to the present. English constitutional ideas and the common law in the American colonies, formation of the Constitution, the role of the Supreme Court, development of the modern American legal system, growth of the legal profession, the problem of civil liberties. The course is designed to offer insight into the relationship of constitutional-legal institutions to American society. Pr.: Sophomore standing. 241-555-0-2205

**241 557. History of American Agriculture.** (3). Concentrates on the period since 1850 in an attempt to acquaint the student with the political and economic history of American agriculture. No attempt will be made to present the scientific or technological side of agriculture in detail, but agriculture will be shown in relation to the life of the entire United States. The life of the farmer and his family, the relationship between agricultural changes and other parts of the economy will be part of this course. Special attention will be paid to agriculture in Kansas and the Great Plains. Pr.: Sophomore standing. 241-557-0-2205

**241 558. History of Kansas.** (3). Land, people, and cultural developments in Kansas, from the earliest written records to the present. Designed to provide the student with an intimate understanding of the State of Kansas. Pr.: Sophomore standing. 241-558-0-2205

**241 561. War in the Twentieth Century.** (3). Considers the military theory and practice, the technology, and the political and ideological constraints of World Wars I and II, the Spanish Civil War, the Korean War and the Indochinese wars. Students are to gain an understanding of the varieties of military experience in the 20th century, including civil wars, "total war," and guerrilla warfare. Pr.: Sophomore standing. 241-561-0-2205

**241 562. History of American Military Affairs.** (3). Deals with the development of military institutions in colonial America and the United States, civil-military relations and conflicts between political constraints and strategic demands, popular attitudes toward the military, and the rise of the military-industrial complex. Pr.: Sophomore standing. 241-562-0-2205

**241 582. Latin American Nations.** (3). Survey of economic, social, and political developments of the Latin American nations from independence to the present decade with emphasis on Argentina, Brazil, Peru, Chile, and Mexico. Stresses reform and revolution of the last fifty years. Pr.: Sophomore standing. 241-582-0-2205

**241 585. Topics in the History of the Americas.** (3). Provides instructor and students the opportunity to investigate in detail a particular theme, event or problem in the history of North, Central, or South America. Topics vary. May be repeated for credit. Pr.: Sophomore standing. 241-585-0-2205

**241 598. Senior Seminar for Secondary Teachers.** (3). The purpose of this course is to examine critically the historical content of teaching materials currently in use at the secondary level in public schools. The aim of this examination is to weigh the historical validity of the materials. Pr.: Sophomore standing. 241-598-0-2205

**241 599. Senior Seminar.** (3). A seminar for seniors in problems and interpretations concerning broad areas of historical enquiry and relating to the teaching of history. Pr.: Sophomore standing. 241-599-0-2205

**241 601. History of Science I.** (3). Scientific thought and activity from antiquity to the mid-17th century, emphasizing Greek science, medieval science, and the Scientific Revolution, and especially developments in astronomy, theories of motion, and biology. Pr.: Sophomore standing. 241-601-0-2205

**241 602. History of Science II.** (3). Scientific thought from the mid-17th to the late 19th century, with emphasis on developments in astronomy, physics, chemistry, geology, and biology (including evolutionary thought), and discussion of the role of philosophies of science and scientific societies. Pr.: Sophomore standing. 241-602-0-2205

**241 606. A History of Witchcraft and the Occult.** (3). A study of the history of witchcraft and the occult in western civilization with special attention to religious, intellectual, and social issues and influences. Pr.: Sophomore standing. 241-606-0-2205

**241 608. 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. Pr.: Sophomore standing. 241-608-0-2205

**241 610. History and Culture of Greece.** (3). The rise of civilization in the ancient Near East, the migrations of the Greeks and the Heroic Age, the Greek city-states, commerce and colonization, the Persian invasion, Athens' leadership of Greece, the war between Athens and Sparta, Alexander the Great, and the total Hellenic achievement. Pr.: Sophomore standing. 241-610-0-2205

**241 611. History and Culture of Rome.** (3). Examines the various theories of Rome's origin, the causes, problems, and influences upon the republican government, political and economic problems of Roman expansion and the Roman world. Various reforms including those of the Gracchi, Caesar, and Augustus. Contact with Greece and the older areas of civilization. The Roman imperial system, the many causes of Rome's fall, and Rome's role as a synthesizer of the ancient classical culture. Pr.: Sophomore standing. 241-611-0-2205

**241 612. Europe in the Middle Ages.** (3). Europe from the fall of the Roman Empire to the 13th century. Investigates the conflict and interaction of Roman, Christian and Germanic ideals and attitudes in the early Middle Ages, and the increasing complexity and sophistication of society, culture, religion and government of the high Middle Ages. Pr.: Sophomore standing. 241-612-0-2205

**241 613. The Renaissance.** (3). The Italian Renaissance as a major phase in the history of western civilization and its spread to Northern Europe. Pr.: Sophomore standing. 241-613-0-2205



- 241 614. The Reformation.** (3). A study of the Protestant, Catholic and Radical Reformations with special attention to Luther, Calvin, the origins of the Church of England and the Presbyterian Church, the Anabaptists, the Puritans, and Roman Catholic Reform, and the impact of religious developments on the political, economic, social, and intellectual history of the Western World. Covers the period from approximately 1500 to 1660. Pr.: Sophomore standing. 241-614-0-2205
- 241 615. Europe in the Age of Absolutism.** (3). Surveys the economic, social, political and intellectual history of Western Europe in the 17th century, a period marked by economic depression, international conflict and domestic revolutions as well as by cultural achievement. Emphasizes the complex interaction among social groups; the rise of a European state system; the development of constitutional monarchy in England and absolute monarchy in France; and the change in values generated by the Scientific Revolution. Pr.: Sophomore standing. 241-615-0-2205
- 241 616. Revolutionary Europe.** (3). Europe from the death of Louis XIV in 1715 to the fall of Napoleon in 1815. The origins and development of the French Revolution and the Napoleonic legacy, also examines reform and counter-revolutionary movements in England, Italy, Russia, Poland and the Germanies. Pr.: Sophomore standing. 241-616-0-2205
- 241 617. Nineteenth-Century Europe.** (3). The history of Europe from the French Revolution to the end of the first World War. Major topics covered will include the rise of conservatism as an ideology and its application in practice, the nature of liberalism and socialism, the impact of science and technology, the origins and course of World War I. Pr.: Sophomore standing. 241-617-0-2205
- 241 618. Twentieth-Century Europe.** (3). Examines the political, social and intellectual developments of Europe in the period of the two World Wars. Emphasis on the failure of democracy and the rise of competing anti-democratic and non-democratic mass movements and ideologies. The course will also deal with the attempted system of collective security, its failure, and the origins and course of World War II. Pr.: Sophomore standing. 241-618-0-2205
- 241 620. England to 1603.** (3). English medieval institutions, with some regard to their interrelation when possible. Approached through selected topics including Anglo-Saxon society as a folk culture, Anglo-Norman military customs, English monastic and mystical life, the origins of Parliament, the Reformation, etc. Pr.: Sophomore standing. 241-620-0-2205
- 241 621. England since 1603.** (3) II. English society and politics in modern times. Emphasis on topics such as the three orders of society (king, lords and commons), the English church, the rise of the House of Commons, the extension of the vote and relations with Scotland and Ireland. Pr.: Sophomore standing. 241-621-0-2205
- 241 622. The British Empire.** (3) On demand. A survey of the British Empire and its conversion into the Commonwealth emphasizing the period 1780-1965. The objective is to familiarize the student with the cultural, political, and constitutional backgrounds of many widely scattered nations once closely linked. Pr.: Sophomore standing. 241-622-0-2205
- 241 623. An End To Empire: The Dynamics of Asian Nationalism.** (3). Examines, through a study of the careers and writings of great leaders of modern Asia (Mao Tse-tung, Mahatma Gandhi, Ho Chi Minh, Mohammed Ali Jinnah, Jawaharlal Nehru, and Chiang Kai-shek), the rise, development and success of Asian nationalism in its struggle with Western colonialism. No background in Asian studies necessary. Pr.: Sophomore standing. 241-623-0-2205
- 241 625. Topics in British History.** (3). Provides instructor and students the opportunity to investigate in detail a particular theme, event or problem in British history. Topics vary. May be repeated for credit. Pr.: Sophomore standing. 241-625-0-2205
- 241 627. History of France, 1400-1715.** (3). France from the conclusion of the Hundred Years War to the death of Louis XIV. French economy, society and royal administration, and the changes generated in these areas by significant events: the Reformation and the Wars of Religion; the rise of France to world power; peasant uprisings and constitutional crisis; and the reforms of Richelieu, Colbert and Louis XIV. Trends in art, architecture and philosophy. Pr.: Sophomore standing. 241-627-0-2205
- 241 628. History of France since 1715.** (3). France from the death of Louis XIV to the present. The impact of the French Revolution and the Napoleonic system on the agrarian economy and aristocratic society of the 18th century; the evolution of liberalism, socialism and colonialism; the development of parliamentary democracy and the impact of the Industrial Revolution; the French response to the devastation of World War I, the humiliation of World War II and the colonial wars of the De Gaulle era. Pr.: Sophomore standing. 241-628-0-2205
- 241 630. Topics in French History.** (3). Provides instructor and students the opportunity to investigate in detail a particular theme, event or problem in French history. Topics vary. May be repeated for credit. Pr.: Sophomore standing. 241-630-0-2205
- 241 633. Modern Germany, 1789-1914.** (3). Central Europe in the French Revolutionary era, the revolutions of 1848, German unification, imperial Germany, emphasizing social changes, especially the transition from agrarian to industrial society. Pr.: Sophomore standing. 241-633-0-2205
- 241 634. Modern Germany, 1914-1945.** (3). Examines the political, social, economic and intellectual developments in Germany from World War I to the end of World War II. The establishment of the Weimar republic, the nature of its democratic system, the flourishing of cultural activities and the attack on democratic theory and practice leading to the establishment of a totalitarian dictatorship. National Socialism and its leader and alternative interpretations of National Socialism. Pr.: Sophomore standing. 241-634-0-2205
- 241 636. Topics in German History.** (3). Provides instructor and students the opportunity to investigate in detail a particular theme, event or problem in German history. Topics vary. May be repeated for credit. Pr.: Sophomore standing. 241-636-0-2205
- 241 639. History of Russia to 1801.** (3). Medieval and early modern Russia with emphasis on the culture of Kievan Rus', the Mongol Yoke, the rise of Moscow, and the emergence of imperial Russia. Emphasizes those trends that contributed to the character of modern Russian society including Orthodoxy, autocracy, serfdom, and westernization. Pr.: Junior standing or consent of instructor. 241-639-0-2205
- 241 640. Grandeur and Decline of Imperial Russia.** (3). Russia in the 19th century with emphasis on the political, economic, social, and intellectual development of tsarist society. Topics of special concern: origins of the intelligentsia, plans for political reform under absolutism, serfdom and economic development, the legacy of the Great Reforms and counter reforms, origins and evolution of revolutionary populism. Pr.: Junior standing or consent of instructor. 241-640-0-2205
- 241 642. Topics in Russian History.** (3). Provides instructor and students the opportunity to investigate in detail a particular theme, event or problem in Russian history. Topics vary. May be repeated for credit. Pr.: Sophomore standing. 241-642-0-2205
- 241 650. Topics in European History.** (3). Provides instructor and students the opportunity to investigate in detail a particular theme, event or problem in European history. Topics vary. May be repeated for credit. Pr.: Sophomore standing. 241-650-0-2205
- 241 655. Medieval Religion and Politics.** (3). The interrelationship of religion and politics from the late Roman Empire to the Conciliar Epoch. Christianity in the Roman



Empire and the barbarian kingdoms, the development of royal theocracy, the rise of the papacy, the conflict of church and state, the secularization of government, the Avignon papacy, the Great Schism, and conciliarism. Pr.: Sophomore standing. 241-655-0-2205

**241 657. European Culture in the Middle Ages.** (3). Medieval thought and education from the end of antiquity to the 14th century. The Latin Fathers and the leading scholars of the pre-Carolingian period, the Carolingian Renaissance, monastic biblical scholarship, the beginnings of secular schools, the Renaissance of the 12th century, the rise of universities, the influence of Aristotle, scholasticism, and the destruction of the medieval syntheses. Emphasis on individual men and ideas. Pr.: Sophomore standing. 241-657-0-2205

**241 660. Renaissance Men and Ideas.** (3). The history of ideas in Western Europe during the Renaissance, approximately 1300-1600. Pr.: Sophomore standing. 241-660-0-2205

**241 668. European Diplomatic History I.** (3). The nature, evolution, and functions of the European diplomatic system from 1500 to 1815. Includes a study of the personality and roles of prominent rulers, spies, and diplomats. Analyzes the Greek and Roman diplomatic tradition, international relations during the Middle Ages, the Venetian system, the struggle for European hegemony, the emergence of the Great Powers, the French Revolution and the Napoleonic empire. Discusses the use of major diplomatic archives and the interpretation of ambassadorial instructions and reports. Pr.: Sophomore standing. 241-668-0-2205

**241 669. European Diplomatic History II.** (3). The nature, evolution, and functions of the European diplomatic system from 1815 to the present. Includes a study of the personality and roles of prominent rulers, spies, and diplomats. Focuses on the Vienna settlement, Bismarckian diplomacy, international developments between the two World Wars, and the Cold War. Pr.: Sophomore standing. 241-669-0-2205

**241 677. Science and Society in the Eighteenth Century.** (3). Scientific thought and institutions in the late 17th and 18th centuries and their relation to technology, agriculture, medicine, exploration, religion and other social concerns. Pr.: Sophomore standing. 241-677-0-2205

**241 678. Science and Society in the Nineteenth Century.** (3). Scientific thought and institutions in the 19th century, emphasizing developments in astronomy, physics, chemistry, geology, biology, and evolutionary theory up to about 1870, and their relation to social concerns. Pr.: Sophomore standing. 241-678-0-2205

**241 680. European Culture in the Nineteenth Century.** (3). Major developments in European thought in the 19th century concentrating on the origin and development of major ideologies. Topics include: Romanticism and the revolt against the Enlightenment; liberalism; Hegel and the young Hegelians; Utopian socialism; Marxism; Darwin and Darwinism; racial thought; and positivism. Pr.: Sophomore standing. 241-680-0-2205

**241 681. European Culture in the Twentieth Century.** (3). Examines the new perceptions of man, society and the external world that have developed in the 20th century. Topics include: psychoanalysis; theories of the elite; cyclical theories of history; attacks on liberal values; 20th century Marxist theory; fascism and the intellectuals; existentialism; the revolution in science and 20th century theology. Pr.: Sophomore standing. 241-681-0-2205

#### UNDERGRADUATE AND GRADUATE CREDIT

**241 701. South Asian History I.** (3). An introductory survey of the growth of Indo-Muslim civilization in South Asia covering the present territory of Bangladesh, India, Pakistan and Ceylon plus the mountain countries of Afghanistan, Nepal, Bhutan and Sikkim. Emphasis on the religions of South Asia (Hinduism, Buddhism, Islam and Sikhism), caste, and South

Asian culture and the accomplishments of its ancient philosophy and great empires. No background in South Asia is required. Pr.: Sophomore standing. 241-701-0-2205

**241 702. South Asian History II.** (3). Examines the creation of the British Indian Empire with its unique imperial life-style, the development of South Asian culture—part Western and part traditional—the rise of anti-British nationalism and the competition among differing nationalist dreams that culminated in the creation of the new states of India, Pakistan, Bangladesh and Ceylon. The civilization of South Asia, imperialism, and anti-colonial nationalism. No background in South Asia is required. Pr.: Sophomore standing. 241-702-0-2205

**241 707. Topics in Non-Western History.** (3) On demand. Provides instructor and students the opportunity to investigate in detail a particular theme, event or problem in non-western history. Topics vary. May be repeated for credit. Pr.: Sophomore standing. 241-707-0-2205

**241 710. Theories and Methods of Psychohistory.** (3). The origin of psychohistory in works by Freud and Neo-Freudians such as Erikson and Lifton, the emerging methods and theories in such areas as psychobiography, history of childhood, large group processes and the attempts to construct philosophical and ideological systems out of the combination of history and psychology. (Same as Psych. 617.) Pr.: Junior standing. 241-710-0-2205

**241 717. History of American Culture.** (3). Main emphasis is on political, religious and social thought and ideology, 1620 to present. Pr.: Sophomore standing. 241-717-0-2205

**241 719. Science in America.** (3). A survey of American science from the colonial era to the present, with special attention to the historical context and the role of institutions and government. Some attention to the social problems faced by scientists and their responses to them. Pr.: Sophomore standing. 241-719-0-2205

**241 721. American Ethnic History.** (3). The role of ethnic minorities in American history, emphasizing non-western-European immigrant groups. Pr.: Sophomore standing. 241-721-0-2205

**241 723. American Urban History.** (3). The role of the city in American history, emphasizing the process of urbanization. Pr.: Sophomore standing. 241-723-0-2205

**241 725. American Labor History.** (3). Labor as an institutional development (organized labor) and as a general theme in American history. Emphasis on the period after 1877 with focus on contemporary issues. Pr.: Sophomore standing. 241-725-0-2205

**241 728. Frontier America.** (3). Primary emphasis on the 19th century when Americans were rapidly spreading across the continent. Also examines the earlier developments of the frontier and considers the 20th century role of the trans-Mississippi. Pr.: Junior standing or consent of instructor. 241-728-0-2205

**241 729. The Great Plains.** (3). Through concentration on the one-fifth of North America identified as the Great Plains, an effort is made to present the development of that region in historic times. Pr.: Junior standing or consent of instructor. 241-729-0-2205

**241 741. Technology and War.** (3). From the development of weapons to 1900 emphasizing problems of development in technology and their relationship to war, and military organization and the role of leadership. Pr.: Sophomore standing. 241-741-0-2205

**241 743. Peacekeeping.** (3). From the development of peacekeeping methods in the community to the 19th century. Then a systematic or thematic approach to peacekeeping worldwide. Emphasizes the role and contribution of the military as opposed to political and diplomatic history. Pr.: Sophomore standing. 241-743-0-2205

**241 745. History of Military Thought.** (3). The development of military thought and theory from Machiavelli to the



present, to give the student a knowledge of classical military literature. Pr.: Sophomore standing. 241-745-0-2205

**241 750. Colonial Hispanic America.** (3). Iberian and indigenous American background; exploration, conquest, settlement, and development of Latin America. Stresses growth of mestizo culture, colonial styles of living, and wars of independence. Pr.: Sophomore standing. 241-750-0-2205

**241 752. Modern Mexico.** (3). Brief survey of lines of national development, 1821-1910, and major emphasis on the 20th century Revolution and its reforms (1910-1940) as well as its subsequent implications. Pr.: Sophomore standing. 241-752-0-2205

**241 758. Eighteenth-Century England.** (3). Crown, aristocracy and commons and their relations in society, economy, church and politics within the British Isles. Pr.: Sophomore standing. 241-758-0-2205

**241 760. Nineteenth-Century England.** (3). Change and permanence in domestic British affairs from 1801 onwards. Topics include the Industrial Revolution, strife over Ireland, the rise of modern political parties, the decay of religious values, etc. Pr.: Sophomore standing. 241-760-0-2205

**241 766. Modern Eastern Europe.** (3). Eastern Europe as an ethnically diverse region located between the Germanic lands and Russia emphasizing the impact of both external and internal forces upon the political, socio-economic, and intellectual development of the various nations. Covers the period from the triumph of the three eastern monarchies over Poland to the Brezhnev Doctrine and *Ostpolitik*, including the growth of national consciousness and the continuing struggle for political independence. Pr.: Junior standing or consent of instructor. 241-766-0-2205

**241 769. The Russian Revolutions and the Soviet System.** (3). Russia's industrial revolution and its deepening crisis to the present. Emphasis on prospects for constitutional monarchy and a liberal parliamentary order from the Revolution of 1905 to 1914, World War I and the February Revolution, Social Democracy and the roots of Leninism, Bolshevizing Soviet society under War Communism and the NEP, Stalinism: fulfillment or betrayal of Leninism, the Great Patriotic War and the emergence of the Soviet Empire, and Destalinization: prospects for the Soviet system. Pr.: Junior standing or consent of instructor. 241-769-0-2205

**241 775. European and American Political and Social Movement.** (3). Selected revolutionary, reform, or conservative movements since the 1600s. The course transcends geographic and chronological boundaries in search of unifying themes. Pr.: Sophomore standing. 241-775-0-2205

**241 780. Rise and Fall of the House of Habsburg.** (3). Analyzes the diplomatic, military, political, economic, and social aspects of the Habsburg empire in Central Europe, the Iberian Peninsula, Italy, and the Netherlands from its foundation to its dissolution in the 20th century. Pr.: Sophomore standing. 241-780-0-2205

**241 798. Readings in History.** (1 to 3). Students will read on a central theme, attend weekly discussions, and write a final report. 241-798-3-2205

**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. 241-799-3-2205

#### GRADUATE CREDIT

**241 801. Historiography.** (3-4). 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. 241-801-0-2205

**241 808. Quantification in History.** (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. Pr.: Statistics 330 or equiv. 241-808-0-2205

**241 899. Research in History, M.A.** Credit arranged. 241-899-4-2205

**241 901. Advanced Historiography.** (1-4). Advanced work offered on demand and by arrangement, in main currents in historical research, the writing of history, and the influence of great historians. 241-901-4-2205

**241 919. Seminar in History of Christianity.** (3). 241-919-0-2205

**241 920. Seminar in American Social History.** (3). 241-920-0-2205

**241 921. Seminar in Latin American History.** (3). 241-921-0-2205

**241 922. Seminar in American Diplomatic History.** (3). 241-922-0-2205

**241 923. Seminar in the History of the American West.** (3). 241-923-0-2205

**241 924. Seminar in Colonial America.** (3). 241-924-0-2205

**241 926. Seminar in American Economic History.** (3). 241-926-0-2205

**241 927. Seminar in American Science and Technology.** (3). 241-927-0-2205

**241 928. Seminar in American History.** (3). 241-928-0-2205

**241 930. Seminar in Modern European History.** (3). 241-930-0-2205

**241 931. Seminar in German History.** (3). 241-931-0-2205

**241 932. Seminar in French History.** (3). 241-932-0-2205

**241 933. Seminar in European Diplomatic History.** (3). 241-933-0-2205

**241 935. Seminar in Modern Russian History.** (3). 241-935-0-2205

**241 936. Seminar in Renaissance and Reformation.** (3). 241-936-0-2205

**241 937. Seminar in British History.** (3). 241-937-0-2205

**241 940. Seminar in Military History.** (3). 241-940-0-2205

**241 950. Seminar in South Asian History.** (3). 241-950-0-2205

**241 979. Seminar in the History of Science.** (3). 241-979-0-2205

**241 980. Topics in European History.** (1-3). 241-980-0-2205

**241 981. Topics in Third World History.** (1-3). 241-981-0-2205

**241 982. Topics in the History of Science.** (1-3). 241-982-0-2205

**241 983. Topics in Military History.** (1-3). 241-983-0-2205

**241 984. Topics in American History.** (1-3). 241-984-0-2205

**241 985. Readings in History.** (1-3). 241-985-3-2205

**241 986. Problems in History.** (1-3). 241-986-3-2205

**241 999. Research in History, Ph.D.** Credit arranged. 241-999-4-2205

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#### JOURNALISM AND MASS COMMUNICATIONS

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Walter Bunge,\* Head of Department

Professors Bunge,\* and Howe;\* Associate Professors Applegate, Bontrager,\* Holt and Morris;\* Assistant Professors Brown, Eaton, MacFarland, Oukrop,\* and Shaver; Instructors Daly, Fidler, and Parrish. Visiting Professor Kiene.

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 must fulfill the general requirements of the College of Arts and Sciences. Beyond this they develop individualized programs within the framework of a broad, liberal arts education in consultation with their advisers. Only one-quarter of a student's total course work is taken in the department. The remainder is in the humanities, social sciences and sciences. Requirements include a minimum of 90 credit hours outside the department and a minimum of 30 credit hours and a maximum of 34 credit hours within the department.

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, advertising and others.

Specialized curricula at the undergraduate level include agricultural and home economics journalism. See course listings under the College of Agriculture and the College of Home Economics. Enrollment guides for journalism majors are available in the department office.

Transfer students are urged to take not more than 12 hours of course work in journalism before entering KSU. Transfer students should take Reporting II, Editing and Law of the Press at KSU. Decisions about the number of hours of junior college or other course work in journalism to be transferred will be determined by the student's academic adviser at KSU after a thorough consideration of the courses the student has taken.

### Print Journalism Sequence

#### Required:

289 275	Reporting I .....	3
289 285	Reporting II (Print) .....	3
289 330	Editing I .....	3

#### Electives:

Twenty-one (21) to twenty-five (25) hours selected within the department according to the student's major and minor interests in journalism and mass communications, in consultation with adviser.

### Radio-Television Sequence

#### Required:

290 240	Fundamentals of R-TV Production .....	3
290 250	Fundamentals of R-TV Performance .....	3
290 260	R-TV Continuity .....	3
289 275	Reporting I .....	3
290 330	Reporting II (R-TV) .....	3

Select courses from the following groups to meet minimum requirements in each group.

#### Group I

290 355	KSDB-FM Participation .....	1
290 375	Cable TV Participation .....	1
290 640	Advanced Radio Production .....	3
290 650	Advanced Television Production .....	3

Students may take not more than 4 hours of participation courses and not more than 3 hours of either course. Minimum 4 hours; maximum, 7 hours.

#### Group II

290 660	History of Broadcasting .....	3
290 665	R-TV Regulation and Responsibility .....	3
290 630	R-TV Programming .....	3
290 685	R-TV Management .....	3

Minimum 3 hours; maximum 9 hours.

#### Group III

290 675	Broadcast Criticism .....	3
290 610	R-TV Drama Writing .....	3
290 615	R-TV Series Writing .....	3
290 620	R-TV Advertising .....	3

Minimum 3 hours; maximum 9 hours.

#### Electives

Remaining hours in Journalism and Mass Communications may include

any 290 or 289 courses, provided the student does not exceed the maximum for Groups I, II, or III. (Min. 30 hrs., max. 34 hrs within J.M.C.; 90 hrs. outside J.M.C.)

## 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 Broadcast Education Association 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 written comprehensive examinations. Additional details on the graduate program are included in the department's "Guide to Graduate Study," available in the department office.

## Courses in Journalism

### UNDERGRADUATE CREDIT

**289 235. Survey of the Mass Media.** (3). 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 upperclassmen journalism majors. 289-235-0-0601

**289 250. Agricultural Journalism.** (3). Survey of agricultural information techniques and methods of working with the mass media. Pr.: 229 110. For non-majors only. 289-250-1-0602

**289 275. Reporting I.** (3). Instruction in news gathering and reporting techniques. Pr.: Sophomore standing; ability to type 30 words a minute. 289-275-1-0602

**289 285. Reporting II (Print).** (3). Three hours rec. and six hours reporting for the **Kansas State Collegian** each week. Pr.: 289 275. 289-285-1-0602

**289 310. Photojournalism I.** (3). Basic camera and laboratory techniques of news photography. Pr.: 289 275 or 250, or consent of instructor for non-majors. 289-310-1-0602

**289 320. Principles of Advertising.** (3). An examination of the advertising field and its relationship to marketing and journalism. 289-320-0-0602



**289 330. Editing I.** (3). 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 289 285. 289-330-1-0602

**289 335. Editing II.** (3). 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. 289-335-1-0602

**289 355. Advertising Media.** (3). The selecting, scheduling, selling and buying of the various advertising media. Pr.: 289 320. 289-355-0-0602

**289 360. Publications Practice.** (1-4). 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. 289-360-2-0602

**289 399. Honors Seminar in Mass Communications.** (1-3). Pr.: Honors students only; consent of supervising instructor. 289-399-0-0601

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**289 510. Yearbook Editing and Management.** (2). Planning, editing, layout, writing and financing a publication. 289-510-1-0602

**289 525. Journalism of Modern Living.** (3). Study of contemporary trends in community and family life reporting, emphasizing feature writing and creative editing. Pr.: 289 275 or consent of instructor. 289-525-1-0602

**289 535. Photojournalism II.** (3). Advanced work in taking, processing and editing photographs for newspapers and magazines, including picture page layout and legal implications. Pr.: 289 310. 289-535-1-0602

**289 555. Advertising Copy and Layout.** (3). The creating, designing and writing of advertising copy for the print media stressing the production of a workable advertising campaign. Pr.: 289 320. 289-555-1-0602

#### UNDERGRADUATE AND GRADUATE CREDIT

**289 600. Public Affairs Reporting.** (3). Investigative reporting of local, state and national affairs. Pr.: 289 285 or consent of instructor. 289-600-0-0602

**289 605. Supervision of School Publications.** (3). A methods course for those planning to teach secondary or junior college journalism courses and advise high school or junior college publications. 289-605-0-0602

**289 610. Interpretation of Contemporary Affairs.** (3). 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. 289-610-0-0602

**289 615. Magazine Article Writing.** (3). 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. 289-615-0-0602

**289 620. Magazine Production.** (3). 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. 289-620-0-0602

**289 625. Formation of Public Opinion.** (3). Role of interpersonal and mass communications information on public opinion. Practical survey experience. Pr.: Junior standing and consent of instructor. 289-625-0-0602

**289 630. Public Relations.** (3). Media, methods, principles, and practices of public relations. Pr.: Junior standing or consent of instructor. 289-630-0-0602

**289 635. Public Information Methods.** (3). Application of the principles of public relations to actual and hypothetical cases. Emphasis on communications techniques used in public relations. Pr.: 289 630; consent of instructor. 289-635-0-0602

**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 289 630; senior standing; consent of instructor. 289-640-0-0602

**289 645. The Black Press in America.** (3). Consideration of the growth, development and current status of the Black press in the United States. 289-645-0-0602

**289 650. Newspaper Management.** (2). Relations of departments of a newspaper to one another; costs, statistics, advertising, news, and business methods in publishing. 289-650-0-0602

**289 660. History of Journalism.** (3). 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. 289-660-0-0602

**289 665. Law of Mass Communications.** (3). 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. 289-665-0-0601

**289 670. International Communications.** (3). Comparative study of world press systems and the role of communications in national development. 289-670-0-0601

**289 680. Readings in Mass Communications.** (1-3). Investigation of the literature of mass communications. Pr.: Minimum of nine hours of completed course work in JMC, senior or graduate standing and consent of supervisory instructor. 289-680-3-0602

**289 685. The Mass Communicator: Ethics and Issues.** (3). A consideration of influences and controls that define the role of the mass communicator in American society. Pr.: Senior standing. 289-685-0-0602

**289 690. Problems in Mass Communications.** (1-4). Pr.: Background of courses needed for problem undertaken. 289-690-3-0602

**289 720. Seminar in the New Journalism.** (3). An examination of contemporary developments in reportage with emphasis on new journalism practitioners and media outlets. Restricted to seniors and graduate students. 289-720-0-0602

**289 730. Seminar in the Future of the Media.** (3). 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. 289-730-0-0601

**289 740. Colloquium in Mass Communications.** (1-3). Discussion of selected topics in mass communications research and practice. Restricted to seniors and graduate students. 289-740-0-0601

**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. 289-750-0-0602

**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. 289-755-0-0602

**289 760. Behavioral Science Reporting.** (3). Reporting and writing on problems of human behavior. Pr.: For Fellows in



Mental Health Mass Communications Program or consent of instructor. 289-760-0-0602

**289 765. Communication Theory.** (3). An examination of major communication theories as they relate to individual, interpersonal, group and mass communications. 289-765-0-0601

**289 770. Professional Journalism Practicum.** (1-4). For advanced students. Supervised practical work in the area of professional journalism and mass communications. Includes laboratory investigation, field work and internships. Pr.: 289 285 or 290 330 and consent of supervising instructor. 289-770-2-0602

**289 780. Research Methods in Mass Communications.** (3). Survey of research methods used in the study of the mass media. 289-780-0-0602

#### GRADUATE CREDIT

**289 899. Research in Mass Communications.** Credit arranged. Pr.: Registration in the Graduate School and sufficient training to carry on the line of research undertaken. 289-899-4-0602

### Courses in Radio and Television

#### UNDERGRADUATE CREDIT

**290 240. Fundamentals of Radio-Television Production.** (3). Basic training in radio and television production and the economic and social impact of the radio-television industry. Two hours lec. and two hours lab. per week. Required of all students with R-TV concentration. 290-240-1-0603

**290 250. Fundamentals of Radio-Television Performance.** (3). Basic training in non-dramatic radio and television performance. Includes study for FCC 3rd Class radio-telephone permit. Two hours lec. and two hours lab. per week. Required of all students with R-TV concentration. 290-250-1-0603

**290 260. Radio-Television Continuity.** (3). Study of forms and the preparation of non-dramatic scripts for various types of broadcast programs. Required of all students with R-TV concentration. Pr.: 290 240. 290-260-0-0603

**290 330. Reporting II (Radio-Television).** (3). Practical experience in gathering, writing, editing and presenting news for KSDB-FM and cable television, and study of current issues in radio-television news. Pr.: 289 275, 290 240. Required of all students with R-TV concentration. 290-330-1-0603

**290 355. KSDB-FM Participation.** (1). Supervised performance in the operation of the University's student FM radio station. Pr.: 290 240, 290 250 or consent of instructor. 290-355-5-0603

**290 375. Cable Television Participation.** (1). Supervised participation in program origination for cable television. Pr.: 290 240, 290 250 or consent of instructor. 290-375-2-0603

#### UNDERGRADUATE AND GRADUATE CREDIT

**290 610. Radio-Television Drama Writing.** (3). Study of the principles and preparation of dramatized broadcast programs. Pr.: 290 240, 290 250 for JMC majors. 290-610-0-0603

**290 615. Radio-Television Series Writing.** (3). Development of complete scripts for series of documentary and anthology broadcast programs. Pr.: 290 240, 290 250 for JMC majors. 290-615-0-0603

**290 620. Radio-Television Advertising.** (3). Study of the principles and practices in broadcast advertising and development of radio-television promotion and advertising campaigns. Pr.: 290 240, 290 260 for JMC majors. 290-620-0-0603

**290 630. Radio-Television Programming.** (3). Study of the principles, planning and development of radio-television

programs and schedules. Pr.: Junior or senior standing. 290-630-0-0603

**290 640. Advanced Radio Production.** (3). Theory and practice of radio remotes, automation and multi-channel recording and editing in the production of commercials, dramatic narrative and documentary programs. Pr.: 290 240, 290 260. 290-640-1-0603

**290 650. Advanced Television Production.** (3). Theory of computer-generated visuals, color television and specialized television recording techniques, and practice of dramatic production from the viewpoint of directors, producers and performers. Pr.: 290 240, and either 290 610, or 290 615 for JMC majors. 290-650-1-0603

**290 660. History of Broadcasting.** (3). History of the radio-television industry; its effects on American life; the economic, political and social significance of broadcasting. Pr.: Junior standing. 290-660-0-0603

**290 665. Radio-Television Regulation and Responsibility.** (3). A study of the major laws and legal decisions which affect broadcasting and cable. Primary attention given to the Communications Act and the Federal Communications Commission's Rules and Regulations; other laws relating to broadcasting and cable management considered. Pr.: Junior standing. 290-665-0-0603

**290 675. Radio-Television Criticism.** (3). Study of the principles and criteria of mass media criticism, with emphasis on those considerations unique to broadcasting. Pr.: Senior standing. 290-675-0-0603

**290 685. Radio-Television Management.** (3). Study of the practices and problems of broadcast station and cable facility management, with special attention to sales organization theory. Pr.: Senior standing, minimum of one hour each in 290 355, 290 375. 290-685-0-0603

**290 750. Radio-Television Research.** (3). Study and application of radio-television research, its literature and methodology. Minimum of 15 hours of completed course work, or concurrent enrollment, in JMC; consent of instructor. 290-750-0-0603

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### MATHEMATICS

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John E. Maxfield,\* Head of Department

Professors Chawla,\* Dixon,\* Fuller,\* Hsu,\* Kirmser,\* Marr,\* Maxfield,\* T. Parker,\* Stamey,\* Stromberg,\* Yee,\* and Young,\* Associate Professors Burckel,\* Dressler,\* Greechie,\* Lee,\* Pigno,\* Sloat, and Strecker,\* Assistant Professors Curtis,\* Hamsher, Herman,\* Huff, Jeffcott,\* Logan,\* F. Miller,\* W. Parker,\* Summerhill,\* and Williams,\* Emeritus: Professors Babcock\* and White,\* Associate Professors Janes and Mossman,\* Instructor Woldt.

#### Undergraduate Study

For credit by examination in College Algebra, Trigonometry and Calculus, see page 10.

All Mathematics Majors, not in the honors program, 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 or 225, 226, 250, and 251.

**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 numbered 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 or Engineering Physics I and II if 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.

**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 interested in applied mathematics. The student 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	3
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. 612	Finite Applications of Mathematics	3
Math. 590	History of Mathematics	3

For students who expect to enter a graduate school the following courses are appropriate to their 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 and one course in computer programming is recommended.

(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
A&F 215, 315	Educational Psychology I, II
C&I 451	Principles of Secondary Education
C&I 476	Methods of Training in Secondary Schools
C&I 586	Teaching Participation in Secondary Schools
A&I 611	Educational Sociology
C&I 316	Introduction to Instructional Media

(c) Complete general Education Requirements of the College of Education.

**Bachelor's Degree Program for Industry.** Students desiring to enter industry upon earning a bachelor's degree in mathematics should, in the lower division years, complete the calculus sequence (Math. 221-223, 240 or Math. 225, 226, 250, 251) and acquire some proficiency in computer programming. It is also recommended that students take a course in probability and statistics (Statistics 510) and a course in vector analysis (Math 514). In the junior year, students should take advanced calculus (Math 553, 554). To fulfill degree requirements, in upper division years the following courses are highly recommended:

Math. 550	Introduction to Complex Analysis	3
Math. 551	Applied Matrix Theory	3
Math. 552	Orthogonal Functions and Elementary Partial Differential Equations	3
Math. 555	Numerical Analysis	3
Math. 640-641	Ordinary Differential Equations I, II	6



For additional courses, or as substitutes to the courses in this list, the student may take the following courses:

Math. 512-513	Introduction to Modern Algebra I, II .....	6
Math. 621-622	Analysis I, II .....	6
Math. 703	Linear Algebra .....	3
Math. 713-714	Theory of Matrices I, II .....	6
Math. 761-762	Advanced Numerical Analysis I, II .....	6
Math. 780-781	Numerical Solutions to Ordinary and Partial Differential Equations I, II .....	6

It is recommended that the student also take at least one six-hour upper division year-course outside the Mathematics Department; these courses ought to be in the area, or areas, of applications in which the student is interested (e.g., Engineering, Physics, Statistics, Computer Science, or others).

## 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 page 32. 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. 245-010-0-1701

**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. 245-100-0-1701

**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. 245-110-0-1701

**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. 245-149-0-1701

**245 150. Plane Trigonometry.** (3) I, II, S. Pr.: Plane geometry and 1 1/2 units of high school algebra. 245-150-0-1701

**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. 245-220-0-1701

**245 221. Analytic Geometry and Calculus II.** (4) I, II, S. Cont. of Math. 220 to include transcendental functions. Pr.: Math. 220. 245-221-0-1701

**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. 245-222-0-1701

**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. 245-224-0-1703

**245 225. Analytic Geometry and Calculus I-S.** (5) I. Analytic geometry, differential and integral calculus of functions of one variable. Accelerated coverage of the material in Math. 220-222. Pr.: Consent of department. 245-225-0-1701

**245 226. Analytic Geometry and Calculus II-S.** (5) II. Continuation of Math. 225 to include transcendental functions. Pr.: Math. 225. 245-226-0-1701

**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. 245-230-0-1701

**245 231. Honors Calculus II.** (4) II. Continuation of Math. 230. Pr.: Math. 230 and consent of department. 245-231-0-1701

**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. 245-233-0-1701

**245 234. Algebra and Calculus in Euclidean Spaces II.** (4) II. Continuation of Math. 233. Pr.: Math. 233 and consent of department. 245-234-0-1701

**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. 245-240-0-1701

**245 250. Linear Algebra and Differential Equations I.** (3) I. An integrated introduction to linear algebra and differential equations. Pr.: Math. 226 or consent of department. 245-250-0-1701

**245 251. Linear Algebra and Differential Equations II.** (3) II. Continuation of Math. 250. Pr.: Math. 250 or consent of department. 245-251-0-1701

**245 399. Seminar in Mathematics.** Credit arranged. On sufficient demand. Primarily for Honors Students. Pr.: Consent of instructor. 245-399-3-1701

**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. 245-477-0-1701

**245 478. Introduction to Set Theory and Metric Spaces II.** (3) II. Continuation of Math. 477. Pr.: Math. 477 and consent of department. 245-478-0-1701

**245 499. Undergraduate Topics in Mathematics.** Credit arranged. I, II, S. Reading courses in advanced undergraduate mathematics. Background of courses needed for topic undertaken and consent of instructor. 245-499-3-1701

### 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. 245-500-0-1701



**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. 245-501-0-1701

**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. 245-505-0-1701

**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. 245-508-0-0833

**245 509. Intuitive Geometry.** (2) S. Measurement, triangles, quadrilaterals, nonmetric geometry, similarity, volumes, elementary coordinate geometry. Pr.: Consent of instructor. 245-509-0-1701

**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 or 226. 245-511-0-1701

**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 or 225 or graduate standing. 245-512-0-1701

**245 513. Introduction to Modern Algebra II.** (3) II. Cont. of Math. 512. Pr.: Math. 512. 245-513-0-1701

**245 514. Vector Analysis.** (3). A standard introduction to vector algebra and calculus in two and three dimensions. Dot and cross products, differentiation of vector functions, the operators div, grad and curl, line and surface integrals and the theorems of Green, Gauss and Stokes. Applications to physics and other sciences will be included. Pr.: Math. 222 or consent of instructor. 245-514-0-1703

**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. 245-530-0-1701

**245 531. Introduction to Real Analysis II.** (3) II. Continuation of Math. 530. Pr.: 530, and consent of department. 245-531-0-1701

**245 550. Introduction to Complex Analysis.** (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 or 250. 245-550-0-1703

**245 551. Applied Matrix Theory.** (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. 245-551-0-1703

**245 552. Orthogonal Functions and Elementary Partial Differential Equations.** (3) I. Orthogonal functions, Fourier Series, boundary value problems in partial differential equations. Pr.: Math. 240 or 250. 245-552-0-1703

**245 553. Advanced Calculus 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.: Math. 222 or 226. 245-553-0-1701

**245 554. Advanced Calculus II.** (3) II. Continuation of Advanced Calculus I. Pr.: Math. 553. 245-554-0-1701

**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 or 250, 551. 245-555-0-1701

**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 or 225. 245-570-0-1701

**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 or 226. 245-572-0-1701

**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 or 250. 245-575-0-1701

**245 577. Elementary Topology I.** (3) I. Introduction to general topological spaces and invariants under continuous mappings and under homeomorphisms. Pr.: Math. 240 or 250. 245-577-0-1701

**245 578. Elementary Topology II.** (3) II. Cont. of Math. 577. Pr.: Math. 577. 245-578-0-1701

## 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. 245-612-0-1701

**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 or 226. 245-619-0-1701

**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 or 226. 245-620-0-1701

**245 621. Analysis I.** (3) I, II, S. Metric spaces, limits, continuity, differentiation, mean value theorems, Riemann-Stieltjes integral, series. Pr.: Math. 240 or 250 or graduate standing. 245-621-0-1701

**245 622. Analysis II.** (3) I, II. Function spaces, Stone-Weierstrass Theorem, Ascoli Theorem, series, introduction to Lebesgue measure. Pr.: Math. 621. 245-622-0-1701

**245 640. Ordinary Differential Equations I.** (3) On sufficient demand. First-order equations, second-order linear equations, autonomous systems, stability, Liapunov's method, Fuchsian equations, Sturm, Liouville equations and expansions in eigenfunctions, Green's Functions, Floquet theory, non-linear equations, perturbation techniques, the WKB and Langer asymptotic theory. Pr.: Math. 240, 550. 245-640-0-1703

**245 641. Ordinary Differential Equations II.** (3) On sufficient demand. Continuation of Math. 640. Pr.: Math. 640. 245-641-0-1703

**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. 245-670-0-1701

**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. 245-671-0-1701

**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. 511 or consent of department. 245-701-0-1701

**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. 245-703-0-1701

**245 704. Introduction to the Theory of Groups.** (3) II. Introduction to abstract group theory; to include permutation groups, homeomorphisms, direct products, Abelian groups. Jordan-Holder and Sylow theorem. Pr.: Math. 513. 245-704-0-1701

**245 706. Theory of Numbers.** (2-3) II in alt. years. Divisibility properties of integers, prime numbers, congruences, multiplicative functions. Pr.: Math. 221 or 226. 245-706-0-1701

**245 708. Set Theory I.** (3) I. Set theory; functions, relations and orderings; ordinal and cardinal numbers; transfinite induction; axiom of choice. Pr.: Math. 511 or consent of department. 245-708-0-1701

**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. 245-710-0-1701

**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. 245-713-0-1701

**245 714. Theory of Matrices II.** (3) II. Cont. of Math. 713. Pr.: Math. 713. 245-714-0-1701

**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 or 225. 245-717-0-1701

**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. 245-723-0-1701

**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. 245-724-0-1701

**245 740. Calculus of Variations.** (3) On sufficient demand. Necessary conditions and the Euler-Lagrange equations, Hamilton-Jacobi theory, Noether's theorems, direct methods, applications to geometry and physics. Pr.: Math. 622, 753, or equivalent. 245-740-0-1701

**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. 245-750-0-1701

**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. 245-752-0-1701

**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.: Math 552, 554. 245-761-0-1701

**245 762. Advanced Numerical Analysis II.** (3) II. Continuation of Math. 761. Pr.: Math. 761. 245-762-0-1701

**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. 245-766-0-1701

**245 767. Partial Differential Equations of Mathematical Physics II.** (3) II. Continuation of Math. 766. Pr.: Math. 766. 245-767-0-1701

**245 771. Transformation and Vector Geometry.** (3) I. Concepts of transformations and vectors and their applications to Euclidean Geometry. Pr.: Math. 572. 245-771-0-1799

**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 or 250. 245-772-0-1701

**245 773. Foundations of Geometry.** (3). Euclid's parallel postulate, non-Euclidean geometries, incidence, affine geometries, order congruence, continuity. Pr.: Math. 572. 245-773-0-1701

**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. 245-774-0-1701

**245 780. Numerical Solution of Ordinary Differential Equations.** (2) I. (Concurrent with Computer Science 780). One-step and multi-step methods for initial value problems. Stability, consistency and convergence of these methods. Stiff equations and boundary value problems. Pr.: One C.S. Language Lab. and Math. 555 or C.S. 480, Math. 240 plus concurrent enrollment in C.S. 780. 245-780-0-1701

**245 785. Numerical Solution of Partial Differential Equations.** (2) II. (Concurrent with Computer Science 785). 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. 780 and C.S. 780 plus concurrent enrollment in C.S. 785. 245-785-0-1701

**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. 245-791-0-0833

## 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. 245-806-0-1701

**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. 245-807-0-1701

**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 ap-



proximation, arithmetic of quadratic forms. Pr.: Math. 822. 245-808-0-1701

**245 809. Analytic Theory of Numbers II.** (3) II in alt. years. Cont. of Math. 808. Pr.: Math. 808. 245-809-0-1701

**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. 245-810-0-1701

**245 811. Higher Algebra II.** (3) II. Cont. of Math. 810. Pr.: Math. 810. 245-811-0-1701

**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. 245-821-0-1701

**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. 245-822-0-1701

**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. 245-825-0-1701

**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. 245-826-0-1701

**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. 245-852-0-1701

**245 853. Functional Analysis II.** (3) II in alt. years. Cont. of Functional Analysis I. May be repeated for credit. Pr.: Math. 852. 245-853-0-1701

**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. 245-871-0-1701

**245 872. General Topology II.** (3) II. Compact spaces and compactification, uniform and proximity spaces, metric spaces and metrization, topology of  $D^n$ , function spaces, complete spaces, introduction to homotopy theory. Pr.: Math. 871. 245-872-0-1701

**245 881. Differentiable Manifolds I.** (3) I in alt. 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. 245-881-0-1701

**245 882. Differentiable Manifolds II.** (3) II in alt. years. Fibre bundles, theory of connections, linear and affine connections, Riemann manifolds, submanifolds of Riemann manifolds, complex manifolds. Pr.: Math. 881. 245-882-0-1701

**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. 245-889-0-1701

**245 890. Hilbert Space I.** (3) I in alt. years. Geometry of Hilbert space, bounded and unbounded operators, Riesz representation theorem, spectral theorem. The lattice of closed subspaces of Hilbert Space and generalizations to projection lattices. Pr.: Math. 822 or consent of instructor. 245-890-0-1701

**245 891. Hilbert Space II.** (3) II in alt. years. Continuation of Math. 890. Pr.: Math. 890. 245-891-0-1701

**245 897. Seminar in Mathematics Education.** (1-3) II, S. Topics in Mathematics and the related applications in Mathematics Education. Pr.: Graduate standing and consent of instructor. 245-897-2-0833

**245 898. Topics in Mathematics.** Credit arranged. I, II, S. Background of courses needed for topic undertaken and consent of instructor. 245-898-4-1701

**245 899. Thesis Topics.** Credit arranged. I, II, S. 245-899-4-1701

**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. 245-900-2-1701

**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. 245-912-0-1701

**245 913. Ring Theory II.** (3) II in alt. years. Cont. of Ring Theory I, with emphasis on special rings. Pr.: Math. 912. 245-913-0-1701

**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. 245-914-0-1701

**245 915. Lattice Theory II.** (3) II in alt. years. Cont. of Math. 914. Pr.: Math. 914. 245-915-0-1701

**245 925. Banach Algebra I.** (3) I in alt. years. Basic Gelfand Theory, function algebras, numerical range,  $*$ -algebras,  $B^*$ - and von Neumann algebras. Pr.: Consent of instructor. 245-925-0-1701

**245 926. Banach Algebra II.** (3) II in alt. years. Continuation of Math. 925. Pr.: Math. 925. 245-926-0-1701

**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. 245-951-0-1701

**245 952. Differential Topology II.** (3) II in alt. years. Cont. of Differential Topology I. Pr.: Math. 951. 245-952-0-1701

**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. 245-971-0-1701

**245 972. Algebraic Topology II.** (3) II. Cont. of Algebraic Topology I. Pr.: Math. 971. 245-972-0-1701

**245 991. Topics in Algebra.** (3) On sufficient demand. Selected topics in modern algebra. May be taken more than once for credit. Pr.: Consent of instructor. 245-991-0-1701

**245 992. Topics in Analysis.** (3) On sufficient demand. Selected topics in modern analysis. May be taken more than once for credit. Pr.: Consent of instructor. 245-992-0-1701

**245 993. Topics in Harmonic Analysis.** (3) On sufficient demand. Selected topics in harmonic analysis. May be taken more than once for credit. Pr.: Consent of instructor. 245-993-0-1701

**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. 245-994-0-1701

**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. 245-995-0-1701

**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. 244-996-0-1701

**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. 245-999-4-1701



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## MILITARY SCIENCE

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Edwin W. Basham, Head of Department

Assistant Professors Hebrank, Jones, Lord, and Cullin;  
Instructors Olmstead and Vovk.

In accordance with the Land Grant Act of 1862 (Morrill Act), military instruction has been a tradition at Kansas State University since its founding. The Military Science Department, one of the oldest departments on the campus, currently provides military instruction through the Army Reserve Officers Training Corps (AROTC) program. This program is designed to train selected men and women to become officers in the Army Reserve. Specially qualified individuals may be commissioned into the Regular Army to pursue a military career.

AROTC program is open to all university students. The Military Science courses are credit-awarding courses and credits are applicable to any degree as elective credits. Cadets may pursue any curriculum offered by the university.

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.

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 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.

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 pay 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 includes 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 561, 562, 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. Scholarship cadets are required to complete History course 241 525, Battles and Leaders as an additional elective. All non-scholarship cadets are encouraged to take this course.



### 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. 249-100-0-1801

**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. 249-102-0-1801

**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. 249-200-0-1801

**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. 249-202-0-1801

### 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. 249-300-0-1801

**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. 249-302-0-1801

**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. 249-400-0-1801

**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. 249-402-0-1801

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## MODERN LANGUAGES

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Robert L. Coon, Head of Department

Professor Coon;\* Associate Professor Beeson;\* Assistant Professors Alexander, Bulmahn, Bunch,\* Dehon,\* Febres,\* Gonzalez-del-Valle,\* Kolonosky,\* McGraw, Mendenhall,\* C. Miller,\* Ossar,\* Shaw,\* Smith, and Tunstall; Instructor Driss; Emeriti: Professor Moore;\* Associate Professors Munro\* and Pettis.\*

### Undergraduate Study

All courses in the department are offered to non-majors on a credit or no-credit basis.

Students majoring in languages should enroll for the Bachelor of Arts degree.

For a minor, 18 hours in a single language at college level are required.

Majors are offered in French, German, Spanish, and Linguistics.

For a language major, 30 hours in a single language above the level of I and II must be completed. Students majoring in languages must take two survey courses in their chosen language, plus three literature courses above the level of 700.

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: 681, 780, and 789. 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

In Modern Languages, the degree Master of Arts is offered in the fields of French, German, Spanish, and Linguistics. General requirements for the Master of Arts degree can be found under the Graduate School section of the Bulletin.

Detailed information concerning the graduate program in Modern Languages and financial support available may be obtained by writing to the Head of the Department.

The Department cooperates with several others in the South Asia Language and Area Studies Program, details of which are given on page 88.

The Department of Modern Languages co-sponsors the **Journal of Spanish Studies: Twentieth Century**, a national literary journal.

### Literature with Readings and Lectures in English

#### 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. 253-501-0-1110

**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. 253-502-0-1102

**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. 253-503-0-1103

**253 504. Russian Literature in Translation: the 19th Century.** (3). Survey of principal writers of Tsarist Russia with emphasis upon Turgenev, Dostoevsky, Tolstoy and Chekhov. 253-504-0-1106

**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. 253-505-0-1105

**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. 253-506-0-1199

**253 507. European Literature in Translation.** (3). Selected readings in English from the major authors of Europe and the Spanish-speaking world. 253-507-0-1505

**253 508. Russian Literature in Translation: the Soviet Period.** (3). The development of Russian literature since the



Revolution, with emphasis upon Mayakovsky, Sholokhov, Pasternak and Solzhenitsyn. 253-508-0-1106

**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. 253-516-0-1102

## French

### UNDERGRADUATE CREDIT

**253 001. Orientation for Summer School Program in Paris.** (0). 253-001-0-1102

**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. 253-101-0-1102

**253 102. French for Reading Knowledge II.** Continued reading of selected French texts. Not considered as prerequisite for Mod. L. 211. Pr.: Mod. L. 101 or equiv. 253-102-0-1102

**253 109. French II.** (1). Language laboratory. Optional for students taking French I. Concurrent enrollment in French I required. For credit/no credit only. 253-109-0-1102

**253 110. French III.** (1). Language laboratory. Optional for students taking French II. Concurrent enrollment in French II required. For credit/no credit only. 253-110-0-1102

**253 111. French I.** (4). Introduction to the structure of modern French, emphasizing the spoken language with practice in the language laboratory. 253-111-0-1102

**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. 253-112-0-1102

**253 113. Intensive French I, II.** (8). A concentrated study designed to provide the student with a basic working knowledge of French grammar and conversation in a single semester. Equivalent to French I and II. Pr.: Open to all students with consent of the instructor. 253-113-0-1102

**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. 253-211-0-1102

**253 212. Elementary French Conversation IIIA.** (2). Course not open to fluent speakers of French. Normally to be taken concurrently with French III. Pr.: Mod. L. 112 or equiv. 253-212-0-1102

**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. 253-213-0-1102

**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. 253-214-0-1102

**253 215. Commercial French.** (2). Designed for students wishing to learn French for business and correspondence purposes. Heavy emphasis on letter-writing and familiarization with French business forms. Knowledge of spoken French not required. Does not count toward the French B.A. language requirement. Pr.: Mod. Lang. 211 or equivalent competency. 253-215-0-1102

### 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. 253-511-0-1102

**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. 253-512-0-1102

**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. 253-513-0-1102

**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. 253-515-0-1102

**253 519. Special Studies in French.** Credit arranged. Pr.: Consent of department head and instructor involved. 253-519-3-1102

### UNDERGRADUATE AND GRADUATE CREDIT

**253 709. French Civilization.** (3). Introduction to French culture with special emphasis on social and historical developments since World War II. Pr.: Twenty-one hours of college French or equivalent. 253-709-0-1102

**253 710. Sixteenth-Century French Literature.** (3). Reading and discussion of selected prose and poetry of the French Renaissance. Pr.: 21 hours of college French or equiv. 253-710-0-1102

**253 711. Seventeenth-Century French Literature I.** (3). The literature of the Baroque period. Pr.: 21 hours of college French or equiv. 253-711-0-1102

**253 712. Seventeenth-Century French Literature II.** (3). The literature of French Classicism. Pr.: 21 hours of college French or equiv. 253-712-0-1102

**253 713. Eighteenth-Century French Literature.** (3). Critical study of the literature of the Enlightenment. Pr.: 21 hours of college French or equiv. 253-713-0-1102

**253 714. Nineteenth-Century French Literature I.** (3). A study of Pre-romanticism and Romanticism. Pr.: 21 hours of college French or equiv. 253-714-0-1102

**253 715. Nineteenth-Century French Literature II.** (3). A study of Realism, Naturalism and Symbolism. Pr.: 21 of college French or equiv. 253-715-0-1102

**253 716. Twentieth-Century French Drama.** (3). Reading and analysis of the contemporary French theater from Cocteau through the Existentialist and Absurdist playwrights. Pr.: 21 hours of college French or equiv. 253-716-0-1102

**253 717. Twentieth-Century French Prose and Poetry.** (3). Readings in non-dramatic literature of the contemporary period. Pr.: 21 hours of college French or equiv. 253-717-0-1102

**253 719. Advanced French Syntax.** (3). An intensive study of the syntax and structure of the language. Introduction to French stylistics. Pr.: 21 hours of college French or equiv. 253-719-0-1102

**253 720. Seminar in French.** (3) A seminar with variable topics. Pr.: Senior standing or consent of the instructor. 253-710-0-1102

## German

### UNDERGRADUATE CREDIT

**253 002. Orientation for Summer School Program in Germany.** (0). 253-002-0-1103

**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. 253-103-0-1103

**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. 253-104-0-1103

**253 119. German II.** (1). Language laboratory. Optional for students taking German I. Concurrent enrollment in German I required. For credit/no credit only. 253-119-0-1103



**253 120. German III.** (1). Language laboratory. Optional for students taking German II. Concurrent enrollment in German II required. For credit/no credit only. 253-120-0-1103

**253 121. German I.** (4). Introduction to the structure of modern German. Practice of the spoken language with additional experience in the language laboratory. 253-121-0-1103

**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. 253-122-0-1103

**253 123. Intensive German I, II.** (8). A concentrated study designed to provide the student with a basic working knowledge of German grammar and conversation in a single semester. Equivalent of German I and II. Pr.: Open to all students with consent of the instructor. 253-123-0-1101

**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. 253-221-0-1103

**253 222. Elementary German Conversation IIIA.** (2). 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. 253-222-0-1103

**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. 253-223-0-1103

**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. 253-224-0-1103

**253 225. Intensive German III, IV.** (7). A concentrated study allowing the student to do the work of the second year of German in a single semester. Reading and discussion of selections of modern German prose, review of German grammar, and extensive spoken practice. Pr.: Mod. Lang. 122 or 123 or equivalent competency. 253-225-0-1103

#### 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. 253-521-0-1103

**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. 253-522-0-1103

**253 523. German Composition.** (3). A study of German syntax and exercises in composition. Pr.: Mod. L. 223 or equiv. 253-523-0-1103

**253 529. Special Studies in German.** Credit arranged. Pr.: Consent of department head and instructor involved. 253-529-3-1103

#### 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.: 21 hours of college German or equiv. 253-721-0-1103

**253 722. German Romanticism.** (3) II. A study of representative works of German Romantic literature by such authors as Schlegel, Tieck, Eichendorff, Novalis. Pr.: 21 hours of college German or equiv. 253-722-0-1103

**253 723. Goethe and Faust.** (3) I. The writings of Goethe and his masterpiece, Faust. Pr.: 21 hours of college German or equiv. 253-723-0-1103

**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.: 21 hours of college German or equiv. 253-724-0-1103

**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.: 21 hours of college German or equiv. 253-725-0-1103

**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.: 21 hours of college German or equiv. 253-726-0-1103

**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.: 21 hours of college German or equiv. 253-727-0-1103

**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. 253-728-0-1103

**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. 253-729-0-1103

**253 730. 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.: 21 hours of college German or equivalent. 253-730-0-1103

**253 731. Advanced Spoken and Written German.** (3). Intensive practice in conversation and diction, with considerable practice in the writing of essays in German. Pr.: 24 hours of college German or equiv. 253-731-0-1103

**253 732. Methods in German Literary Criticism.** (3). Introduction to the various theories of literary analysis. Interpretation of representative German texts. Pr.: 24 hours of college German or equiv. 253-732-0-1103

#### Greek

##### UNDERGRADUATE CREDIT

**253 143. Greek I.** (4). Introduction to the grammar of classical Greek and reading of elementary prose. 253-143-0-1110

**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. 253-144-0-1110

#### 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. 253-299-0-1101

#### Italian

##### UNDERGRADUATE CREDIT

**253 131. Italian I.** (4). Introduction to the structure of modern Italian. 253-131-0-1104

**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. 253-132-0-1104

#### Latin

##### UNDERGRADUATE CREDIT

**253 141. Latin I.** (4). An introductory study of the structure of Latin. 253-141-0-1109



**253 142. Latin II.** (4). Continuation and completion of the study of the structure of Latin. Pr.: Mod. L. 141 or equiv. 253-142-0-1109

**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. 253-241-0-1109

**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. 253-242-0-1109

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 541. Vergil.** (3). A study of the Latin epic as exemplified by Vergil's poetry. Pr.: Mod. L. 542 or equiv. 253-541-0-1109

**253 542. Cicero.** (3). A study of the versatility of Cicero as evidenced in various works. Pr.: Mod. L. 242 or equiv. 253-542-0-1109

**253 543. Horace.** (3). A critical study of the major works of Horace. Pr.: Mod. L. 511 or equiv. 253-543-0-1109

**253 549. Special Studies in Latin.** Credit arranged. Pr.: Consent of the department head and instructor involved. 253-549-3-1109

#### Linguistics

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 681. General Phonetics.** (3). Same as Speech 681 and Engl. 681. 253-681-1-1505

#### UNDERGRADUATE AND GRADUATE CREDIT

**253 780. Introduction to Linguistics.** (3). Same as Speech 780 and Engl. 780. 253-780-0-1505

**253 781. Introduction to Historical Linguistics.** (3). Same as Speech 781 and Engl. 781. 253-781-0-1505

**253 782. Language Typology.** (3). Same as Speech 782 and Engl. 782. 253-782-0-1505

**253 783. Phonology I.** (3). Same as Speech 783 and Engl. 783. 253-783-0-1505

**253 784. Phonology II.** (3). Same as Speech 784 and Engl. 784. 253-784-0-1505

**253 785. Syntax I.** (3). Same as Speech 785 and Engl. 785. 253-785-0-1505

**253 786. Syntax II.** (3). Same as Speech 786 and Engl. 786. 253-786-0-1505

**253 787. Advanced Syntax.** (3). Same as Speech 787 and Engl. 787. 253-787-0-1505

**253 788. Advanced Phonology.** (3). Same as Speech 788 and Engl. 788. 253-788-0-1505

**253 789. Topics in Linguistics.** (3). Same as Speech 789 and Engl. 789. 253-789-0-1505

**253 791. Methods and Techniques of Learning a Second Language.** (3). Same as Speech 791. 253-791-0-1505

**253 792. Field Methods in Linguistics.** (3). Same as Speech 792 and Soc. and Anthro. 792. 253-792-0-1505

#### Russian

#### UNDERGRADUATE CREDIT

**253 149. Russian II.** (1). Language laboratory. Optional for students taking Russian I. Concurrent enrollment in Russian I required. For credit/no credit only. 253-149-0-1106

**253 150. Russian III.** (1). Language laboratory. Optional for students taking Russian II. Concurrent enrollment in Russian II required. For credit/no credit only. 253-150-0-1106

**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. 253-151-0-1106

**253 152. Russian II.** (4) II. Continuation of the study of Russian grammar and oral communication. Pr.: Mod. L. 151 or equiv. 253-152-0-1106

**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. 253-251-0-1106

**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. 253-252-0-1106

#### 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. 253-551-0-1106

**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 19th century, including those of Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, and Tolstoy. 253-552-0-1106

**253 553. Russian Conversation and Composition.** (3). Discussion in Russian. Extensive practice in writing Russian compositions. 253-553-0-1106

**253 559. Special Studies in Russian.** Credit arranged. Pr.: Consent of department head and instructor involved. 253-559-3-1106

#### Spanish

#### UNDERGRADUATE CREDIT

**253 003. Orientation for Summer School Abroad Program in Mexico City.** (0). 253-003-0-1105

**253 159. Spanish II.** (1). Language laboratory. Optional for students taking Spanish I. Concurrent enrollment in Spanish I required. For credit/no credit only. 253-159-0-1105

**253 160. Spanish III.** (1). Language laboratory. Optional for students taking Spanish II. Concurrent enrollment in Spanish II required. For credit/no credit only. 253-160-0-1105

**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. 253-161-0-1105

**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. 253-162-0-1105

**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. 253-261-0-1105

**253 262. Elementary Spanish Conversation IIIA.** (2). 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. 253-262-0-1105

**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. 253-263-0-1105

**253 264. Elementary Spanish Conversation IVA.** (2). Continuation of Elementary Spanish Conversation IIIA. Should be taken concurrently with Spanish IV. 253-264-0-1105

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**253 560. Business Spanish.** (2). Intensive practice in Spanish business correspondence and terminology. Pr.: Two years of college Spanish or equiv. 253-560-0-1105



**253 561. Spanish Literature I.** (3). Introduction to the verse, prose, and drama of Spain from the Middle Ages to 1700. Pr.: 18 hours of college Spanish or equiv. 253-561-0-1105

**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. 253-562-0-1105

**253 564. Advanced Spanish Composition and Conversation.** (3). A study of the grammar and syntax of modern Spanish. Pr.: Mod. Lang. 263 or equiv. 253-564-0-1105

**253 568. Literary Analysis in Spanish.** (3). Introduction to literary analysis by study in depth of chosen texts representative of the many genres in Spanish and Spanish-American literatures. Pr.: Mod. Lang. 263 or equiv. 253-568-0-1105

**253 569. Special Studies in Spanish.** Credit arranged. Pr.: Consent of department head and instructor involved. 253-569-3-1105

#### UNDERGRADUATE AND GRADUATE CREDIT

**253 751. Spanish-American Narrative I.** (3). The reading and study of selected Spanish-American novels and short stories. Pr.: 21 hours of college Spanish or equiv. 253-751-0-1105

**253 752. Spanish-American Narrative II.** (3). Continuation of Spanish-American Narrative I, with emphasis on contemporary fiction. Works by such writers as Borges, Asturias, Garcia Marquez, Vargas Llosa, and Arguedas will be read. Pr.: 21 hours of college Spanish or equiv. 253-752-0-1105

**253 753. Spanish-American Drama, Essay, and Poetry I.** (3). An in-depth reading and discussion of works in each of these three genres, to include such authors as Sarmiento, Bello, Heredia, and Sanchez. Pr.: 21 hours of college Spanish or equiv. 253-753-0-1105

**253 754. Spanish-American Drama, Essay, and Poetry II.** (3). A continuation of Spanish-American Drama, Essay and Poetry I, with emphasis on such contemporary authors as Paz, Dragun, Usigli, Neruda, Mistral and Dario. Pr.: 21 hours of college Spanish or equiv. 253-754-0-1105

**253 755. Spanish Poetry.** (3). Reading and analysis of Spanish poetry from the Medieval period to our times, with emphasis on different critical approaches to poetry. Such authors as J. Manrique, Garcilaso de la Vega, J. de la Cruz, Lope de Vega, Gongora, Quevedo, Zorrilla, Espronceda, Becquer, Garcia Lorca and J. Guillen will be studied. Pr.: 21 hours of college Spanish or equiv. 253-755-0-1105

**253 756. Nineteenth-Century Spanish Literature.** (3). The reading and study of 19th-century Spanish literature: drama, essay, novel, poetry and short story. Such authors as Larra, Zorrilla, el Duque de Rivas, Espronceda, Tamayo y Baus, Echegaray, Becquer and Perez Galdos will be discussed. Pr.: 21 hours of college Spanish or equiv. 253-756-0-1105

**253 757. The Generation of 1898.** (3). Reading and analysis of prose and poetry written by members of the Generation of 1898. Special attention will be given to Unamuno, Valle-Inclan, A. Machado, Azorin, and Baroja. Pr.: 21 hours of college Spanish or equiv. 253-757-0-1105

**253 767. Twentieth-Century Spanish Drama.** (3). Reading and analysis of such dramatists as Benavente, Garcia Lorca, Sastre and the Absurdists. Pr.: 12 hours of college Spanish or equiv. 253-767-0-1105

**253 768. Post-Civil War Spanish Novel.** (3). Reading and analysis of significant novels of the post-Civil War period. Pr.: 21 hours of college Spanish or equiv. 253-768-0-1105

**253 769. 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 field. Pr.: 21 hours of college Spanish or equiv. 253-769-0-1105

**253 770. Hispanic-American Civilization.** (3). Survey of Spanish-American culture and civilization from 1492 to the present. Pr.: 21 hours of college Spanish or equiv. 253-770-0-1105

**253 771. Spanish Novel of the Golden Age.** (3). Reading and analysis of Golden Age novels, including the Picaresque novel, Cervantes, and other works. Pr.: 21 hours of college Spanish or equiv. 253-771-0-1105

**253 773. Spanish Drama of the Golden Age.** (3). Reading and analysis of dramatists such as Lope de Vega, Tirso de Molina and Calderon de la Barca. Pr.: 21 hours of college Spanish or equiv. 253-773-0-1105

**253 775. Cervantes.** (3). Reading of the works of Cervantes and discussion of the literary and cultural background of the period. Pr.: 21 hours of college Spanish or equiv. 253-775-0-1105

**253 779. Seminar in Spanish.** (3). A seminar with variable topics. Pr.: Senior standing or consent of the instructor. 253-779-0-1105

#### 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. 253-571-0-1199

**253 572. Urdu II.** (5). Continuation of Urdu I. Pr.: 571. 253-572-0-1199

**253 573. Urdu III.** (4). Readings in graded texts, conversation drills and applied grammar. Pr.: 572 or equiv. 253-573-0-1199

**253 574. Urdu IV.** (4). Continuation of Urdu III. Reading and discussion of contemporary literature and grammatical analysis. Pr.: 573 or equiv. 253-574-0-1199

**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. 253-575-0-1199

**253 578. Tamil I.** (5). The elementary study of the principal modern Dravidian tongue. Pr.: Some knowledge of another foreign language desirable. 253-578-0-1199

**253 579. Tamil II.** (5). Continuation of Tamil I. Pr.: 578. 253-579-0-1199

**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. 253-582-0-1199

#### GRADUATE CREDIT

**253 799. Problems in Modern Languages.** Credit arranged. 253-799-3-1101

**253 899. Research in Modern Languages.** Credit arranged. Pr.: 30 hours in one modern language or equiv. 253-899-4-1101

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#### MUSIC

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Robert A. Steinbauer,\* Head of Department

Professors Steinbauer,\* Walker,\* and White;\* Associate Professors Flouer,\* Langenkamp,\* Roby,\* Shull,\* and Sidorfsky;\* Assistant Professors Caine,\* Edwards,\* Hewett, Jackson,\* Polich, Sloop,\* Thomson,\* and R. Walker;\* Instructors Sutton and M. Walker; Assistant Instructors Bolan, J. Edwards and L. Roby; Teaching Associates Rieger and Schwab.

#### Undergraduate Study

The Department of Music is a member, with institutional accreditation, 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. 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, availability of instructor and fees for non-majors 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. For specific requirements of each curriculum, see pages 85 and 145.

**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 175, 176, 214, 215, 406, 407 (Comprehensive Musicianship). Recital Attendance is required for eight semesters.

If the field is Music Literature, the program also calls for eight selected hours of electives in Music History and Music Literature. In addition, eight semester hours in a single applied area are required.

If the field is Music Theory, the program calls for Music 503, 521 (three hours), 615, 616, two semester hours elected in Music Literature, and eight semester hours of applied piano.

If the field is Applied Music, the program calls for Music 615, 616 (Music Theory) plus 16 hours of an applied instrument or voice.

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.

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 175, 176, 214, 215, 406, 407, 504, 505, 615, 616 (Comprehensive Musicianship and Theory of Music courses). Instrumental majors are required to take Music 503. Vocal majors must elect 8 additional hours in music; instrumental majors, 5 hours.

**Requirements in General Education** are stated on page 84.

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 521 (4 hours), 701, 702 (Theory of Music), Music Electives (8 hours), General Electives (19 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, 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 Coordinator 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 rec. a week. 257-100-0-1004

**257 175. Styles I, 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. 257-175-1-1004

**257 176. Styles II, Musical Styles 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 175 (Textures of Music), or consent of instructor. 257-176-1-1004



**257 214. Styles III, Musical Styles of the Baroque Period.** (4) I, II. The beginnings of homophony as applied to a diatonic style. Procedures of harmonic counterpoint. Lecture and lab. meets 6 hours per week. Pr.: Music 176 or consent of instructor. 257-214-1-1006

**257 215. Styles IV, Musical Styles of the Classical Period.** (4) I, II. Common procedures of the late 18th century. Forms, modulatory procedures, basic orchestrational skills as applied to chamber ensembles. Lecture and lab. meets 6 hours per week. Pr.: Music 214 or consent of instructor. 257-215-1-1006

**257 390. Problems in Music.** (1-3) I, II, S. Offered on demand. Pr.: Background of courses needed for problems undertaken. 257-390-4-1004

**257 406. Styles V.** (4). I, II, S. Musical style of the Romantic Period. Chromatic harmony and impressionistic devices. Orchestration as applied to the large ensemble. Lecture and lab. Pr.: Styles IV or consent of instructor. 257-406-1-1006

**257 407. Styles VI.** (4). I, II, S. Musical style of the Modern Period. Modern music; contemporary practice and aesthetics; polytonality, serial techniques, electronic music. Lecture and lab. Pr.: Styles V or consent of instructor. 257-407-1-1006

**257 416. Conducting.** (2) I, II, S. Required for the music education major before student teaching. Deals with techniques of the baton, gestures, signs, and cues as generally used in conducting choral and instrumental organizations. Includes essentials of technique and interpretation in both choral and instrumental types of ensemble performance. May be an elective course for the applied major. 257-416-1-1004

**257 423. Music 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) 215. 257-423-0-1004

**257 424. Music Form and Analysis II.** (2) II. Continuation of Music 423. Forms and compositional techniques as used by major composers of the 20th century. Pr.: Music (Theory) 423 or consent of instructor. 257-424-0-1004

**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. One hour lab. each week as needed. Pr.: Music (Theory) 215. 257-503-1-1004

**257 504. Styles VII.** (2-4). I, II, S. Problems in Musical Style. Individual projects relating to a specific style problem of the applied major or minor. Pr.: Styles VI or consent of instructor. 257-504-3-1004

**257 505. Styles VIII.** (2-4). I, II, S. Problems in Music Pedagogy. Individual projects relating to a specific pedagogical problem of the applied major or minor. Pr.: Styles VI or consent of instructor. 257-505-3-1004

#### UNDERGRADUATE AND GRADUATE CREDIT

**257 615. Counterpoint I.** (2) I, S. Canon and Fugue in the 18th century style. 257-615-0-1006

**257 616. Counterpoint II.** (2) II, S. Contrapuntal devices used by 20th century composers. Serial Techniques. 257-616-0-1006

**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. 257-631-0-1004

**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. 257-632-3-1004

**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. 257-701-0-1006

**257 702. Advanced Analysis II.** (2) II and alternate S. Modern chord structures, atonality, polytonality and form used in contemporary compositions. Pr.: Music (Theory) 701. 257-702-0-1004

**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 215 or consent of instructor. 257-711-0-1004

**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. 257-714-0-1004

**257 736. Advanced Conducting.** (2) S. Choral and Instrumental experiences plus score reading and preparation. Pr.: Conducting 416 and 417 or consent of instructor. 257-736-0-1004

#### Courses in Music History and Literature

##### UNDERGRADUATE CREDIT

**257 150. Music Listening Laboratory.** (V, 1-2) 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. 257-150-1-1006

**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. 257-243-0-1006

**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. 257-245-0-1006

**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. 257-250-0-1006

**257 421. History of Music I.** (2) I, alt. S. Chronological study of significant musical trends; the influence of cultural forces upon musical developments; the contributions of individual composers. Pr.: Consent of instructor. 257-421-0-1006

**257 422. History of Music II.** (2) II, alt. S. Continuation of Music 421. Pr.: Consent of instructor. 257-422-0-1006

**257 571. The Opera.** (3). 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. Offered jointly by the Departments of Music and Speech; same as Speech 571. 257-571-0-1006

##### GRADUATE AND UNDERGRADUATE CREDIT

**257 613. Afro-American Music.** (3) II. Negro music of the new world viewed in a cultural-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. Offered jointly by Anthropology and Music. Same as Anthropology 613. 257-613-0-1006

**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. 257-637-0-1004

**257 638. Literature for Pipe Organ II.** (2) II. Continuation of Music 627, with emphasis on literature from the Romantic



and Modern Eras. Pr.: Music (Applied) 637. 257-638-0-1004

**257 642. Methods and Materials for the Studio.** (2) 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. 257-642-2-1004

#### GRADUATE CREDIT

**257 759. Music of the Middle Ages and Renaissance.** (2) In alternate years. Survey of music from antiquity to 1600. The study of musical idioms and growth pertaining to this period of Music History and Literature. Pr.: Consent of instructor. 257-759-0-1006

**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.: Consent of instructor. 257-761-0-1004

**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.: Consent of instructor. 257-763-0-1004

**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.: Consent of instructor. 257-764-0-1004

**257 765. Music of the 20th Century.** (2) Offered on demand. The historical aspect in musical analysis of composition since the Romantic period. Pr.: Consent of instructor. 257-765-0-1004

**257 799. Problems in Music.** Credit arranged. I, II, S. Pr.: Background of courses needed for problem undertaken. 257-799-3-1004

**257 801. Introduction to Graduate Study.** (2) I, S. Library procedures, research methods and practice in preparing scholarly papers. 257-801-1-1004

**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. 257-803-0-1006

**257 804. Music in History I.** (2) I, alt. S. 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. 257-804-0-1006

**257 805. Music in History II.** (2) Alt. S. Continuation of Music in History I from the Renaissance through the 20th century. Pr.: Graduate standing. 257-805-0-1006

**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. 257-898-4-1004

**257 899. 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. 257-899-4-1004

#### 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. Pr.: Junior standing or consent of instructor. (Course open to elementary education majors only.) 257-405-0-0832

**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. 257-412-0-0832

**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 of instructor. 257-413-0-0832

**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. 257-512-2-0832

**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. 257-513-2-0832

**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. 257-514-2-0832

**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. 257-706-0-0832

**257 707. Choral Pedagogy.** (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. 257-707-0-0832

**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. 257-712-0-0832

**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. 257-726-0-0832

**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. 257-727-0-0832

**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. 257-728-0-0832

**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. 257-729-0-0832

**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. 257-730-0-0832

**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. 257-731-1-0832  
**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. 257-760-0-0832

**257 815. Workshop in Percussion Instruments.** (1) S. Survey and demonstration of the methods, materials and teaching techniques of percussion instruments. 257-815-0-0832

**257 816. Workshop in Woodwind Instruments.** (1) S. Survey and demonstration of the methods, materials and teaching techniques of woodwind instruments. 257-816-0-0832

**257 817. Workshop in Brass Instruments.** (1) S. Survey and demonstration of the methods, materials and teaching techniques of brass instruments. 257-817-2-0832

**257 818. Workshop in Stringed Instruments.** (1) S. Survey and demonstration of the methods, materials and teaching techniques of stringed instruments. 257-818-2-0832

**257 819. Workshop in Electronic Music.** (1) S. A practical and non-technical explanation of synthesizers, synchronous tape-recorders, and audio mixing devices. Applications for the classroom. Consent of instructor. 257-819-2-0832

**257 820. Workshop in Marching Band.** (1) S. Survey of the methods, materials and the teaching techniques of the Marching Band. Pr.: Music 115 or consent of instructor. 257-820-2-0832

**257 821. 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. Pr.: Music 212 or consent of instructor. 257-821-2-0832

**257 822. 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. 257-822-2-0832

**257 823. Workshop in Choral Music.** (1) S. Choral techniques and interpretation of Baroque, Classical, Romantic, and Modern styles. Pr.: Graduate standing or consent of instructor. 257-823-2-0832

**257 824. Workshop in Instrumental Music.** (1) S. Teaching techniques, methods and materials for woodwind, brass, string, and percussion sections of bands and orchestras. Pr.: Graduate standing or consent of instructor. 257-824-2-0832

**257 825. Workshop in Piano Pedagogy.** (1) S. Methods, materials and teaching techniques for all grade levels. Pr.: Graduate standing or consent of instructor. 257-825-2-0832

## Courses in Performance

### UNDERGRADUATE CREDIT

**257 050. Recital Attendance.** (0) I, II. 257-050-0-0000

**257 111. Concert Choir.** (1) I, II. Membership by tryout. 257-111-0-1004

**257 115. Marching Band.** (1) I. Marching Band during fall semester: Performs for Athletic and University events. Admission by audition. 257-115-0-1004

**257 116. Concert Band.** (1) II. Open to all interested wind and percussion performers without audition. 257-116-0-1004

**257 117. Symphonic Band.** (1) I, II, S. A select performing organization. Admission by audition only. 257-117-0-1004

**257 121. Collegiate Chorale.** (1) I, II, S. 257-121-0-1004

**257 125. K-State Singers.** (1) I, II. Membership by tryout. (Not open to Music majors.) 257-125-0-1004

**257 130. Symphony Orchestra.** (1) I, II, S. Membership by audition. 257-130-0-1004

**257 131. Theatre Orchestra.** (1) I, II. Membership by audition. 257-131-0-1004

**257 135. Varsity Men's Glee Club.** (1) I, II. Membership by tryout. 257-135-0-1004

**257 140. Women's Glee Club.** (1) I, II. Membership by tryout. 257-140-0-1004

**257 288. Instrumental Ensemble.** (1) I, II, S. Elective for selected students. 257-288-0-1004

**257 289. Concert Jazz Ensemble.** (1) I, II, S. Elective for selected students. 257-289-0-1004

**257 290. Vocal Ensemble.** (1) I, II, S. Elective for selected students. 257-290-0-1004

**257 291. Madrigal Singers.** (1) I, II. 257-291-0-1004

**257 292. Jazz Instrumental Ensemble.** (1) I, II, S. 257-292-0-1004

**257 293. String Ensemble.** (1) I, II, S. 257-293-0-1004

**257 294. Brass Ensemble.** (1) I, II, S. 257-294-0-1004

**257 295. Wind Ensemble.** (1) I, II, S. 257-295-0-1004

**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. 257-350-0-1004

**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. 257-351-0-1004

**257 475. Opera Workshop.** (1-6) I, II, S. Principles and techniques of operatic and musical theatre production, with emphasis on class rehearsal and performance of selected scenes from opera and musical drama; brief survey of the history of opera. Offered jointly by the Departments of Music and Speech. Vocal Ensemble credit may be earned in this course. Same as Speech 475. 257-475-0-1004

**257 501. Half Recital.** (0) I, II, S. Public performance; vocal or instrumental with suggested performing time of 25 minutes. 257-501-0-1004

**257 502. Full Recital.** (0) I, II, S. Public performance; vocal or instrumental with suggested performing time of 50 minutes. 257-502-0-1004

### GRADUATE CREDIT

**257 840. Ensemble.** (1) I, II, S. A graduate course in ensemble techniques and materials. Pr.: Consent of instructor. 257-840-0-1004

## Courses in Applied Music

### UNDERGRADUATE CREDIT

**257 060. Piano Proficiency.** (0) I, II, S. Required for graduation of all music majors. 257-060-2-1004

**257 203. Voice Class I.** (1) I, II. (Not for Voice Majors). 257-203-1-1004

**257 204. Voice Class II.** (1) I, II. (Not for Voice Majors). 257-204-1-1004

**257 206. Piano Class I.** (1) I, II, S. For freshmen and transfer music students with no piano background. 257-206-1-1004

**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. 257-207-1-1004

**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. 257-208-1-1004

**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. 257-209-1-1004

**257 210. Voice Class III.** (1) I, II. (Not for Voice Majors). 257-210-1-1004



**257 211. Voice Class IV.** (1) I, II. (Not for Voice Majors.) 257-211-1-1004

**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. 257-212-1-1004

**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.) 257-232-1-1004

**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.) 257-233-1-1004

**257 234. String Techniques and Materials.** (1) I, II, S. A beginning course designed to teach the fundamentals of playing and methods for teaching stringed instruments. (For Music Majors only, and not open to String Music Majors.) 257-234-1-1004

**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.) 257-235-1-1004

**257 251. Pre-Applied Study.** (Variable) I, II, S. For students who do not meet standards for regular applied study. 257-251-3-1004

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.** 257-252-3-1004

**257 254. Bassoon.** 257-254-3-1004

**257 256. Clarinet.** 257-256-3-1004

**257 258. Double Bass.** 257-258-3-1004

**257 260. Flute.** 257-260-3-1004

**257 262. French Horn.** 257-262-3-1004

**257 263. Harpsichord.** 257-263-3-1004

**257 264. Oboe.** 257-264-3-1004

**257 266. Organ.** 257-266-3-1004

**257 267. Harp.** 257-267-3-1004

**257 268. Percussion.** 257-268-3-1004

**257 270. Piano.** 257-270-3-1004

**257 272. Saxophone.** 257-272-3-1004

**257 275. Trombone.** 257-275-3-1004

**257 276. Trumpet.** 257-276-3-1004

**257 278. Tuba.** 257-278-3-1004

**257 280. Viola.** 257-280-3-1004

**257 282. Violin.** 257-282-3-1004

**257 284. Violoncello.** 257-284-3-1004

**257 286. Voice.** 257-286-3-1004

**257 285. Italian Diction.** (1) I. Rules for pronouncing and translating Italian Vocal Texts. (One semester required.) 257-285-0-1004

**257 287. German Diction.** (1) I. Rules for pronouncing and translating German Vocal Texts. (One semester required.) 257-287-0-1004

**257 306. Voice Class V.** (1) I, II. (Not for Voice Majors.) 257-306-1-1004

**257 307. Voice Class VI.** (1) I, II. (Not for Voice Majors.) 257-307-1-1004

**257 308. Voice Class VII.** (1) I, II. (Not for Voice Majors.) 257-308-1-1004

**257 309. Voice Class VIII.** (1) I, II. (Not for Voice Majors.) 257-309-1-1004

**257 427. Advanced String Techniques and Materials.** (Var. 1-2) II. Playing and teaching skills beyond fundamentals and presentation of materials suitable for private and public school instruction at the secondary level. Required of all instrumental majors in Music Education. Pr.: Music 234. 257-427-1-1004

**257 428. Advanced Woodwind Techniques and Materials.** (Var. 1-2) II. Playing and teaching skills beyond fundamentals and presentation of materials suitable for private and public school instruction at the secondary level. Required of all instrumental majors in Music Education. Pr.: Music 232. 257-428-1-1004

**257 429. Advanced Brass Techniques and Materials.** (Var. 1-2) I. Playing and teaching skills beyond fundamentals and presentation of materials suitable for private and public school instruction at the secondary level. Required of all instrumental majors in Music Education. Pr.: Music 233. 257-429-1-1004

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.** 257-432-3-1004

**257 434. Bassoon.** 257-434-3-1004

**257 436. Clarinet.** 257-436-3-1004

**257 438. Double Bass.** 257-438-3-1004

**257 440. Flute.** 257-440-3-1004

**257 442. French Horn.** 257-442-3-1004

**257 443. Harpsichord.** 257-443-3-1004

**257 444. Oboe.** 257-444-3-1004

**257 446. Organ.** 257-446-3-1004

**257 447. Harp.** 257-447-3-1004

**257 448. Percussion.** 257-448-3-1004

**257 450. Piano.** 257-450-3-1004

**257 452. Saxophone.** 257-452-3-1004

**257 454. Trombone.** 257-454-3-1004

**257 456. Trumpet.** 257-456-3-1004

**257 458. Tuba.** 257-458-3-1004

**257 460. Viola.** 257-460-3-1004

**257 462. Violin.** 257-462-3-1004

**257 464. Violoncello.** 257-464-3-1004

**257 465. French Diction I.** (1) I. Rules for pronouncing and translating French Vocal Texts. (One semester required.) 257-465-0-1004

**257 466. Voice.** 257-466-3-1004

**257 467. French Diction II.** (1) II. Rules for pronouncing and translating French Vocal Texts. Pr.: Music 465. 257-467-0-1004

**257 521. Composition.** 257-521-0-1004

#### 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. 257-802-1-1004

The following courses in Applied Music offered each semester and summer carry from one to four hours credit per semester.

**257 852. Baritone.** 257-852-3-1004

**257 854. Bassoon.** 257-854-3-1004

**257 856. Clarinet.** 257-856-3-1004



- 257 857. **Advanced Composition.** 257-857-3-1004  
 257 858. **Double Bass.** 257-858-3-1004  
 257 860. **Flute.** 257-860-3-1004  
 257 862. **French Horn.** 257-862-3-1004  
 257 863. **Harpsichord.** 257-863-3-1004  
 257 864. **Oboe.** 257-864-3-1004  
 257 866. **Organ.** 257-866-3-1004  
 257 868. **Percussion.** 257-868-3-1004  
 257 870. **Piano.** 257-870-3-1004  
 257 872. **Saxophone.** 257-872-3-1004  
 257 875. **Trombone.** 257-875-3-1004  
 257 876. **Trumpet.** 257-876-3-1004  
 257 878. **Tuba.** 257-878-3-1004  
 257 880. **Viola.** 257-880-3-1004  
 257 882. **Violin.** 257-882-3-1004  
 257 884. **Violoncello.** 257-884-3-1004  
 257 886. **Voice.** 257-886-3-1004

**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 17 of this catalog.

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## PHILOSOPHY

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B. R. Tilghman,\* Head of Department

Professor Tilghman;\* Associate Professors Reagan\* and Scheer;\* Assistant Professors Exdell, Hamilton,\* and Smith; 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, 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 36 hours in philosophy and must include the following courses: Phil. 220, 300, 301 and 440. The remaining eight courses may be taken in accordance with one of the two program options:

A. **Philosophy Concentration:** Eight courses in philosophy of which six must be at or above the 400 level.

B. **Interdisciplinary Option:** Four courses in a related discipline of which three must be at or above the 400 level; and four courses in philosophy of which three must be at or above the 400 level. Due to the flexibility of this option, each major selecting it must develop a program in consultation with the department's undergraduate adviser. The program must then be approved by the department. Some examples of related disciplines are: psychology, political science, pre-law, linguistics, mathematics, history, and religion.

### 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. 259-100-0-1509

**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. 259-101-0-1509

**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. 259-110-0-1509

**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. 259-200-0-1509

**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. 259-210-0-1509

**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. 259-220-0-1509

**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. 259-300-0-1509

**259 301. History of Modern Philosophy.** (3) II. The development of philosophical ideas from the Renaissance to the nineteenth century. 259-301-0-1509

**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. 259-310-0-1509

**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. 259-397-0-1509

**259 398. Honors Colloquium.** Credit arranged. I or II. Open only to juniors in the Arts and Sciences Honors Program. 259-398-0-1509

**259 399. Honors Seminar in Philosophy.** Variable credit. I or II. 259-399-0-1509

**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. 259-400-0-1509

**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. 259-410-0-1509

**259 415. Philosophy of Law.** (3) I or II. A study of problems about the nature of legal reasoning, relationship between law and morality, and the justification of legal punishment. 259-415-0-1509

**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. 259-420-0-1509

**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. 259-425-0-1509

**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. 259-430-0-1509

**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. 259-440-0-1509

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**259 500. 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. 259-500-0-1509

**259 505. The Philosophy of Science.** (3) I or II. Philosophical problems concerning science, its methods, laws and theories. Pr.: One course in philosophy or consent of instructor. 259-505-0-1509

**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. 259-510-0-1509

**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. 259-520-0-1509

**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. 259-530-0-1509

**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. 259-540-0-1509

**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. 259-550-0-1509

**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. 259-560-0-1509

**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. 259-570-0-1509

#### 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. 259-600-0-1509

**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. 259-605-0-1509

**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. 259-610-0-1509

**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. 259-620-0-1509

**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. 259-630-0-1509

**259 680. Problems in Philosophy.** Credit arranged. I, II, S. Independent study for qualified students. Pr.: Background of courses required for problem undertaken. 259-680-3-1509

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#### PHYSICS

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Charles Hathaway,\* Head of Department

Professors Bark,\* Bhalla,\* Curnutte,\* Dale,\* Dragsdorf,\* Ellsworth,\* Legg,\* Richard\* and Williams,\* Associate Professors Cocke,\* Eck,\* Evans,\* Folland,\* Hathaway,\* Lee,\* Macdonald,\* Manney,\* Seaman,\* and Spangler,\* Assistant Professors Compaan,\* Jack,\* McGuire,\* Rosenkilde,\* Weaver\* and Zollman,\* Research Associates Czuchlewski, Crozier, Downing, Pedersen, Pinkley and Varghese; Emeritus: Professor Cardwell,\* Associate Professors Avery, Chapin\* and Crawford,\* Instructor Green.

Physics is a quantitative science based on observation and experiment. Students of physics learn, often by performing experiments themselves, how a body of experimental data suggests an experimental law. Then they see how this experimental law can be generalized and always tested by further experiment. However, it is as the originator of the next step in the method of science that physics emerges as the foundation of our technological age. The collection of experimental laws is studied and when properly generalized and tested is unified into a fundamental physical principle. This is a continuing process in which the only limitations are the mind of man and nature's willingness to divulge its 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 individuals who will apply their 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.

A student of physics may obtain either a Bachelor of Arts or a Bachelor of Science degree with a major in Physics. In addition to the general requirements for the Bachelor of Arts or Bachelor of Science degree a physics major must complete the following core courses: Phys. 100, 150, 213, 214, 506, 522, 532, 551, 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 student's 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 undergraduate courses without receiving graduate credit.

Information on the undergraduate and graduate programs, the supporting facilities, financial support, and the research activities in physics may be obtained from the Head, Department of Physics. (Some of the major items of scientific equipment are described under the heading "Research Resources" on page 20.)

### 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. 265-100-2-1902

**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. 265-101-0-1901

**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. 265-102-0-1901

**265 103. Man's Physical World I Laboratory.** (1) I, II, S. Two hours lab. a week. Pr.: Phys. 101 or conc. enrollment. 265-103-1-1901

**265 104. Man's Physical World II Laboratory.** (1) I, II, S. Two hours lab. a week. Pr.: Phys. 102 or conc. enrollment. 265-104-1-1901

**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. 265-113-1-1902

**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. 265-114-1-1902

**265 115. Descriptive Physics.** (4) I, II. Three hours lec., one hour quiz, and two hours lab. a week. Pr.: High School algebra. 265-115-1-1902

**265 125. Physics for Musicians.** (3) II. Selected topics applied to the physics of music and musical instruments. 265-125-0-1902

**265 150. Undergraduate Physics Seminar II.** (1) II. Continuation of 265 100. 265-150-2-1902

**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. 265-191-0-1911

**265 192. Descriptive Astronomy Laboratory.** (1) I, II, S. Two hours laboratory a week; use of telescopes, planetarium and laboratory equipment in astronomy; open to interested students without concurrent enrollment in Physics 191 by consent of instructor. 265-192-1-1911

**265 193. Descriptive Meteorology.** (3) I. Nontechnical treatment of the fundamentals of modern meteorology and associated physical processes. 265-193-0-1913

**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. 265-213-1-1902

**265 214. Engineering Physics II.** (5) I, II, S. Magnetism, electricity, and light; for technical students. Two hours lec., two hours rec., one hour quiz, and two hours lab. a week. Pr.: Phys. 213, Math 221. 265-214-1-1902

**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. 265-300-3-1902

**265 301. Junior Honors Colloquium.** Variable credit. Open only to juniors in the Arts and Sciences Honors Program. 265-301-0-1902

**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. 265-400-3-1902

**265 401. Dialogues in Physics.** (2) On sufficient demand. Discussion of current research topics such as fusion power, laser development, superconductivity, radiation effects, quasi-stellar objects. Offered for non-science students. Topics covered will vary each semester depending on current developments and interests. Classes will include both discussions and demonstrations, and occasional special lectures by visiting scholars. Lay scientific literature will be used as resource material. Pr.: Phys. 102 or concurrent enrollment. This course may not be repeated. 265-401-0-1902

**265 451. Modern Physics.** (3) I. A qualitative introduction to contemporary theories and problems in physics. Pr.: Phys. 114 or consent of instructor. 265-451-0-1902

**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. 265-460-0-1902

#### 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. 265-506-1-1902

**265 515. Physics for Science Teachers.** (1-6). Apparatus and demonstration methods in teaching physics. Offered on sufficient demand. Pr.: Phys. 114 or 214. 265-515-0-1902

**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. 265-516-1-1902

**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. 265-521-0-1902

**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. 265-522-0-1902

**265 531. Intermediate Physics II.** (3) II. Cont. of Phys. 521. Pr.: Phys. 521. 265-531-0-1902

**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. 265-532-0-1902

**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. 265-546-1-1902

**265 551. Atomic Physics.** (3) I, II, S. An introduction to contemporary theories and problems in physics. Pr.: Phys. 214; Math. 222. 265-551-0-1902

**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. 265-552-0-1902

**265 553. Introduction to the Physics of Lasers.** (3) II. A study of the physics of lasers. Survey of current laser systems. Technological applications. Pr.: Phys. 114 or 214. 265-553-0-1902

**265 561. Geophysics.** (3) II alt. years. Principles and methods of exploration geology by physical methods. Pr.: Phys. 114 or 214; Math. 221. 265-561-0-1916

**265 591. Microclimatology.** (3) II. (See Agron. 591). A description of the climatological conditions near the ground and their application to the biological sciences. Pr.: Phys. 113; Math. 100. 265-591-0-1913

**265 595. Astronomy.** (3) I. A quantitative and qualitative survey of the universe primarily for the science major. Occasional planetarium and telescopic observation sessions. Pr.: One year of college physics. 265-595-0-1911

#### 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. 265-611-0-1902

**265 612. Introductory Quantum Mechanics II.** (3) II. Cont. of Phys. 611. Pr.: Phys. 611. 265-612-0-1902

**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. 265-616-0-1902

**265 621. Mechanics II.** (5) II. Cont. of Physics 522. Pr.: Phys. 522. 265-621-0-1902

**265 631. Electricity and Magnetism II.** (3) I. Cont. of Phys. 532. Pr.: Phys. 532. 265-631-0-1902

**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 lec. and six hours of lab. each week. Pr.: Phys. 214 or consent of instructor. 265-636-1-1902

**265 641. Nuclear Physics.** (3) II. Modern theories of nuclear physics. Pr.: Phys. 611. 265-641-0-1904

**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 lec. 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. 557. 265-651-0-1902

**265 671. Thermodynamics and Statistical Physics.** (3) II. Pr.: Phys. 522; Math. 240. 265-671-0-1902

**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. 265-681-0-1902

**265 691. Astrophysics.** (3) II. A quantitative study of the sun and stars; structure and evolution; intrinsic properties; solar activity; galaxies; chemical evolution. Pr.: Phys. 522, 532. 265-691-0-1912

**265 701. Journal Club.** Credit arranged. I, II. Seminar in current topics in physics. Pr.: Consent of instructor. 265-701-2-1902

**265 707. Topics in Physics.** Credit arranged. I, II, S. Special topics courses. Topics and credits announced for the semester in which offered. May be given in conjunction with lecture series by visiting scientists. Pr.: Graduate standing or consent of instructor. 265-707-3-1902

**265 711. Introduction to Theoretical Physics.** (3) I. Pr.: Phys. 621. 265-711-0-1902

**265 731. Electrodynamics I.** (3) II. Pr.: Phys. 631. 265-731-0-1902

**265 751. Atomic Spectra.** (3) I. Atomic energy levels and the origin of spectra. Pr.: Phys. 611. 265-751-0-1902



**265 752. Molecular Spectra.** (3) II. Molecular energy levels and the origin of spectra. Pr.: Phys. 611. 265-752-0-1903

**265 781. X-ray and Crystal Physics.** (3) I alt. years. Pr.: Phys. 532. 265-781-0-1902

**265 782. Introduction to Solid State Physics.** (3) II. Pr.: Phys. 611. 265-782-0-1902

**265 786. X-ray Laboratory.** (1) I alt. years. Three hours lab. a week. Pr.: Phys. 781 or conc. enrollment. 265-786-1-1902

#### 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. 265-800-3-1902

**265 808. Advanced Problems.** Credit arranged. I, II, S. Independent study in a special problem in physics at the graduate level chosen with the advice of a faculty mentor. Pr.: Graduate standing and consent of instructor. 265-808-3-1902

**265 811. Quantum Mechanics I.** (3) I. Pr.: Physics 611, 711, 821. 265-811-0-1902

**265 821. Advanced Dynamics.** (3) II. Pr.: Phys. 711. 265-821-0-1902

**265 899. Research in Physics.** Credit arranged. I, II, S. Master's level research. Consent of instructor. 265-899-4-1902

**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. 265-910-3-1902

**265 911. Quantum Mechanics II.** (3) II. Pr.: Phys. 811. 265-911-0-1902

**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. 265-912-0-1902

**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. 265-913-0-1902

**265 914. Quantum Field Theory.** (3) Offered on sufficient demand. Pr.: Consent of instructor. 265-914-0-1902

**265 931. Electrodynamics II.** (3) I. Pr.: 731. 265-931-0-1902

**265 941. Advanced Nuclear Physics I.** (3) I. Pr.: Phys. 641, 811. 265-941-0-1904

**265 942. Advanced Nuclear Physics II.** (3) II. Cont. of Phys. 941. Pr.: Phys. 941. 265-942-0-1904

**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. 265-943-0-1904

**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. 265-951-0-1903

**265 952. Advanced Topics in Optics.** (3) II. Critical studies of selected advanced topics. May be repeated once for credit. Pr.: Consent of instructor. 265-952-0-1902

**265 953. Advanced Topics in Atomic Interactions.** Credit arranged. Critical studies of advanced topics in atomic interactions. Pr.: Consent of instructor. 265-953-3-1904

**265 971. Statistical Mechanics.** (3) I. Pr.: Phys. 611, 671, 821. 265-971-0-1902

**265 981. Solid State Physics.** (3) I. Pr.: Phys. 782, 971, 911 or conc. enrollment. 265-981-0-1902

**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. 265-982-0-1902

**265 983. Advanced X-ray Physics.** (3). Offered on sufficient demand. Pr.: Phys. 781, Math. 240. 265-983-0-1902

**265 999. Research in Physics.** Credit arranged. I, II, S. Doctoral level research. Pr.: Consent of instructor. 265-999-4-1902

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#### POLITICAL SCIENCE

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Michael W. Suleiman,\* Head of Department

Professors Douglas\* and Suleiman;\* Associate Professors Gustafson,\* Hajda,\* Richter,\* and Williams;\* Assistant Professors Althoff,\* Born,\* Iyengar,\* Linford,\* and Lynn;\* Emeritus Professor: Iles.

#### Undergraduate Study

The major in political science acquaints the student with the political aspects of society and encourages the student to develop a critical and imaginative spirit with which to look at public issues. Since political issues reflect the broader contemporary situation, the program in political science also provides the foundation for a liberal education on which to build a continuing, responsible interest in political activity and public affairs. At the same time, scientific training in the analysis of political problems is intended to equip the student with the skills necessary to choose among a wide variety of careers in public service, both national and international, business, teaching, research, and administration. Qualified students should be stimulated to seek advanced training in political science at the graduate level.

A political science major should complete a broad liberal arts program which includes study in related social sciences, such as economics, history, psychology, sociology, anthropology, and geography. The political scientist should also develop awareness of the intimate relationships between social and physical science. In addition, the major will find familiarity with statistics and mathematics indispensable in using the tools now available for describing and explaining political phenomena.

**Advisory Services.** A pre-law program also may be pursued through a major in political science. An especially qualified pre-law adviser helps the student select an appropriate course of study leading toward a career in law, and offers individual assistance in selecting a law school.

A selection of courses for those interested in public administration is available, and an adviser for this field can be secured by communicating with the head of the department.

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 88).

**Armed Forces and Society.** Political science and several other departments offer coordinated coursework in military phenomena and security processes—ranging from the technology of war and military policy making to the problems of civil-military relations in peacetime and the development of viable disarmament policies. Some of the relevant courses 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 (269 325) or World Politics (269 333) should normally be taken during the freshman or sophomore year. Another fundamental course, Political Behavior (269 501) or an acceptable substitute, should normally be taken during the sophomore or junior year after completing at least six hours in political science. Remaining courses are to be distributed throughout all areas of political science. A total of 27 hours is required for the major.

**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 (269 325) and World Politics (269 333) 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 Club, a student group of both majors and non-majors, also is a source of information and guidance.

### 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; the student 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. 269-110-0-2207

**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. 269-111-0-2207

**269 325. United States Politics.** (3). The national government with emphasis on constitutional principles, basic structure, functions, and the political process. 269-325-0-2207

**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. 269-333-0-2207

**269 344. Introduction to Comparative Politics.** (3). Comparative analysis of politics in both "developed" and "developing" countries. Though some attention will be given to abstract and theoretical concepts, the emphasis will be on the actual political process in the countries selected for study. 269-344-0-2207

**269 355. Contemporary Issues.** (3). Study and analysis of selected political topics of immediate relevancy and concern. May be repeated only one time. 269-355-0-2207

**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. 269-385-2-2207

**269 399. Honors Seminar in Political Science.** (1-3). 269-399-0-2207

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**269 501. 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. Pr.: 269 110 or 269 325 or sophomore standing. 269-501-0-2207

**269 505. 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. 505, Geog. 505, Soc. 505, Anthro. 505). 269-505-0-2207

**269 506. 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, languages and literature, geography, social and political structures and ideas. (Same as Geog. 506, Hist. 506, Soc. 506, Anthro. 506). 269-506-0-2207

**269 507. Introduction to Public Administration.** (3). The basic concepts of Public Administration, with emphasis on orientation for citizen understanding; the place of administration and the role of the administrator in the American political process; the organization and activities of government in carrying out public policy; administrative functions, organization, accountability, finance and personnel. Pr.: 269 110 or 269 325 or Economics I (110). 269-507-0-2207



**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. 269-511-0-2207

**269 520. State and Local Government.** (3). The American system of federalism with emphasis on the government and politics of the American states and their subdivisions. Pr.: 269 110 or 269 325 or sophomore standing. 269-520-0-2207

**269 521. Agricultural Politics.** (3). Introduction to the political-cultural problems of rural, including small town, America as well as to the public policies designed for meeting these problems. Emphasis will be placed upon the nature of politics shaping the present and future of rural and small town Kansas. Pr.: 269 110 or 269 325 or sophomore standing. 269-521-0-2207

**269 545. The Politics of Developing Nations.** (3). Comparative analysis of politics in emergent states with emphasis on processes of modernization and nation building. Pr.: 269 110 or 269 344 or sophomore standing. 269-545-0-2207

**269 555. Senior Honors Seminar.** (3). Open to senior majors who have attained a 3.0 Grade Point Average in political science. 269-555-0-2207

## American Government and Politics

### UNDERGRADUATE AND GRADUATE CREDIT

**269 702. Political Sociology.** (3). An introduction to the principles of political sociology; theories of politics and sociology; processes of political sociology; participation within and outside established organizational channels, recruitment of elites, communication and influence, power, decision-making and policy outputs. Data will be presented from a cross-national perspective. Pr.: Sociology 211; Political Science 110 and junior standing or consent of instructor. (Same as Sociology 702). 269-702-0-2207

**269 703. 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. 269-703-0-2207

**269 704. Political Polls and Public 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. 269-704-0-2207

**269 705. The American Presidency.** (3). The presidency as an institution, its evolution, Congressional relationships, executive organization. 269-705-0-2207

**269 706. 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. 269-706-0-2207

**269 707. 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. 269-707-0-2207

**269 711. 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. 269-711-0-2207

**269 713. 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. 269-713-0-2207

**269 714. Constitutional Law I.** (3). Legal foundations of the American political system as defined by constitutional provisions and judicial interpretation. Pattern of govern-

mental power; federalism, separation of powers, judicial review. Constitution as a positive instrument of government: the commerce power. 269-714-0-2207

**269 715. 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. 269-715-0-2207

**269 716. Civil Liberties.** (3). History, theory, and development of Constitutional liberties in the Bill of Rights and the Fourteenth Amendment. 269-716-0-2207

**269 717. 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. 269-717-0-2207

**269 718. Urban Politics.** (3). Fundamental problems of political power and decision-making in urban-suburban governmental settings. 269-718-0-2207

**269 719. National Security Policy and Process.** (3). Formation and management of contemporary U.S. security establishment and policies with emphasis on arms-control, competition for resources, civilian-military relations, and interaction among Congress, the President, and the bureaucracy. 269-719-0-2207

## Comparative Government and Politics

**269 721. European Political Systems.** (3). Comparative analysis of British democracy, totalitarianism, and contemporary Continental European political systems. 269-721-0-2207

**269 722. 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. 269-722-0-2207

**269 723. South Asian Political Systems.** (3). Analysis of selected political systems of South Asia. 269-723-0-2207

**269 724. Middle Eastern Political Systems.** (3). Comparative analysis of selected political systems in the Middle East including nationalism and the conflict of differing ideologies. Validity and usefulness of various theories of political development are tested. 269-724-0-2207

**269 725. Southeast Asian Political Systems.** (3). Comparative analysis of selected political systems in Southeast Asia including consideration of problems of nationalism and political development. 269-725-0-2207

**269 726. African Political Systems.** (3). Comparative analysis of selected political systems of sub-Saharan Africa, including consideration of problems of nationalism and political development. 269-726-0-2207

**269 727. The Soviet Political System.** (3). Government and politics of the Soviet Union. 269-727-0-2207

**269 728. 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. 269-728-0-2207

**269 729. Administration in Developing Nations.** (3). Administrative problems of developing nations of Asia, Africa, and Latin America; principal models for study of comparative public administration; programs in development administration. 269-729-0-2207

## International Relations

**269 741. International Relations.** (3). Analysis of the nature of international relations with emphasis on contemporary theories explaining the international behavior of states. 269-741-0-2207

**269 743. 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. 269-743-0-2207

**269 745. 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. 269-745-0-2207

**269 747. International Law.** (3). Theories of international law, and general problems, such as: recognition, responsibility, war crimes, sources, evidence, codification, and settlement of disputes. 269-747-0-2207

**269 749. 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. 269-749-0-2207

**269 751. International Organization.** (3). Structure, functions, values, and effectiveness of international organizations with emphasis on the United Nations, Common Market and other regional arrangements. 269-751-0-2207

**269 752. 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. 269-752-0-2207

**269 753. 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. 269-753-0-2207

**269 754. 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. 269-754-0-2207

### Political Thought

**269 761. 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 16th century. 269-761-0-2207

**269 763. Political Thought: Since the 16th Century.** (3). Study of the development of Western political thought from the 16th century to the 20th century. 269-763-0-2207

**269 767. American Political Thought.** (3). Political ideas underlying the American union, including the doctrine of rights, the nature of union, liberty, property, and democracy. 269-767-0-2207

**269 771. Modern Political Thought.** (3). Study of contemporary political ideas and social thought. 269-771-0-2207

**269 775. Religion and Politics.** (3). The history, theory, and development of church-state relationships in the United States. A theoretic and legal analysis of the relationship. 269-775-0-2207

**269 776. 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. Pr.: Two social science courses or consent of the instructor. 269-776-0-2207

### 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. 269-785-3-2207

**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. 269-790-3-2207

**269 799. 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. 269-799-0-2207

### 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. 269-800-0-2207

**269 801. Advanced Research Methods I: Research Design.** (3). Analysis of the different types of research designs used by political scientists. Pr.: Stat. 703. 269-801-0-2207

**269 802. Advanced Research Methods II: Data Analysis.** (3). A variety of applied statistical techniques employed by political scientists. Pr.: Stat. 703. 269-802-0-2207

**269 804. Seminar: Public Policy and Decision Making.** (3). 269-804-0-2207

**269 805. Seminar: American Government Problems.** (3). 269-805-0-2207

**269 811. Seminar: International Politics.** (3). 269-811-0-2207

**269 813. Seminar: International Political Communication.** (3). 269-813-0-2207

**269 821. Seminar: Political Thought.** (3). 269-821-0-2207

**269 831. Seminar: Public Administration.** (3). 269-831-0-2207

**269 841. Seminar: Comparative Politics.** (3). 269-841-0-2207

**269 842. Seminar: Comparative Ideologies.** (3). 269-842-0-2207

**269 845. Seminar: South Asian Politics.** (3). 269-845-0-2207

**269 851. Seminar: Public Law.** (3). 269-851-0-2207

**269 861. Seminar: Political Organization and Behavior.** (3). 269-861-0-2207

**269 898. Master's Report.** (2). 269-898-4-2207

**269 899. Master's Thesis.** (6). 269-899-4-2207

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## PSYCHOLOGY

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E. Jerry Phares,\* Head of Department

Professors Danskin,\* Griffitt,\* Hoyt,\* Mitchell,\* Perkins,\* Phares,\* Rappoport,\* Rohles,\* Samelson,\* Sinnett,\* and Thompson;\* Associate Professors Cowan,\* Frieman,\* Shanteau,\* and Uhlarik;\* Assistant Professors Harris, Hayden,\* and Spear;\* Emeritus Professors Alm and Langford.

### Undergraduate Study

The undergraduate program at Kansas State University is designed to serve the needs of several different types of students. It is a versatile program that is composed of a common core for all students. Beyond this common core, however, students may choose among several paths depending upon their more specific interests and goals.

The psychology curriculum is arranged with several functions in mind: (1) to give the student, as a part of a liberal education, some familiarity with the principles, methods, and findings of psychology; (2) to provide knowledge and skills requisite for advanced study at the graduate level; (3) to offer valuable background for students preparing to work in a variety of professions and jobs, such as medicine, law, theology, business, teaching, engineering, etc.; (4) to provide academic work that will prepare the students to pursue a career



as a psychological technician in such facilities as mental hospitals, mental health agencies, community agencies, psychological research laboratories, etc.

**The Core.** The undergraduate major requires Stat. 330 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. An additional 9 hours of psychology electives should be chosen in consultation with the student's adviser.

The foregoing core of 25 hours constitutes the minimum psychology major. This, along with fulfillment of the general College of Arts and Sciences requirements, will enable students to obtain either the B.S. or B.A. degree, depending upon their interests and goals.

**The General Education Option.** For students interested mainly in a liberal education the above core program will be sufficient. In consultation with their adviser, they may wish to choose several other psychology courses beyond the required 25 hour requirement. Additional courses in the arts, sciences, or humanities should be chosen in line with the student's prevailing interests. For example, students interested in industrial relations should take relevant courses in economics, business administration, and sociology. There is great latitude for the student in this option. Beyond the 25 required hours, additional course work is entirely a discretionary matter.

Students interested in teaching or guidance-counseling work in the schools should prepare for teacher certification with a major in psychology. Such students must consult with advisers in the College of Education.

**The Graduate Study Option.** Pursuing an advanced degree in psychology requires, in addition to a strong grade point average and solid aptitude scores, a broad and basic education in psychology. Chances for successful application to graduate school will be enhanced through demonstration of a rigorous grounding in psychology.

Therefore, undergraduates who anticipate pursuing a Ph.D. in psychology should take the following courses (the Core of 25 hours is contained within the following recommendations): Stat. 330, Math. 501, Comp. Sci. 200 and 201, Psych. 110, 250, 460-61, 470, 475-76, 480-81, 505, 605, 620-21, and 775. Depending upon their more specialized goals, students may wish also to take Psych. 598, 616, 575, etc. Students oriented toward physiological psychology will want to ensure they also have appropriate background in biology, chemistry, etc. These matters should be worked out in consultation with an adviser. It is also strongly recommended that students gain research experience by working on projects under faculty supervision.

**The Psychological Technician Option.** A growing field for those with B.A. or B.S. degrees in psychology is that of the **Psychological Technician**. Such a person usually works in an applied setting and carries out duties that are supportive of the Ph.D. psychologist. The psychological technician often assists in such activities as testing, behavior change, community organization, agency management (budgets, referrals,

scheduling), research, data collection and statistical analysis, etc. Technicians and paraprofessionals are playing an increasingly prominent role in agencies, clinics, hospitals, and research settings.

The professional role of psychological technicians is just emerging and the extent of its projected growth and acceptance is still uncertain. However, the academic requirements and, in particular, the field experience requirements will provide a background in human relations that a variety of potential employers in business, industry, government, etc. will find attractive.

Since the psychological technician option is geared toward specific employment the recommended courses are larger in number and there is more structure in this option.

The Core of 25 hours is required. In addition, the following courses are required: Psych. 505, 598, and 440; Soc. 260, 411, 641, or 660; Bus. Ad. 260, and either 420 or 311; Comp. Sci. 200, and either 201 or 202. An integral part of the program is supervised field experience in an applied setting. Arrangements for such experience will be worked out individually with each student as regards the exact number of hours (Psych. 790) and the location (hospital, agency, research laboratory, etc.). Another important aspect of the program is supervised experience in data collection and analysis. Therefore, each student will be expected to make such research arrangements with a specific faculty member. Again, the exact number of hours (Psych. 799) will be worked out individually.

It is expected that most students who choose this option will complete all the formal course work. However, the fieldwork and research experience (Psych. 790 and 799) are perhaps more demanding and time-consuming. While the Psychology Department will make every effort to assist students in locating suitable jobs after completion of this option, the extent and quality of that assistance will be determined not only by students' performance in the formal courses but especially by their work in the field setting and by their research efforts.

### 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 several areas of general-experimental and personality-social psychology. These areas are: sensation and perception, physiological psychology, animal learning and behavior, human learning, social psychology, personality and cognitive processes.

At the master's level, students may specialize in most of the traditional areas of psychology. 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. 273-110-0-2001

**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. 273-115-0-2001

**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, child rearing, etc. Pr.: Psych. 110 and consent of instructor. 273-200-0-2001

**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. Pr.: Psych. 110 and consent of instructor. 273-202-0-2001

**273 250. Experimental Methods in Psychology.** (4). Laboratory investigation of learning, motivation, social-personality processes, and perception and sensation. Includes two hours rec. and four hours lab. per week. Pr.: Psych. 110 or consent of instructor. 273-250-1-2002

**273 280. Psychology of Childhood and Adolescence.** (3). Survey of behavioral development from birth through adolescence. Pr.: Sophomore standing; Psych. 110. 273-280-0-2009

**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. 273-290-2-2001

**273 299. Honors Seminar in Psychology.** (1-3). Selected topics. Open to non-majors in the Honors Program. 273-299-0-2001

**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. 273-420-0-2009

**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. 273-435-0-2009

**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. 273-440-0-2006

**273 445. Consumer Psychology.** (3) II. Survey of psychological principles and facts in perception, learning,

attitude formation, personality, etc. as they apply to behavior of consumers. Pr.: Psych. 110 and junior standing. 273-445-0-2008

**273 460. Information Processing and Memory.** (3). A survey of the manner in which people extract and utilize relevant information from their environment as a basis for behavior. Topics may include memory storage and retrieval, attention, imagery, mnemonic devices, decision making, and other cognitive processes. Pr.: Psych. 250 or consent of instructor. 273-460-0-2002

**273 461. Laboratory in Cognitive Processes.** (1) I. May be taken only in conjunction with Psych. 460. Supervised experimentation in cognitive processes. Pr.: Conc. enrollment in Psych. 460. 273-461-1-2002

**273 465. Psychology of Aesthetics.** (3). An approach to aesthetics which deals with the contributions of psychology to the study of aesthetic judgment and the formation of values. Pr.: Sophomore standing, Psych. 110 or consent of instructor. 273-465-0-2001

**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. 273-470-0-2010

**273 475. Principles of Learning and Motivation.** (3) Introduction to the study of learning and motivation in both animals and humans. Pr.: Psych. 250 or consent of instructor. 273-475-0-2002

**273 476. Laboratory in Learning and Motivation.** (1) May be taken only in conjunction with Psych. 475. Supervised experimentation in learning. Pr.: Conc. enrollment in Psych. 475. 273-476-1-2002

**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. 273-480-0-2002

**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. 273-481-1-2002

**273 490. Psychology of Sexual Behavior.** (3) II. Study of psychological determinants and consequences of human sexual behavior; roles of personality, attitudinal and emotional factors will be emphasized. Pr.: Psych. 110, sophomore standing or consent of instructor. 273-490-0-2005

### 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. 273-505-0-2099

**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. 273-550-0-2005

**273 575. Environmental Psychology.** (3) I. Introduction to the study of man's behavior in relation to his physical setting. Definitions of man-environment system, behavior settings, methods of environmental research, and assessment of behavior in residential, school, hospital, office, and leisure environments; decision making, planning, and design. Pr.: Psych. 110 and six additional hours of psychology or consent of instructor. 273-575-0-2008

**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. 273-590-0-2002



**273 595. Personality-Social Seminar.** (2-3). Intensive discussion of selected topics. May be repeated. Pr.: Either Psych. 605, 620, or consent of instructor. 273-595-0-2003

**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. 273-598-0-2003

#### 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. 273-605-0-2005

**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. 273-606-1-2005

**273 616. Comparative Psychology.** (3). Behavior at different phylogenetic levels as an aid to the clarification of behavioral principles. Pr.: Consent of instructor. 273-616-0-2010

**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. 273-620-0-2099

**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. 273-621-1-2099

**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. 273-622-0-2009

**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. 273-625-0-2008

**273 710. Methods and Theory in Psychohistory.** (3). Reviews the origins of psychohistory in works by Freud and Neo-Freudians such as Erikson and Lifton. Major focus is on the emerging methods and theories as they are being elaborated in such problem areas as psychobiography, history of childhood, and larger group process studies. Primarily for graduate students in psychology and history and for selected advanced undergraduates. Pr.: Consent of instructor. 273-710-0-2005

**273 750. Psychology of Language.** (3). Experimental study of language, including sentence comprehension and memory, language acquisition and development, speech perception, and effects of context, perception, reasoning, and linguistic structure on processing of language. Pr.: Psych. 110, and Psych. 250 or consent of instructor. 213-750-0-2002

**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. 273-775-0-2001

**273 790. Topics in Psychology.** Credit arranged. I, II, S. Pr.: Psych. 110 and consent of instructor. 273-790-3-2001

**273 799. Problems in Psychology.** Credit arranged. I, II, S. Pr.: Psych. 110 and consent of instructor. 273-799-3-2001

#### 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. 273-801-0-2002

**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 equiv. 273-802-0-2007

**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. 273-803-0-2010

**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. 273-804-1-2010

**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 consent of instructor. 273-805-0-2007

**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. 330. 273-806-0-2006

**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. 273-810-0-2002

**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. 273-812-0-2002

**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. 273-814-0-2002

**273 820. Personality Theory.** (3). A comparative examination of contemporary theories of personality structure. Pr.: Psych. 620 or consent of instructor. 273-820-0-2099

**273 825. Judgmental Processes.** (3). Examination of empirical findings and theoretical approaches to decision making and judgment with emphasis on higher cognitive processes. Pr.: Psych. 250 and Psych. 802. 273-825-0-2002

**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. 273-830-0-2005

**273 860. Practicum in Counseling Psychology.** Credit arranged. Supervised practical experience in counseling. Pr.: Consent of instructor. 273-860-2-2004

**273 899. Research in Psychology (M.S.).** Credit arranged. Pr.: Consent of supervisory committee. 273-899-4-2001

**273 908. Advanced Physiological Psychology.** (3). A study of the neural and endocrinological correlates of behavior. Pr.: Psych. 803 and consent of instructor. 273-908-0-2010

**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. 273-909-0-2002

**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. 273-911-0-2010

**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. 273-915-0-2002

**273 919. Advanced Measurement.** (3). The logic of measurement, scaling theory, psychophysics and psychometrics, and problems in classification and prediction. Pr.: Psych. 806. 273-919-0-2006

**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. 273-921-0-2099

**273 922. Psychopathology.** (3). A systematic review of behavior disorders, their etiology and treatment. Pr.: Psych. 505 and 620 or consent of instructor. 273-922-0-2099

**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. 273-925-0-2009

**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. 273-931-0-2005

**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. 273-951-0-2010

**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. 273-952-0-2002

**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. 273-953-0-2099

**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. 273-954-0-2002

**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. 273-955-0-2002

**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. 273-956-0-2006

**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. 273-957-0-2002

**273 958. Seminar in Mathematical Models of Behavior.** (1-3). Selected topics in mathematical psychology, and applications of mathematical models to behavior. May be

repeated with consent of supervisory committee. Pr.: Math 501 and consent of instructor. 273-958-2-2001

**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. 273-959-0-2005

**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. 273-968-0-2001

**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. 273-970-0-2008

**273 990. Internship in Psychology.** Credit arranged. Pr.: Consent of the supervisory committee. 273-990-2-2001

**273 999. Research in Psychology (Ph.D.).** Credit arranged. Pr.: Consent of supervisory committee. 273-999-4-2001

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## SOCIOLOGY AND ANTHROPOLOGY

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Eugene A. Friedmann,\* Head of Department

Professors Friedmann,\* Rohrer,\* and Schnur,\* Associate Professors Edelman,\* O'Brien,\* Orbach,\* Peters,\* and Taylor,\* Assistant Professors Benson, Brede, Camp,\* Cross,\* Dushkin,\* Finnegan, C. Flora,\* J. Flora,\* Harris,\* Miley,\* H. Ottenheimer,\* M. Ottenheimer,\* Pelletier, and Shanline.

The Department of Sociology and Anthropology is a department which offers work in the subject matter disciplines of sociology, anthropology and social work. Four separate undergraduate majors are available: 1) General Sociology; 2) Sociology/Corrections Option; 3) Anthropology and 4) Social Work. The student may enroll in a B.S. or B.A. program in any of these major areas. Graduate level work is offered in Sociology only. M.A. programs are offered in General Sociology and in Sociology/Corrections option. A Ph.D. program with a specialization in the areas of Community and Rural Organization and Social Change and Development is being initiated in the 1975-76 academic year. Descriptions of the specific undergraduate majors and graduate programs are given below under the appropriate disciplinary headings.

### Sociology

Sociology is the study of society and of social relationships. Some of the principal areas considered are social and community organization; the development and interaction of individuals in society; major social institutions; social problems and deviant behavior; population growth and distribution; and social change and development.

The trained sociologist is prepared for professional work in social research, teaching, community and government planning and service agencies, and corrections and law enforcement careers. It is also a desirable background, either as a sole or a combined major, for further professional training in law, city planning, public administration, hospital administration, as well as for advanced graduate work in sociology or other of the social sciences.

**The Undergraduate Program.** Students who desire to major in sociology should refer to the general



requirements for the A.B. or B.S. degree (see page 84). There is a choice of two options in the undergraduate sociology major: (1) the General Sociology option; and (2) the Correctional Administration 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 189).

Students enrolled in the General Sociology option will be required to take 28 semester hours of sociology to include Soc. 211, 511 and 560. In addition to the other requirements nine hours of electives in sociology are to be taken at the 500 level or above, and an additional nine hours are required at the 600 level and above.

Students enrolled in the Corrections Administration option will be required to take 31 semester hours of sociology to include Soc. 211, 511, 520, 661, 762 and two of the following: Sociology 660, 763, 764, 765, or 766. 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.

**The Graduate Program.** The graduate programs in sociology provide the student with the opportunity to develop skills and interests in specific areas of focus while obtaining a solid grounding in basic substantive areas of sociology. They offer a high level of student-faculty interaction and the opportunity to participate in supervised research.

The general master's program offers a full range of sociological specialties and a broad sociological background. It is primarily intended to prepare students who want to continue into Ph.D. programs. However, it may also be designed for students who want to teach in community colleges or work in areas of applied research.

The M.A. in sociology with a Correctional Administration option offers a balanced program of basic and applied sociological studies for those preparing for professional careers in correctional administration.

The Ph.D. program is being initiated in August, 1975. It offers specialized training in community and rural organization, societal change and development, sociological theory, and research methods. Additional training is provided in demography and human ecology, deviant behavior, social psychology, and social organization. Graduates will be prepared for academic teaching and research careers as well as for applied social research.

Sociology students may draw upon related graduate programs in computer science, statistics, and various

social and behavioral sciences in designing individual programs of study. Special university programs in the economics of development, regional and community studies, and South Asian studies may be relevant for specific objectives. An IBM 370 and a computing center with a full range of facilities and services are available to graduate students. Research facilities in the Department of Sociology include a Population Research Laboratory, a Community Studies Laboratory, and a Statistical Laboratory.

For the major in Social Work see page 167.

For the major in Anthropology see page 166.

## 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. 277-211-0-2208

**277 214. Introduction to Sociology.** H(4) I, II. Development, structure and functioning of human groups; societal and cultural patterns; the nature of sociological inquiry. Lecture, discussion and independent study. 277-214-0-2208

**277 301. Topics in Sociology.** (3). Supervised independent and/or interdisciplinary study projects. Pr.: Soc. 211 and consent of instructor. 277-301-0-2208

**277 399. Honors Seminar in Sociology.** (1-3). Readings and discussion of selected topics. Open to non-majors in the Honors Program. 277-399-3-2208

**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 equivalent. 277-411-0-2208

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**277 501. Proficiency Development.** (1-3). Integrative review of sociological concepts and skills under faculty supervision. For single students or groups of students. Not applicable to major field requirements. Not repeatable. For undergraduate credit only. Pr.: Consent of instructor and superior performance in relevant course. 277-501-0-2208

**277 505. 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. 505, Geog. 505, P. Sci. 505, Anthro. 505.) Pr.: Soc. 211. 277-505-0-2208

**277 506. 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. 506, Geog. 506, P. Sci. 506, Anthro. 506.) Pr.: Soc. 211. 277-506-0-2208

**277 510. Social Welfare as a Social Institution.** (3) 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. 277-510-0-2208

**277 511. Comparative Social Theories.** (3). Investigations of a range of current sociological theories concerning the socialization process, group behavior and social organization. Pr.: Soc. 211. 277-511-0-2208



**277 520. Methods of Social Research I.** (4). 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. 300 or consent of instructor. To include one credit hour of laboratory and field research experience. 277-520-1-2208

**277 530. Population and Human Ecology.** (3). Theories, policies, growth, composition, spatial aspects, movements, and world population trends. Pr.: Soc. 211 or consent of instructor. 277-530-0-2208

**277 531. Urban Sociology.** (3). 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. 277-531-0-2208

**277 540. Social Organization.** (3). 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. 277-540-0-2208

**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 equivalent. 277-542-0-2208

**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. 277-545-0-2208

**277 550. 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. 277-550-0-2208

**277 565. Program and Policy Formulation and Analysis.** (3). Examination of policies and programs developed to cope with various social problems. Emphasis will be placed on analysis of existing programs and policies and the formulation of alternative policies. Attention will be given to policy change through legislative action. Same as 279 565. Pr.: Soc. 260, 510. 277-565-0-2104

**277 570. Race and Ethnic Relations in the U.S.A.** (3). 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. 277-570-0-2208

**277 590. Senior Seminar in Sociology.** (3) I. Integration of courses in sociology. Pr.: Soc. 211 or consent of instructor. Undergraduate credit only. 277-590-0-2208

**277 618. Religion in Culture.** (3). The nature of religion in nonliterate and peasant societies, and its manifestations in different cultural systems. Same as Anthro. 618. Pr.: Anthro. 200 or Soc. 211 or consent of instructor. 277-618-0-2208

**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. 277-640-0-2208

**277 660. Juvenile Delinquency.** (3). Nature, extent, and causes of delinquency; characteristics of delinquents; means of prevention and treatment. Pr.: Soc. 211 or consent of instructor and junior standing. 277-660-0-2209

**277 661. Criminology.** (3) I, II. Nature, extent, and causes of crime; programs for prevention and treatment. Pr.: Soc. 211 or consent of instructor. 277-661-0-2209

## GRADUATE AND UNDERGRADUATE CREDIT

**277 701. Problems in Sociology.** Credit arranged. I, II, S. Pr.: Soc. 211 and junior standing. 277-701-3-2208

**277 702. Political Sociology.** (Same as Pol. Sci. 702). (3). An introduction to the principles of political sociology. Theories of politics and society. Processes of political socialization, participation within and outside established organizational channels, recruitment of elites, communication and influence, power, decision-making, and policy outputs. Data are presented from a cross-national perspective. Pr.: Soc. 211, Pol. Sci. 110, and junior standing. 277-702-0-2208

**277 709. Development of Social Thought.** (3). Development of social thought from ancient civilization to the middle of the 19th 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. 277-709-0-2208

**277 710. Systematic Analysis of Social Theory.** (3). Examination of contemporary sociological theory with reference to the nature of scientific explanation and the function of scientific theory. Critical study and analysis of selected social theorists and types of social theory with the objective of clarifying the conceptual and logical structure of underlying theoretical models and their assumptions about man and society. Pr.: 277 511 or equivalent. 277-710-0-2208

**277 721. 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. 420 or consent of instructor. 277-721-1-2208

**277 722. Specialized Techniques of Social Research.** (3). Intensive examination of the problems and techniques of design, data collection, analysis and interpretation which accompany a particular strategy of basic or applied research. Topics announced for the semester in which the course is offered. May be repeated with consent of department. Pr.: 277 721 or equivalent. 277-722-0-2208

**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. Pr.: Soc. 211. 277-730-1-2208

**277 731. Community Organization and Leadership.** (3). American community organization; special emphasis on community problems and planning. Pr.: Soc. 211 or consent of instructor. 277-731-0-2208

**277 732. Applied Community Change.** (3). Dynamics of community change processes. Emphasizes community organizing, efficacy of voluntary organizations and local governmental agencies, and the role of extra-community institutions in bringing about or blocking change. Pr.: 277 731 or equivalent. 277-732-0-2208

**277 733. Sociology of Agricultural Development.** (3). Comparative rural systems in developing countries; emphasis on land tenure, peasant movements, relationship of agriculture to rest of society, and influence of developed countries on the agriculture of developing countries. Pr.: Soc. 211 or consent of instructor. 277-733-0-2208

**277 734. Sociology of Agricultural Organization in the U.S.** (3). Social impact of agricultural change in the U.S.; emphasis on land tenure, farmers' social movements, role of agricultural technology and relationship of agriculture to rest of society. Pr.: 277 211. 277-734-0-2208

**277 735. 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 and consent of instructor. 277-735-0-2208

**277 740. Comparative Social Systems.** (3). Comparison of social systems in the Orient, Middle East, Europe, and the Americas. Pr.: Soc. 211 and junior standing. 277-740-0-2208

**277 741. Social Differentiation and Stratification.** (3). Analysis of societal organization based on age, sex, residence, occupation, community, class, caste, and race. Pr.: Soc. 211 and junior standing. 277-741-0-2208

**277 742. South Asian Social Systems.** (3). Survey of contemporary research and analysis of family and caste structures, demography, mobility, urbanization and modernization in India and Pakistan. Focus on social change: intentions, methods, consequences. Pr.: Soc. 211 or Anthro. 200 and either Soc. 505, Anthro. 505 or Anthro. 645, or consent of instructor. 277-742-0-2209

**277 744. 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. 277-744-0-2208

**277 745. 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 261-745.) 277-745-0-2208

**277 746. The Sociology of Formal Organizations.** (3). The nature and types of formal and complex organizations; the connections between them and of their societies; and selected aspects of their internal structure, such as peer group and hierarchical relations in organizations, processes of communication, management, and impersonal mechanisms of control. Studies a variety of formal organizations with particular emphasis upon industrial, educational, and governmental organizations. Pr.: Soc. 211. 277-746-0-2208

**277 747. Sociology of Work.** (3). The social nature of work and related phenomena; occupational structures; career lines; adjustment and interpersonal relations at work; significance of work in the life cycle. Pr.: Soc. 211. 277-747-0-2208

**277 750. Social Control.** (3). Analysis of social and institutional processes and mechanisms of social control: socialization, role allocation, systems of social sanctioning, growth and dynamics of institutional systems of social control. Theoretical approaches to social control emphasizing its character at the institutional and societal level of analysis. Pr.: Soc. 211, 450, or consent of instructor and junior standing. 277-750-0-2208

**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. 277-751-0-2208

**277 752. Social Roles and Social Relationships.** (3). Analysis of the processes of interpersonal perception, attraction and social interaction in the formation, maintenance and change of social relationships and social roles. Particular emphasis is placed on the importance of such processes for the formation of social groups and social interaction in a variety of social contexts. Consideration of major theoretical approaches and their empirical foundations. Pr.: Soc. 450 or consent of instructor. 277-752-0-2208

**277 753. Sociology of Mass Communications.** (3). 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. 277-753-0-2208

**277 659. Correctional Communities and Their Administration.** (3). 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. 277-762-0-2209

**277 763. 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. 762 or consent of instructor. 277-763-0-2209

**277 764. 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. 762 or consent of instructor. 277-764-0-2209

**277 765. 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 762. 277-765-0-2209

**277 766. 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. 277-766-0-2209

**277 767. Social Reactions to Deviance.** (3). Selected topics in the sociology of deviance, such as (1) public reactions to deviant persons and groups, (2) the nature and extent of formally organized responses to deviance, and (3) deviance considered from the perspective of deviant actors. Pr.: 277 411 and consent of instructor. 277-767-0-2208

**277 770. 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. 277-770-0-2209

#### GRADUATE CREDIT ONLY

**277 898. Master's Report Research.** Credit arranged. I, II, S. 277-898-4-2208

**277 899. Master's Thesis Research.** Credit arranged. I, II, S. 277-899-4-2208

**277 911. Seminar in Sociological Theory.** (3). 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. 277-911-0-2208

**277 912. Seminar: Theory Construction in Sociology.** (3). An examination of alternative logical strategies in theory construction with emphasis on theory construction as a research tool. Pr.: 277 511, 277 710 or equivalent. 277-912-0-2208

**277 920. Seminar in Sociological Research.** (3). Application of scientific techniques in the design and execution of research. Pr.: Soc. 620 or equiv. 277-920-0-2208

**277 930. Seminar in Community Analysis.** (3). Various aspects of the structural and functional analyses of communities: demographic, ecological, organizational, institutional. Pr.: Soc. 530 or equiv. 277-930-0-2208

**277 931. Seminar in Demographic Analysis.** (3). Demography as a professional scientific discipline with intensive analysis of demographic techniques. Pr.: Soc. 430 or equiv. 277-931-0-2208



**277 932. Seminar in Rural Sociology.** (3). A sociological survey of research and empirical data on rural life and modes of management or control of agricultural organization for world geographic regions or individual nations. Pr.: 277 733 or 734 or equivalent. 277-932-0-2208

**277 940. Seminar in Social Organization.** (3). 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. 277-940-0-2208

**277 943. 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. 277-943-0-2208

**277 950. Seminar in Sociology of Small Groups.** (3). Longitudinal and cross-sectional analyses of the basic elements in social interaction. Pr.: Soc. 450 or equiv. 277-950-0-2208

**277 951. Seminar in Societal and Institutional Dynamics.** (3) 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. 277-951-0-2208

**277 962. Seminar in Deviant Behavior and Social Disorganization.** (3). Analysis in detail and depth of selected forms of deviant behavior and their relevance to social disorganization. Pr.: Consent of instructor. 277-962-0-2208

**277 999. Ph.D. Dissertation Research.** Credit arranged. 277-999-4-2208

## 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. 278-200-0-2202

**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. 278-201-0-2202

**278 260. Introduction to Archaeology.** (3) I, II. 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. 278-260-0-2202

**278 280. Introduction to Physical Anthropology.** (3) I, 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. 278-280-0-2202

**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. 278-399-3-2202

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**278 501. Proficiency Development.** (1-3). Integrative review of anthropological concepts and skills under faculty supervision. For single students or groups of students. Not applicable to major field requirements. Not repeatable. For undergraduate credit only. Pr.: Consent of instructor and superior performance in relevant course. 278-501-0-2202

**278 505. 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. 505, Geog. 505, P. Sci. 505, Soc. 505.) 278-505-0-2202

**278 506. 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. 506, Geog. 506, P. Sci. 506, Soc. 506.) 278-506-0-2202

**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. 278-520-0-2202



**278 531. Peasant Society.** (3). A comparative approach to agrarian societies; the investigation of economic, political, social and ideological aspects of peasantry. 278-531-0-2202

#### 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. 278-600-0-2202

**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. 278-602-0-2202

**278 604. Culture and Personality.** (3). Anthropological contributions to personality study; cross-cultural comparisons of personality types, means of personality formation in nonliterate and folk cultures; culture change and personality. Pr.: Three hours of anthropology or consent of instructor. 278-604-0-2202

**278 608. Economic Anthropology.** (3). An investigation of the relationship of economic organization to the rest of social organization and culture. Discussion of exchange and display, money, trade and markets, and economic development and social change in selected societies. 278-608-0-2202

**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. 278-610-0-2202

**278 612. Political Anthropology.** (3). Anthropological approaches to the study of politics in non-Western societies. Structural-functional, evolutionary, and conflict theories. A comparison of the political systems of small-scale and complex societies: political modernization. 278-612-0-2202

**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. 278-613-0-2202

**278 615. Expressive Culture.** (3). 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. 278-615-0-2202

**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. 278-616-0-2202

**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. 278-618-0-2202

**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. 278-619-0-2202

**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. 278-622-3-2202

**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. 278-625-3-2202

**278 630. Indians of North America.** (3). Aboriginal cultures of Canada and the United States; culture contact and change among surviving groups. 278-630-0-2202

**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. 278-632-0-2202

**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. 278-634-0-2202

**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. 278-636-0-2202

**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. 278-645-0-2202

**278 650. Cultures of Africa.** (3). Description and comparison of the aboriginal cultures of Africa south of the Sahara. Culture contact and change. 278-650-0-2202

**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. 278-660-0-2202

**278 670. 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. 278-670-0-2202

**278 673. Precolumbian Civilizations 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. 278-673-0-2202

**278 676. 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. 278-676-0-2202

**278 679. 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. 278-679-1-2202

**278 685. 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. 278-685-0-2202

**278 688. 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. 278-688-0-2202

**278 691. Primatology.** (3). Survey of the Primate Order including considerations of evolution, morphology, and behavior. Particular emphasis will be given to developing perspectives about the origin and evolution of man in the context of the Primate Order. Pr.: Anthro. 280 or consent of instructor. 278-691-0-2202

**278 694. Osteology.** (3). Detailed study of human skeleton, with special attention to health and demographic conditions in prehistoric cultures and the evaluation of physical characteristics and genetic relationships of prehistoric populations. Pr.: Anthro. 280 or consent of instructor. 278-694-0-2202

**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 areas or problems involved are different. Pr.: Anthropology 200 or 260 or consent of instructor. 278-730-1-2202

**278 792. Field Methods in Linguistics.** (3). An introduction to techniques of collecting and analyzing linguistic data in the field. Work with non-western informants in class. Offered on demand. Pr.: Consent of instructor. Same as 282 792 and 253 792. 278-792-0-2202

## Social Work

The social work major is intended to prepare the beginning level professional social work practitioner. The curriculum is designed to impart theoretical knowledge of individual development, group processes, and organizational behavior, and to teach a repertoire of versatile skills for problem intervention at various levels.

The social work undergraduate major is of particular value to those students who intend to pursue a professional career in social work upon graduation.

The student who wishes to declare a major in social work must first complete the introductory courses SW 260 and Soc. 510, with a 3.0 average for the two. The student must also have a general grade point average of 2.5. It is expected that the major in social work will not be declared before the end of the sophomore year.

A student completing a B.A. or B.S. in social work must successfully complete 46 hours of major courses (which includes the two introductory courses). These courses are divided into several content areas:

1) Human development and social environment content: 15 credits, in which a student must maintain a 3.0 average: Soc. 411, 550 and 731; Psych. 280 and 420

2) Social work practice content: 6 credits: SW 560 and 561

3) Research content: 4 credits: Soc. 520

4) Social Policy content: 6 credits: Soc. 510 and SW 565

5) Field Placement: 9 credits: SW 562

6) Professional Social Work Seminar: 3 credits: SW 564.

**279 260. Introduction to Social Work.** (3). A survey of the fields of social work, the relationship of social work to other social developments and vocational opportunities. 279-260-0-2208

**279 501. Proficiency Development.** (1-3). Integrative review of social work concepts and skills under faculty supervision.

For single students or groups of students. Not applicable to major field requirements. Not repeatable. For undergraduate credit only. Pr.: Consent of instructor and superior performance in relevant course. 279-501-0-2208

**279 560. Skills and Techniques in the Practice of Social Work I.** (3). Fundamental skills and techniques for social workers, emphasizing the nature of social work, engagement and communication skills, observation and information gathering skills. Pr.: Soc. 411, 550 and 731; Psych. 280 and 420. (Social Work majors only.) 279-560-0-2208

**279 561. Skills and Techniques in the Practice of Social Work II.** (3). Social work practice course concentrating on assessment skills and planning decisions for intervention, strategies and roles. Evaluation termination of change efforts and selected work skills such as collaboration, consultation, and supervision will be integral parts of course material. Pr.: SW 560. To be taken concurrently with SW 562. (Social Work majors only.) 279-561-0-2208

**279 562. Field Experience.** (9). 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 student's experience to analyze social work theory and practice. Pr.: SW 260, Soc. 510, SW 560. To be taken concurrently with SW 561. (Social Work majors only.) 279-562-2-2208

**279 564. Social Work Professional Seminar.** (3). A review of various theories in the behavioral sciences which influence the practice of social work. Primary focus on the course is on the use of these theories in implementing change in various client systems. Pr.: To be taken concurrently with Field Experience SW 562. (Social Work majors only.) 279-564-0-2208

**279 565. Program and Policy Formulation and Analysis.** (3). Examination of policies and programs developed to cope with various social problems. Emphasis will be placed on analysis of existing programs and policies and the formulation of alternative policies. Attention will be given to policy change through legislative action. Same as 277 565. Pr.: SW 260, 510. 279-565-0-2104

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## SPEECH

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Norma D. Bunton,\* Head of Department

Professors Bunton,\* Dace,\* and Flanagan;\* Associate Professors Burke,\* Climenhaga,\* Fedder,\* and Rainbolt;\* Assistant Professors Armagost,\* Aseneta, Gray, Hinrichs,\* Longhurst,\* Neiman,\* Nichols,\* Reeder, Lewis Shelton, Lynn Shelton, and Smith;\* Instructors Atkins, Barnes, Firling, and Molineux; Adjunct Clinical Instructor Millay; 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.



## 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, page 88.

A student majoring in any of the above areas may select a minor field either outside the department or within the department. Only certain areas are approved for minor work within the department when the major is also within the department.

Prerequisite to major graduate work in these fields is the completion of the four-year undergraduate program substantially equivalent to that required of general arts and science students, the curriculum to include sufficient elementary work in the appropriate area of speech to prepare the student for the advanced field chosen.

The Master of Arts degree may be pursued by students in the department under one of the following plans: Plan A: A minimum of 30 semester hours of graduate credit including a master's thesis of six to eight semester hours. Plan B: A minimum of 30 semester hours of graduate credit including a written report of two semester hours either of research or of problem work on a topic in the major field. Plan C: A minimum of 30 semester hours of graduate credit in course work only, but including a project which discloses evidence of creative ability.

Students in Theatre and Linguistics may, with graduate faculty approval, elect any one of the plans: A, B, or C.

Students in General Speech may, with graduate faculty approval, elect plans A or B. Students in Speech Pathology-Audiology may, with graduate faculty approval, elect plans A or C.

Written and oral examinations will be required in all areas.

## Courses In General Speech

### UNDERGRADUATE CREDIT

**281 080. Speech Seminar.** (0). Special topics and lectures for speech majors. Required of all majors each semester. 281-080-0-1506

**281 101\* Spoken English for International Students.** (3) I, II. Semi-intensive aural-oral familiarization in American English as a second language. 281-101-1-1506

**281 105. Oral Communication I.** (2). Selection and outlining of speech material, with emphasis on content, organization, and oral presentation. 281-105-0-1506

**281 106. Oral Communication Ia.** (3). Alternate to Spch. 105 permitting greater emphasis on preparation and delivery of speech material. Credit not granted for both Spch. 105 and 106. 281-106-0-1506

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. 281-107-1-1506

**281 108. Oral Communication IH.** (2) Honors—Participation in and analysis of oral message situations, with emphasis on communication purposes, message design and presentations. 281-108-0-1506

**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. 281-109-0-1506

**281 210. Debate and Drama Participation.** (1 or 2). Four hours maximum credit. Pr.: Consent of director of the activity. 281-210-2-1506

**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. 281-220-0-1506

**281 226. Argumentation and Debate.** (3). Basic theories of argumentation, with emphasis on their application in academic debate. Pr.: Spch. 105 or 106. 281-226-0-1506

**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. 281-235-0-1506

**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. 281-320-0-1506

**281 380. Interviewing.** (2-3). Examination of theories of interviewing with emphasis on developing the communication skills essential for an effective job interview. The class will be divided into three areas: lecture, demonstration, and laboratory. 281-380-1-1506

**281 398. Junior Honors Colloquium.** Variable credit. I, II. Open only to juniors in the Arts and Sciences Honors Program. 281-398-0-1506

**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. 281-499-3-1506

### 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. 281-520-0-1506

### 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.: 281 320. 281-720-0-1506

**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. 281-725-0-1506

**281 726. Persuasion.** (3). The study of communication as persuasion; examination of contemporary approaches to persuasion. 281-726-0-1506

**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. 281-727-0-1506

**281 728. Discussion and Conference Leadership.** (3). Principles and functions of leadership in face-to-face groups. 281-728-0-1506

\* 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.



**281 730. Rhetorical Theory and Criticism.** (3). Study of rhetorical theory and criticism from early Greek to modern times. 281-730-0-1506

**281 731. Medieval and Renaissance Rhetoric.** (3). A study of the influential works of rhetoric from St. Augustine to Thomas Wilson. Pr.: 281 730. 281-731-0-1506

**281 732. Modern Rhetoric.** (3). Readings in the rhetorical theories of Kenneth Burke and other twentieth century contributors. Pr.: 281 730. 281-732-0-1506

**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. 281-735-0-1506

**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. 281-736-0-1506

**281 737. Documentary Film.** (3). Production methods, theory, in documentary film production. 281-737-0-1506

**281 820. Seminar in Speech.** (3). Selected topics in speech research. May be repeated for credit with change in topic. 281-820-3-1506

**281 799. Problems in Speech.** Credit arranged. Open to students in any speech area. Pr.: Junior standing and consent of instructor. 281-799-3-1506

## GRADUATE CREDIT

**281 899. Research in Speech.** Credit arranged. Pr.: Sufficient training to carry on the line of research undertaken and consent of instructor. 281-899-4-1506

## Linguistics

### UNDERGRADUATE CREDIT

**282 280. Introduction to the Study of Language.** (4). Survey of the scientific study of language. Contributions of linguistics to an understanding of the nature of language. Presupposes no previous knowledge of linguistics. Three hours lec. and one hour rec. per week. 282-280-0-1505

### UNDERGRADUATE AND GRADUATE CREDIT

**282 681. General Phonetics.** (3). Description of speech sounds and their classification according to place and manner of articulation. Exposure to the sounds of English and those of other languages. Students will acquire the ability to recognize, transcribe, and reproduce possible speech sounds. (Same as Engl. 681 and Mod. Lang. 681.) 282-681-1-1505

**282 682. Experimental Phonetics.** (3). Introduction to Experimental Phonetics (3) Study of the physiologic, acoustic and perceptual characteristics of speech Pr.: Spch. 350 & 351. 282-682-1-1505

**282 780. Introduction to Linguistics.** (3). The basic concepts of modern linguistics, with exposure to English and other languages. Provides the student with sufficient background to pursue more advanced courses. Assumes no previous linguistics study, but aimed at more mature students. (Same as Engl. 780 and Mod. Lang. 780.) 282-780-0-1505

**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 and Mod. Lang. 781.) 282-781-0-1505

**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.) 282-782-0-1505

**282 783. Phonology I.** (3). Basic concepts of the theory of language sound systems with particular reference to English but including reference to other languages as well. Pr.: Spch., Engl., or Mod. Lang. 681 and 780. (Same as Engl. 783 and Mod. Lang. 783.) 282-783-0-1505

**282 784. Phonology II.** (3). Continuation of 783. Pr.: Spch., Engl., or Mod. Lang. 783. (Same as Engl. 784 and Mod. Lang. 784.) 282-784-0-1505

**282 785. Syntax I.** (3). Basic concepts of syntactic theory, with particular reference to English but including reference to the grammatical systems of other languages as well. Pr.: Engl. 530 or Spch., Engl., or Mod. Lang. 780. (Same as Engl. 785 and Mod. Lang. 785.) 282-785-0-1505

**282 786. Syntax II.** (3). Continuation of 785. Pr.: Spch., Engl., or Mod. Lang. 785. (Same as Engl. 786 and Mod. Lang. 786.) 282-786-0-1505

**282 787. Advanced Syntax.** (3). Discussion of recent contributions in the area of English syntax or general linguistic theory. Pr.: Spch., Engl., or Mod. Lang. 785 and 786. (Same as Engl. 787 and Mod. Lang. 787.) 282-787-0-1505

**282 788. Advanced Phonology.** (3). Discussion of recent contributions in the area of English phonology or general linguistic theory. Pr.: Spch., Engl., or Mod. Lang. 783 and 784. (Same as Engl. 788 and Mod. Lang. 788.) 282-788-0-1505

**282 789. Topics in Linguistics.** (3). Seminar on a special topic in linguistics chosen from a broad spectrum of possible interest areas including history of linguistics, theories of performance, and linguistics and society. Topic to be announced for the semester in which offered. Course may be repeated for credit on another topic. Pr.: Spch., Engl., or Mod. Lang. 780. (Same as Engl. 789 and Mod. Lang. 789.) 282-789-0-1505

**282 791. 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 foreign language (includes English for native speakers of languages other than English) and Spch., Engl., or Mod. Lang. 780. (Same as Engl. 791 and Mod. Lang. 791.) 282-791-0-1505

**282 792. Field Methods in Linguistics.** (3). An introduction to techniques of collecting and analyzing linguistic data in the field. Work with non-western informants in class. Offered only on demand. Pr.: Consent of the instructor. (Same as Mod. Lang. 792 and Soc. and Anthro. 792.) 282-792-0-1505

## GRADUATE CREDIT

**282 890. Current Trends in Linguistics.** (3). Seminar on some aspect of linguistic theory seen as an important new development or as an indication of possible future direction. Pr.: Consent of the instructor. 282-890-0-1505

## 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 300 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, 1973, 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. 283-115-0-1120

**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. 283-140-1-1220

**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. 283-240-0-1220

**283 243. Introduction to Speech Pathology.** (3). A survey of communication disorders, and an introduction to the fields of speech pathology and audiology which are responsible for the clinical management of these disorders. 283-243-0-1220

**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. 283-250-0-1220

**283 255. Language Development.** (3). Basic review of the development of speech and language skills in children. 283-255-0-1220

**283 340. Hearing Problems and Hearing Tests.** (3). Study of the etiology and classification of hearing disorders. Introduction to hearing tests and measurements. 283-340-1-1220

**283 345. Clinical Procedures in Speech Pathology and Audiology.** (1). Orientation to clinical practicum. Opportunities for clinical observation of speech, language, and hearing evaluation and therapy. Study of diagnostic tools, therapy materials, equipment, and clinical procedure. Pr.: Sophomore and junior standing majors only. 283-345-0-1220

**283 350. Speech and Hearing Mechanisms I.** (3). Anatomy and physiology of normal and abnormal speech mechanisms, including respiration, phonation, resonance and articulation. 283-350-0-1220

**283 351. Speech and Hearing Mechanisms II.** (3). Study of the ear and the mechanics of hearing. Pr.: Spch. 350. 283-351-0-1220

#### UNDERGRADUATE AND GRADUATE CREDIT

**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. 283-642-0-1220

**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. 283-644-0-1220

**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. 283-645-1-1220

**283 649. Diagnostic Methods in Speech Pathology.** (3). Study of diagnostic and appraisal procedures utilized in the evaluation of speech and language disorders. 283-649-1-1220

**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. 283-650-3-1220

**283 655. Functional Language Intervention.** (3). Application of behavior modification principles to communication habilitation of language retarded children. Pr.: Spch. 642 or 645, or consent of instructor. 283-655-1-1220

**283 656. Speech and Hearing Handicapped School Child.** (3). Study of the management of the speech and hearing impaired child in the school community. Speech improvement methods, utilization of resource personnel and interprofessional relationships are treated. Pr.: Senior standing. 283-656-0-1220

**283 657. Practicum in Public School Speech and Hearing Services.** (5-8). Observation and participation in the management of speech and hearing impaired children under the supervision of selected public school speech and hearing clinicians. Pr.: Admission to student teaching and senior standing. 283-657-2-1220

**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. 283-660-3-1120

**283 740. Hearing Conservation and Rehabilitation.** (3). Principles and practices involved in conservation, preservation, and rehabilitation of hearing. Pr.: Spch. 640. 283-740-1-1220

**283 742. Laryngeal Disorders.** (3). Research and theory concerning etiologies, assessment, and clinical measurement of laryngeal pathologies. Pr.: 283 350. 283-742-1-1220

**283 745. Audiology.** (3). The clinical evaluation of hearing including the degree and type of hearing deficit and the subsequent effect on communication. Laboratory practice is required. Pr.: Spch. 340 or equivalent. 283-745-1-1220

**283 746. Disorders of Articulation.** (3). Research, theories, and principles concerning the diagnosis and management of articulation disorders. Pr.: 283 240. 283-746-1-1220

**283 750. Cleft Palate and Cerebral Palsy.** (3). Research and theory concerning etiology, characteristics, assessment and clinical management of individuals with cerebral palsy and cleft lip and/or palate. Pr.: 283 350, 645, and 646. 283-750-1-1220

**283 768. Speech Reading and Auditory Training.** (3). Principles and methods of maximizing receptive communication skills of the hearing impaired. Pr.: Spch. 640. 283-768-1-1220

#### GRADUATE CREDIT

**283 840. Neuropathologies of Speech and Language.** (3). Research and theory concerning nature, etiologies, evaluation, and principles of neuropathologies. Pr.: Spch. 645. 283-840-1-1220

**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. 283-843-1-1220

**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. 283-845-1-1220

**283 846. Stuttering.** (3). Research and theory concerned with stuttering behavior, causes, developmental factors, evaluation, and remedial procedures. Pr.: Spch. 645. 283-846-1-1220

**283 847. Practicum in Audiology and Speech Pathology.** (3-5). Audiology: Supervised clinical procedures in screening and diagnostic hearing examinations as related to rehabilitative and medical orientations. Management procedures for the hard of hearing. Hearing aid selection. Speech Pathology: Supervised clinical methods in speech pathology; experience in diagnosis, organization, and administration of treatment programs. May be repeated for a maximum of 15 credit hours. Pr.: Graduate standing in Audiology or Speech Pathology. 283-847-2-1220

**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. 283-849-0-1220

**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. 283-855-1-1220

## 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 playwrighting. 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 168). 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 playwrighting. 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; 284 160, 165, 560, 563, 664, 710, 712, 760, 763, 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. 284-050-1-1007

**284 160. Introduction to Theatre.** (3). Consideration of the basic elements of theatre: aesthetics, dramatic literature, theatre technology, and producing organizations. 284-160-0-1007

**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. 284-165-0-1007

**284 241. 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. Same as 257 241. 284-241-0-1007

**284 260. Stage Movement.** (3). A study of the technique of stage movement and an investigation of the language of gesture. Students are encouraged to have had a minimum of one semester of ballet or modern dance before entering this course, or to take dance concurrently with stage movement. 284-260-1-1007

**284 261. Fundamentals of Acting.** (3). Theory and practice of fundamental skills and techniques of acting. Major emphasis is on freeing and training the individual's imagination, intellect, body and voice through designed exercise and performed scenes. May be repeated for a total of 6 hours credit with consent of instructor. 284-261-1-1007

**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. 284-263-0-1007

**284 266. Fundamentals of Technical Production.** (3). An introduction to the technical problems of theatre production, including painting and mounting scenery, construction of costumes, and techniques of stage lighting. 284-266-1-1007

**284 268. Techniques of Makeup.** (3). Techniques of makeup for stage, movies, and television. 284-268-1-1007

**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. 284-370-0-1007

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**284 560. Advanced Stage Movement.** (3). Study in the physical development of character and advanced techniques of stage movement. May be repeated for a total of 9 hours credit by qualified students. Pr.: Spch. 260 and one semester of ballet or modern dance. 284-560-1-1007

**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. 284-561-1-1007

**284 562. Playwrighting.** (3). Theoretical study and practical application of techniques of playwriting with regard to plot, characters, and production; emphasis placed on the one-act form. May be repeated for a total of 6 hours credit. 284-562-0-1007

**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. 284-563-0-1007

**284 565. Principles 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. 284-565-1-1007

**284 567. Costuming for the Theatre.** (3). A lecture-laboratory course covering the principles and techniques of construction and design of stage costuming. May be repeated for a total of 6 hours credit. 284-567-1-1007

**284 570. History of the Theatre.** (3). A survey of the development of the theatre from ancient times to the present day. 284-570-0-1007

#### 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 improvisation of plays. Emphasis placed on both skillful guidance of the children and the pursuit of original research. 284-664-0-1007

**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.) 284-710-2-1007

**284 712. Theatre Management.** (3). Theatre management, promotion, finance, organization; emphasis on contract negotiations and use of facilities. 284-712-0-1007

**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. 284-760-0-1007

**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. 284-761-1-1007

**284 762. Advanced Playwrighting.** (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. 284-762-0-1007

**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. 284-763-1-1007

**284 764. Playwrighting 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. 562 or its equivalent and consent of the instructor. 284-764-0-1007

**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. 284-765-1-1007

**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 9 hours credit by qualified students. Pr.: Consent of the instructor. 284-766-1-1007

**284 767. Advanced Costuming for the Theatre.** (3). Studies in stage costuming: history, characterization, fabrics, construction and designing of costumes for university productions. May be repeated for a total of 6 hours credit by qualified students. Pr.: Spch. 567 or consent of the instructor. 284-767-1-1007

**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. 284-768-0-1007

**284 769. Stage Lighting.** (3). History and technique of lighting for the stage and television. May be repeated for a total of 9 hours credit. 284-769-0-1007

**284 770. Greek Theatre.** (3). Studies in the drama and stagecraft of the Greek period. 284-770-0-1007

**284 771. Roman, Medieval, and Baroque Theatre.** (3). Studies in the drama and stagecraft of the Roman, Medieval, and Baroque periods. 284-771-0-1007

**284 772. Romantic Theatre.** (3). Studies in the drama and stagecraft of the Romantic era. 284-772-0-1007

**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. 284-773-0-1007

**284 774. Avant-Garde Theatre.** (3). Studies in Avant-Garde drama and stagecraft since World War II. 284-774-0-1007

**284 775. Oriental Theatre.** (3). Studies in the drama and stagecraft of India, China, and Japan. 284-775-0-1007

**284 776. Slavic Theatre.** (3). Studies in the drama and stagecraft of the Slavic countries from 1800 to the present. Pr.: Junior standing. 284-776-0-1007

**284 777. Aesthetics of the Theatre.** (3). Principal emphasis on theoretical problems of dramatic art. 284-777-0-1007

**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. 284-778-0-1007

**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. 284-779-2-1007

#### GRADUATE CREDIT

**284 870. Seminar in Theatre.** (3). Selected topics in theatre research. May be repeated for credit with change of topic. 284-870-0-1007

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#### STATISTICS

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Arthur Dayton,\* Acting Head of Department

Professors Feyerherm,\* Fryer,\* Nassar,\* and Siotani,\*  
Associate Professors Dayton,\* Johnson, Kemp,\* Milliken,\* and Perng.\*

#### 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 (page 84), 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 Comp. Sci. 201 and one of 202, 203, 204 or 205. A student may seek a Bachelor of Science degree by satisfying the general requirements of that degree (page 84) 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 upon application directly to the agency offering such fellowships.

## Courses in Statistics

### UNDERGRADUATE CREDIT

**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. 285-200-0-1702

**285 320. Elements of Statistics.** (3) I, II, S. A basic first course in probability and statistics; frequency distributions; averages and measures of variation; probability; simple confidence intervals and tests of significance appropriate to binomial and normal populations; correlation and regression, including confidence intervals and tests of significance for bivariate populations. Pr.: Math. 100. 285-320-0-1702

**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. 285-330-0-1702

**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. 285-340-0-1702

**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. 285-341-0-1702

**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, index numbers, time series, 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 340. 285-350-0-1702

**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. 285-351-0-1702

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**285 510. Introductory Probability and Statistics I.** (3) I, S. Descriptive statistics, probability concepts and laws, sample spaces; random variables; binomial, uniform, normal and Poisson; two-dimensional variates; expected values; confidence intervals; binomial parameter, median, normal mean



and variance; testing simple hypotheses using CI's and  $\chi^2$ ; goodness of fit. Numerous applications. Pr.: Math. 222. 285-510-0-1702

**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. 285-511-0-1702

#### UNDERGRADUATE AND GRADUATE CREDIT

**285 702. Methods for Social Statistics.** (3) I. Statistical methods applied to experimental and survey data from social sciences; test of hypotheses concerning treatment means; linear regression; product-moment, rank, and bi-serial correlations; contingency tables and chi-square tests. Pr.: 285 330. 285-702-0-1702

**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; 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. 285-703-0-1702

**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. 702 or 703. 285-704-0-1702

**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. 702 or 703. 285-705-0-1702

**285 710. Sample Survey Methods.** (2) II, S. Design, conduct, and interpretation of sample surveys. Pr.: Stat. 702 or 703. Meets four times per week during second half of semester. 285-710-0-1702

**285 716. Non-Parametric Statistics.** (2) 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. Meets four times per week during second half of semester. Pr.: One previous course in statistics. 285-716-0-1702

**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. 285-720-0-1702

**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. 201 and Stat. 704 and 705 or concurrent enrollment. 285-725-0-1702

**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. 704, 705, and course in matrices. 285-730-0-1702

**285 750. Probability and Stochastic Processes I.** (3) I. Random variables; conditioning; independence; laws of large numbers; central limit theorems; generating functions, difference equations. Pr.: Math 240. 285-750-0-1702

**285 751. Probability and Stochastic Processes II.** (3) II. Markov chains; Markov processes; Wiener-Kolmogorov prediction theory; time series. Pr.: Stat. 750. 285-751-0-1702

**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. 285-770-0-1702

**285 771. Theory of Statistics II.** (3) II, S. Introduction to multivariate distributions; sampling distributions, derivation and use; estimation of parameters, testing hypothesis; multiple regression and correlation; simple experimental designs; introduction to non-parametric statistics; discrimination. Pr.: Stat. 770. 285-771-0-1702

**285 799. Problems in Probability and Statistics.** Credit arranged. I, II, S. Pr.: Stat. 703 or 770 and consent of instructor. 285-799-3-1702

#### GRADUATE CREDIT

**285 810. Seminar in Probability and Statistics.** (1) I, II. Discussion and lectures on topics in probability and statistics; one seminar talk by each student registered for credit. Pr.: Graduate standing and at least two graduate courses in statistics. 285-810-0-1702

**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. 285-820-0-1702

**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. 285-830-0-1702

**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. 285-831-0-1702

**285 840. Theory of Statistics III.** (3). Functional forms and properties of selected distribution functions. Characteristic functions. Limiting distributions. Pr.: Stat. 771. 285-840-0-1702

**285 841. Theory of Statistics IV.** (3) II. Convolutions of distributions. Theory of Runs. Distributions of order statistics. Sequential analysis. Pr.: Stat. 840. 285-841-0-1702

**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. 285-860-0-1702

**285 861. Linear Models II.** (3) II. Generalized inverses; polynomial regression; experimental design, variance-component, and mixed models. Pr.: Stat. 860. 285-861-0-1702

**285 898. Master's Report.** (2) I, II, S. Pr.: Consent of instructor. 285-898-4-1702

**285 899. Master's Thesis Research.** Credit arranged. I, II, S. Pr.: Consent of instructor. 285-899-4-1702

**285 945. Problems in Statistical Consulting.** Credit arranged. I, II, S. Principles and practices of statistical consulting. Supervised experience in consultation and consequent research concerning applied statistics and probability associated with on-campus investigations. Pr.: Stat. 704, 705 and 771. 285-945-2-1702

**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. 285-950-0-1702

**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. 285-965-0-1702

**285 966. Multivariate Analysis II.** (3) II. Classification and discrimination; canonical correlations; distributions of roots of determinantal equations; multivariate analysis of variance; union-intersection principles; simultaneous confidence estimation; multiple comparisons; nonparametric multivariate inference. Pr.: Stat. 965. 285-966-0-1702

**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. 285-990-0-1702

**285 991. Foundations of Probability II.** (3) II. Conditional

random variables, martingales, ergodic theorems. Pr.: Stat. 990. 285-991-0-1702

**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. 285-995-0-1702

**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. 285-996-0-1702

**285 999. Research in Statistics.** Credit arranged. I, II, S. Pr.: Consent of instructor. 285-999-4-1702



# the college of business administration

Robert A. Lynn,\* Dean

John T. Donnelly,\* Associate Dean

Mildred E. Buzenberg, Assistant Dean

Professors Barton-Dobenin,\* Fox,\* Jones,\* Laughlin,\* and Lynn;\* Associate Professors Coleman,\* Donnelly,\* Graham,\* Gugler,\* King,\* Richards, Thiessen, and Vaden;\* Assistant Professors Brown,\* Buzenberg, Gentry,\* Gudgell, Hollinger, Jauch,\* Miller, Min, Nezzer, Norvell,\* Reutzel, and Riley; Instructors Ginn, May, Stewart, Stockard, and Streit; Assistant Instructor Clement; 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 obtain a position in business, and (4) the proven ability to think creatively and analytically in order to 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.



## 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.

### Communications

229 100	English Composition I	3
229 120	English Composition II	3
281 106	Oral Communications Ia	3
	Communication Electives	2-3
		11-12

### Social Science

269 325	U.S. Politics	3
273 110	General Psychology	3
277 220	Introduction to Sociology	3
		9

### Quantitative

245 100	College Algebra	3
245 500	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	2
286 201-205	Language Lab	1
		15

### General Electives

	Social Science	3
	Humanities	6
	Natural Science*	6
	Social Science, Humanities or Natural Sciences	6
		21

### Business and Economics

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
305 695	Business Policy	3
305 696	Business and Society	3
	Economics Electives	6
	Major field (see below)	18
		58

### Other

	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 I	3
305 271	Cost Accounting	3
305 361	Intermediate Accounting II	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 I **	3
305 663	Auditing II	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 I	3
305 350	Insurance	3
305 361	Intermediate Accounting II	3
305 552	Real Estate	3
305 553	Business Risk Management	3
305 653	Portfolio Management	3
305 692	Applications of the Computer in Business	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
305 692	Applications of the Computer in Business	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

#### Marketing

	<b>Required:</b>	
305 540	Consumer Behavior	3
305 640	Marketing Research	3
305 642	Marketing Strategy	3
305 643	Promotional Administration	3
	<b>Plus six hours selected from:</b>	
305 541	Retailing	3
305 542	Sales Management	3
305 543	Sales Communications	3
305 641	Marketing Logistics	3
305 692	Applications of the Computer in Business	3

#### Management

	<b>Required:</b>	
305 520	Organizational Behavior	3
305 521	Quantitative Management	3
305 531	Personnel and Wage Administration	3
305 622	Decision Analysis	3
	<b>Plus six hours selected from:</b>	
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
305 691	Business Measurements and Forecasting	3
305 692	Applications of the Computer in Business	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

	<b>Required:</b>	
305 111	Production Typing	3
305 213	Transcription	3
305 310	Office Practice and Techniques	3
305 311	Office Management	3
	<b>Plus six hours selected from:</b>	
305 210	Office Machines	3
305 350	Insurance	3
305 391	Administrative Communications	3
305 292	Business Law II	3
305 531	Personnel and Wage Administration	3
305 552	Real Estate	3
305 590	Women in Business	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 I.



## 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 August 1, 1973, or all students graduating after August 1, 1977. 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 I .....	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
		<hr/> 49

## 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.

## 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 transferable. 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
	<hr/> 15

Second Semester	Credit Hours
English Composition II .....	3
American Government .....	3
Accounting II .....	3
Humanities Electives .....	3
Social Science Electives .....	3
Physical Education .....	0
	<hr/> 15

Third Semester	Credit Hours
Economics I .....	3
Managerial and Cost Controls .....	3
Fund. of 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 Ad-

\*\*The prerequisite of College Algebra for Business Administration students is 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.



ministration. The final decision regarding admission of an applicant is made by the dean of the 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 bachelor's 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. A score of 450 or higher is an admission requirement which is waived only in exceptional cases where other strengths are demonstrated. 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 .....		24

<b>Option A:</b>		
Required core .....		24
Elective area* .....		6
Written comprehensive exams required .....		0
Hours required for graduation .....		30

\* Elective areas include, but are not necessarily limited to, the following: computer science; economics; finance; industrial relations; management; marketing; operations research (industrial engineering); political science; psychology; sociology; statistics.

<b>Option B:</b>		
Required core .....		24
Master's thesis .....		6
Oral defense of thesis required .....		0
Hours required for graduation .....		30

## 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 .....	13
Economics .....	9
Business Finance .....	3
Business Law .....	3
Management .....	3
Marketing .....	3
Statistics .....	3
Math through Calculus .....	-
	<hr/>
	37

**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. In 1975, the regulations required students to elect courses 861 and 862.

<b>Required:</b>		
305 820	Behavioral Management Theory .....	3
305 850	Financial Controls for Business .....	3
305 860	Accounting Theory I .....	3
305 890	Decision Theory of the Firm .....	3
305 891	Legal and Social Environment .....	3
		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 II .....	(3)
305 861	Accounting Theory II .....	(3)
305 862	Tax Planning and Research .....	(3)
Written comprehensive exams required .....		0
		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. 305-101-0-0501

**305 110. Intermediate Typing.** (3) I, II. 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. 305-110-0-0514

**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. 305-111-0-0514

**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. 305-112-0-0514

**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. 305-202-0-0506

**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. 305-210-1-0501

**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. 305-212-0-0514

**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. 305-213-0-0514

**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. 305-260-0-0502

**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. 305-261-0-0502

**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. 305-270-0-0501

**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. 305-271-0-0502

**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. 305-292-0-0501

**305 293. Black Business Studies.** (2-3) Intersession, II. Offered on sufficient demand. 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. 305-293-0-0501

**305 294. World Business — A Field Study.** (2) Spring Intersession. A concentrated study tour of businesses in selected world industrial centers outside the continental United States. 305-294-2-0504

**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. 305-300-0-0501

**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. 305-310-0-0514

**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. 305-311-0-0506

**305 350. Insurance.** (3) I, II, S. 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. 305-350-0-0512

**305 361. Intermediate Accounting II.** (3) I, II, S. Statement analysis and special problems peculiar to the corporate form of organization. Pr.: 305 261. 305-361-0-0502

**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. 305-391-0-0501

**305 392. Business Law II.** (3) I, II. 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. 305-392-0-0501

**305 399. Honors Seminar in Business.** (1) I, II. Readings and discussions on selected topics. A maximum of four hours credit may be obtained. 305-399-0-0501

**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. 305-420-0-0506

**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. 305-421-0-0506

**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. 305-440-0-0509

**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. 305-450-0-0504

**305 460. Advanced Accounting.** (3) I, II. Accounting for partnerships, installment sales, consignments, consolidated statements, and other special topics. Pr.: 305 260 and 261. 305-460-0-0502

**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. 305-461-0-0501

**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. 305-465-2-0502



**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. 305-495-2-0501

#### 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. 305-520-0-0501

**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. 305-521-0-0506

**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. 305-530-0-0513

**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. 305-531-0-0515

**305 540. Consumer Behavior.** (3) I, S. 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. 305-540-0-0509

**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. 305-541-0-0509

**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. 305-542-0-0509

**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. 305-543-0-0509

**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. 305-550-0-0504

**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. 305-551-0-0505

**305 552. Real Estate.** (3) II, S. Principles and practices including legal, economic and social implications from the viewpoint of the real estate practitioner, investor and society. Pr.: Junior standing. 305-552-0-0511

**305 553. Business Risk Management.** (3) I. Development of risk management and insurance programs for the business firm. Risk identification, evaluation and treatment for business property and life insurance, group insurance and pension fund programs. Pr.: 305 450. 305-553-0-0501

**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. 305-590-0-0501

**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. 350-622-0-0501

**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. 305-630-0-0516

**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. 305-631-0-0501

**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. 305-632-0-0516

**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. 305-640-0-0500

**305 641. Marketing Logistics.** (3) I. 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. 305-641-0-0501

**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. 305-642-0-0509

**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. 305-643-0-0501

**305 650. Capital Budgeting.** (3) Development of a rational and systematic approach to formulating a firm's strategy for investing in productive facilities within an economy characterized by increasing technological change and uncertainty. Pr.: 245 500, 285 350 and 305 450. 305-650-0-0501

**305 651. Financial Management.** (3) II. Analysis of problems in advanced financial planning and control. Pr.: 245 500, 285 350 and 305 450. 305-651-0-0501

**305 653. Portfolio Management.** (3) II. A theoretical and empirical synthesis of institutional investment decision-making. Concentrates on selecting the optimal investment set. Pr.: 245 220 or 500, 285 351 and 305 450. 305-653-0-0501

**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. 305-660-0-0502

**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. 305-661-0-0502

**305 662. Auditing I.** (3) I, II. Theory and procedures used in balance sheet audits. Pr.: 305 361. 305-662-0-0502

**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. 305-663-0-0502

**305 665. Computer Applications in Accounting.** (3) I. Study of the computer as an accounting tool. Emphasizes applications to custodial, performance and decision functions. Pr.: 286 200 and 201 or 202, and 12 hours of accounting. 305-665-0-0502

**305 666. Advanced Managerial Controls.** (3) II. Control of operations through budgeting, cost analysis and income determination. Emphasizes use of accounting data for decision making. Pr.: 225 110 and 120, 305 450 and 10 hours of accounting. 305-666-0-0501

**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. 305-690-0-0513

**305 691. Business Measurements and Forecasting.** (3) II. Analysis of business data, with emphasis on selection and the use of information for executive decisions. Topics include current economic indicators, forecasting techniques, and business data sources. Pr.: 285 350 or consent of instructor. 305-691-0-0501

**305 692. Application of the Computer in Business.** (3) II. A study of computer solutions of business problems. Programs will be developed in Information Systems, Location, PERT, Inventory Control, Simulation and Finance. Pr.: 286 200 and 285 350. 305-692-0-0501

**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. 305-695-0-0501

**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. 305-696-0-0501

**305 698. Problems in Business Administration.** Credit arranged. I, II, S. Pr.: Background of courses needed for the problem undertaken. 305-698-3-0501

**305 699. Problems in Accounting.** Credit arranged. I, II, S. Pr.: Background of courses needed for the problem undertaken. 305-699-3-0502

**305 770. Controllership.** (3) I. Emphasis on control of operation through cost analysis, internal and external reporting, and income determination concepts. Pr.: 305 270. 305-770-0-0501

#### 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. 305-820-0-0506

**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. 305-840-0-0509

**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. 305-841-0-0509

**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. 305-850-0-0506

**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. 305-860-0-0502

**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. 305-861-0-0502

**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 hours in accounting and 305 461. 305-862-0-0502

**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. 305-870-0-0502

**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. 305-890-0-0501

**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. 305-891-0-0501

**305 892. Research Methods in Business.** (3) I. Application of statistical methods of analysis to problems in business. Experimental design, data collection and methods of analysis are covered. Pr.: 285 350 and 305 420. 305-892-0-0503

**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. 305-893-0-0501

**305 898. Research in Business Administration.** Credit arranged. I, II, S. Pr.: Sufficient training to carry on the line of research undertaken. 305-898-4-0501

**305 899. Thesis Research.** Credit arranged. I, II, S. Pr.: Sufficient background to pursue line of research undertaken and consent of instructor. 305-899-4-0501



# the college of education

Samuel R. Keys, Dean

Jordan Utsey, Associate Dean

J. Harvey Littrell, Coordinator of Graduate Studies

Margaret C. Bloomquist, Assistant to the Dean and Director of Student Personnel Services

Willard J. Nelson, Director, Pre-education Advisement Center

Roy A. Bartel, Coordinator of Field Experiences

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 schools, secondary schools, and adult programs, 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, 8) providing graduate programs for positions in education at the graduate level, and 9) providing programs to prepare teachers and other personnel in adult education.

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 undergraduate Teacher Education Programs and the Master of Science and Doctor of Philosophy Degree 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

Eddy Van Meter, 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 will determine the resources, human and other, that will be coordinated through agreement.

## INSTRUCTIONAL MEDIA CENTER

Fred A. Teague, Director

The Instructional Media Center provides a wide range of services, instructional materials and audiovisual equipment for faculty and students.



Materials such as tapes, overhead transparencies, slides, films and displays are produced for faculty members. Students use the Media Center to prepare similar materials for use in class projects and in student teaching. Audiovisual equipment of all types is maintained and provided by the Center. The instructional materials collection includes films, filmstrips, slides and tapes used in teacher education.

A Video Recording Studio is provided for use in the production of instructional television recordings. The Instructional Media Center also includes an outstanding Audio Recording Studio. These studios accommodate production and reproduction of a wide variety of audio and video recorded teaching and individual study materials.

Facilities are available for group and individual uses of instructional media. Rooms are provided for group viewing of films and video tapes. An Independent Development Laboratory is provided for the use of instructional materials on an individual basis. The laboratory includes learning spaces which are provided with all materials and equipment needed for totally individualized instruction.

## 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 on either the elementary or secondary levels will enroll in the appropriate pre-professional curriculum: Elementary (402) or Secondary (404). **Exceptions to the above:** Students majoring in agricultural education, home economics education, music education, and physical education 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 adviser in Room 110 Holton Hall. Refer to the sections Bachelor of Science in Elementary Education, page 185, and Bachelor of Science, page 186, for further information.

**Transfer Students.** Students transferring as freshmen or sophomores will enroll in one of the pre-professional curriculums as indicated in the Pre-Education paragraph. Students transferring as juniors or seniors (53 hours minimum) will enroll in Elementary Curriculum (410), Elementary — special education — Curriculum (411) or one of the appropriate Secondary Education Curriculums 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 students on selection of courses to meet Kansas State University 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 EDUCATION

**Adult Education.** The Adult Education program is designed to develop competencies essential to persons working with adults in educational settings. These settings include proprietary schools, rehabilitation agencies, employment security, hospitals, industry, government, public community schools and colleges, religious institutions, military, voluntary and benevolent associations, other settings, and other non-certified programs. The Adult Education Bachelor's Degree Program is not to be used for vocational certification.

The program in adult education requires (1) General education studies, (2) Professional education studies and (3) Area of concentration as outlined in the section entitled Bachelor of Science Curriculum in Adult Education.

**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 Curricula in Secondary Education. 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 PROGRAMS IN EDUCATION

**Adult Education.** Any student intending to enter Adult Education must have the Application for Admission to Adult Education filed and approved before the student may enroll in any of the following courses:

405 315	Educational Psychology II
405 611	Educational Sociology
410 633	Practicum in Adult Education

The Application for Admission to the Adult Education Program must be approved before a change into the Adult Education Curriculum may be completed. The application forms are available in the Office of Student Personnel Services, College of Education, Holton Hall Room 111.

**Teacher Education.** 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 student may be transferred from the Pre-Professional to the Professional Program. 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 and Adult Education 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 and Adult Education:** (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 and Adult 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 IC.
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-Professional Elementary

Curriculum (402) in the College of Education for the freshman and sophomore years. Freshmen and sophomores are advised by a College of Education pre-education adviser in Room 110 Holton Hall. The adviser is available for advising and counseling students concerning the courses essential for entry into the Teacher Education Program.

All sophomores must make application for admission to the Teacher Education Program. When the applications are approved, students are transferred into the Teacher Education Professional Program. Students are reassigned from a pre-education adviser to an elementary education adviser.

### GENERAL EDUCATION REQUIREMENTS

**Humanities** ..... minimum requirement 12 sem. hours  
Required: English Composition I & II. (A minimum grade of "C" is required in at least one of the courses.) A course in Speech. (A minimum grade of "C" required.) Modern Foreign Language, Linguistics, or Literature.

**Psychology** ..... minimum requirement one course  
Required: General Psychology, 273 110.

**Social Sciences** ..... Minimum requirement 9 sem. hours.  
(Psychology not included here. See general education electives below.)  
Required: Courses must be selected from Anthropology, Economics, Geography (excluding 235 220 and 235 420), History, Political Science, Sociology. The total of Social Sciences & General Psychology must be a minimum of 12 sem. hours.

**Natural Sciences** ..... minimum requirement 12 sem. hours  
Required: At least one biological science course, and at least one physical science course. One laboratory course.

**Mathematics** ..... minimum requirement 3 sem. hours  
Course recommended: Mathematics 245 508 "Topics in Mathematics for Elementary School Teachers." No mathematics may apply to the Natural Sciences requirement.

**General Education Electives** ..... 11-12 sem. hours.  
Electives must be selected from any area included above and / or general religion, philosophy, art and music history, literature, appreciation of art, music and theatre, and Humanities courses.

The minimum total hours required in General Education ..... 50

**Physical Education Requirement:**  
261 001 Concepts in Physical Education, credit  
261 Lifetime Sports Activity, credit

### 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
	OR	
261 369	PE 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

**Clinical Experiences:**  
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  
Health Education  
Home Economics

(Continued on next page)



Music and Art  
 Social Science  
 English and Speech  
 Modern Foreign Language  
 Physical Sciences and Mathematics  
 Special Education (Learning Disabilities, Mental Retardation,  
 Emotionally Disturbed, Speech Pathology)  
 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 ..... 12  
 Total credit hours required for graduation ..... 126

**BACHELOR OF SCIENCE**

**Curriculum in Adult Education.** For the freshman and sophomore years, students who wish to teach or pursue career ladders as other personnel in adult education are enrolled in the Pre-Professional Curriculum (401) in the College of Education. Freshmen and sophomores are advised by the College of Education pre-professional adviser in Room 110 Holton Hall. The adviser is available for advising and counseling students concerning the courses essential for entry into the Adult Education Program.

All sophomores make application for admission into the Adult Education Program. When students are accepted into the Adult Education Curriculum (450), they are reassigned from the pre-professional adviser to an adult education adviser.

**GENERAL EDUCATION REQUIREMENTS**

**Humanities** ..... minimum requirement 12 sem. hours  
 Required: English Composition I & II (A minimum grade of "C" is required in at least one of the courses.) A course in Speech (A minimum grade of "C" required.) Modern Foreign Language, Linguistics, or Literature.

**Psychology** ..... minimum requirement one course  
 Required: General Psychology, 273 110.

**Social Sciences** ..... minimum requirement 9 sem. hours  
 (Psychology not included here. See general education electives below.)  
 Required: Courses must be selected from Anthropology, Economics, Geography (excluding 235 220 and 235 420), History, Political Science, Sociology. The total of Social Sciences & General Psychology must be a minimum of 12 sem. hours.

**Natural Sciences and Mathematics** .. minimum requirement 12 sem. hours  
 Required: At least one biological science course, and at least one physical science course. One laboratory course. A maximum of 4 hours of mathematics may apply, but not substitute for a Physical Science. Mathematics may include statistics or computer science.

**General Education Electives** ..... 14-15 hours  
 Electives must be selected from any area included above and/or general religion, philosophy, art and music history, literature, appreciation of art, music and theatre, and Humanities courses.

The minimum total hours required in General Education ..... 50

**Physical Education Requirement:**

261 001 Concepts in Physical Education, credit  
 261 Lifetime Sports Activity, credit

**PROFESSIONAL EDUCATION**

The following course may be taken before a student is admitted to the Adult Education Curriculum:

410 680 Introduction to Adult Education ..... 3

A student must be admitted to the Adult Education Curriculum before enrolling in the following three courses:

405 315 Educational Psychology II ..... 3

405 611 Educational Sociology ..... 3

410 633 Practicum in Adult Education ..... 3-6  
 Professional Education electives ..... 25-28

Total hours required in Professional Education ..... 40

**AREA OF CONCENTRATION**

The hours selected from the field of concentration are in addition to those taken to meet General Education Requirements and may not be

Professional Education courses. Concentrations are offered in the following fields:

Agriculture  
 Art  
 Architecture  
 Business  
 Computer Science  
 Economics  
 English and Speech  
 Engineering  
 Family and Child Development  
 Home Economics  
 Humanities  
 Journalism & Mass Communications  
 Modern Languages  
 Music  
 Natural Sciences  
 Nursing  
 Psychology  
 Recreation and Physical Education  
 Social Sciences  
 Statistics and Mathematics  
 Vocational (skill areas)

Total hours required in Area of Concentration ..... 15

**ELECTIVES** ..... 21

Total credit hours required for graduation ..... 126

**Curricula in Secondary Education.** For the freshman and sophomore years, students preparing to teach in the secondary school are enrolled in the Pre-Professional Secondary Curriculum (404) in the College of Education. Exceptions are students majoring in agricultural education, home economics education, music education, and physical education. 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. 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 College of Education Professional Program. Students are reassigned from the Pre-Education Adviser to a Secondary Education adviser but retain their advisers in their major fields.

There are 22 subject fields applicable to teaching at the secondary level.

**GENERAL EDUCATION REQUIREMENTS**

**Humanities** ..... minimum requirement 12 sem. hours  
 Required: English Composition I & II (A minimum grade of "C" is required in at least one of the courses.) A course in Speech. (A minimum grade of "C" required.) Modern Foreign Language, Linguistics, or Literature.

**Psychology** ..... minimum requirement one course  
 Required: General Psychology, 273 110.

**Social Sciences** ..... minimum requirement 9 sem. hours  
 (Psychology not included here. See general education electives below.)  
 Required: Courses must be selected from Anthropology, Economics, Geography (excluding 235 220 and 235 420), History, Political Science, Sociology.

**Natural Sciences and Mathematics** .. minimum requirement 12 sem. hours  
 Required: At least one biological science course, and at least one physical science course. One laboratory course. A maximum of 4 hours of mathematics may apply, but not substitute for a Physical Science. Mathematics may include statistics or computer science.

**General Education Electives** ..... 14-15 sem. hours  
 Electives must be selected from any area included above and/or general religion, philosophy, art and music history, literature, appreciation of art, music and theatre, and Humanities courses.



**Physical Education Requirement:**

261 001	Concepts of Physical Education, credit
261	Lifetime Sports Activity, credit

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 ..... 24

**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 credit hours required for graduation ..... 126

**AGRICULTURAL EDUCATION (AED 075)**

Students planning to be agricultural education majors will be enrolled in and receive their degrees from the College of Agriculture. See page ??.

**SECONDARY EDUCATION MAJOR FIELDS****ART EDUCATION (EAR 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	Graphic Design 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	Metalsmithing and Jewelry	2
Art	209 290	Lettering	2
Art	209 545	Twentieth Century Art History I	3
Art	209 600	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, graphics design, drawing ..... 6

**BUSINESS EDUCATION (EBU 421)**

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.	305 261	Inter. Accounting I	3
		OR	
B.A.	305 270	Manag. & Cost Contr.	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 Accounting	6

Supporting courses required:

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 Programming	3
Fam. Econ.	630	Family Economics electives	3

**ENGLISH (EED 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
		OR	
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.	229 350	Intro. to Shakespeare	3
		OR	
Engl.	229 650	Shakespearean Drama I	3
Engl.	229	Literature electives, 6 hours at 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 degrees from the College of Home Economics. See page 245. Completion of this Program satisfies State of Kansas requirements for Vocational Home Economics certification.

**JOURNALISM (EJO 423)**

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 Management	2
Journ.	289 555	Advertising Copy and Layout	3
Journ.	289 605	Supervision of School Publications	3
Journ.	289 610	Interpretation of Contemp. Affairs	3
Journ.	289 660	History of Journalism	3
Journ.	289 685	The Journalist in a Free Society	3

**MATHEMATICS (EMA 424)**

Math.	245 220	Analytic Geom. and Calc. I	4
Math.	245 221	Analytic Geom. and Calc. II	4
Math.	245 222	Analytic Geom. and Calc. III	4
Math.	245 240	Series and Differential 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.	245 612	Finite Appl. of Math.	3
Math.	245 619	Foundations of Analysis	3
Math.	245 717	The Real Number System	3
Math.	245 771	Transformation and Vector Geometry	3
Math.	245 791	Topics in Mathematics for Secondary School Teachers	3

Supporting courses required:

Stat.	285 320	Elements of Statistics	3
		OR	
Stat.	285 510	Introductory Probability and Statistics I	3

It is recommended that a course in physics and a course in computer programming be included as part of general education.

**PSYCHOLOGY (EPY 426)**

Psych.	273 110	General Psychology	3
Psych.	273 250	Experimental Methods in Psychology	4
Psych.	273 420	Personality Development	3



Psych.	273 435	Social Psychology .....	3
Psych.	273 460	Information Processing and Memory .....	3
		OR	
Psych.	273 475	Principles of Learning and Motivation .....	3
		OR	
Psych.	273 480	Fundamentals of Perception and Sensation .....	3
Psych.	273	Psychology electives .....	2
		(excluding Ed. Psych. I & II)	
Supporting courses required:			
Stat.	285 320	Elements of Statistics .....	3
		OR	
Stat.	285 330	Stat. for Soc. Sc. Majors .....	3
A&F	405 715	Principles of Measurement ..	3
A&F	405 721	Mental Hygiene in the School and Community ....	3

Completion of a second teaching field based on minimum College of Education requirements.

#### MODERN LANGUAGES (EML 425)

30 hours in one language.

A second teaching field is recommended.

Elective courses in the following departments are recommended: Speech (Linguistics), History, Anthropology, and Philosophy.

Early experience as a teacher's aide is recommended. Make arrangements with Modern Language Education adviser.

#### MUSIC EDUCATION (MED 272)

Students planning to be music education majors will be enrolled in and receive their degrees from the College of Arts and Sciences. See page 144.

#### PHYSICAL EDUCATION (MPE 273 and WPE 274)

Students planning to be physical education majors will be enrolled in and receive their degrees from the College of Arts and Sciences. See page 119.

#### SPEECH (ESP 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 (EBI 430)

Biol.	215 198	Principles of Biology .....	4
Biol.	215 201	Organismic Biology .....	4
Biol.	215 555	Microbiology .....	4
Biol.	215 535	Cell Biology .....	3
Biol.	215 303	Ecosystems and Society ....	3
		OR	
Biol.	215 537	Ecology .....	3
AS&I	005 500	Genetics .....	3
		OR	
Biol.	215 650	Molecular Genetics .....	3

8 hours of Biology electives (minimum 3 courses). It is strongly suggested that the following courses be considered:

Entom.	030 311	Gen. Entomology .....	3
Biol.	215 310	Biology and the Future of Man .....	3
Biol.	215 420	Developmental Biology I ....	3
Biol.	215 640	Human Heredity and Evolution .....	2
Biol.	215 660	Evolution .....	3

Supporting courses required:

##### Chemistry Option A:

Chem.	221 110	General Chemistry .....	5
Chem.	221 190	Elem. Organic Chemistry ....	3
Chem.	221 191	Elem. Organic Chemistry Lab. ....	2
Biochem.	020 200	Elem. Biochemistry .....	5

##### Chemistry Option B:

Chem.	221 210
Chem.	221 230
Chem.	221 250
Chem.	221 350
Geol.	234 512
Geol.	234 130
Phys.	265 115

Chemistry I .....	5
Chemistry II .....	3
Chemistry II Lab. ....	2
General Organic Chemistry ..	3
Earth Science .....	3
El. Geo. Lab. ....	1
Descriptive Physics .....	4

Additional courses highly recommended:

C&I	415 614	Lab Techniques .....	2
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#### CHEMISTRY (ECH 431)

Chem.	221 210
Chem.	221 230
Chem.	221 271
Chem.	221 350
Chem.	221 351
Chem.	221 500

Chemistry I .....	5
Chemistry II .....	3
Chemical Analysis .....	4
Gen. Organic Chemistry ....	3
Gen. Organic Chemistry Lab. .	2
Descriptive Phys. Chemistry .	3
(A substitution may be Phys. Chem. 585 & 586.)	

Chem.	221	Chemistry electives .....	5
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Supporting courses required:

Biol.	215 198
Biol.	215 201
Math.	245 220
Math.	245 221

Principles of Biology .....	4
Organismic Biology .....	4
Analytic Geom. & Calc. I ....	4
Analytic Geom. & Calc. II ....	4

##### Physics Option A:

Phys.	265 113
Phys.	265 114

General Physics I .....	4
General Physics II .....	4

##### Physics Option B:

Phys.	265 213
Phys.	265 214

Engineering Physics I .....	5
Engineering Physics II .....	5

Additional courses highly recommended:

Math.	245 222
Chem.	221 799

Analytic Geom. & Calc. III ...	4
Problems in Chemistry ..	Credit Variable
Lab Techniques .....	2

#### EARTH SCIENCE (EEA 432)

Geol.	234 100
Geol.	234 130
Geol.	234 512
Geol.	234 520
Geol.	234 560
Geog.	235 220

Geology I .....	3
Elem. Geol. Lab. ....	1
Earth Science .....	3
Geomorphology .....	4
Mineralogy .....	4
Environmental Geography I .	4

Supporting courses required:

Biol.	215 198
Biol.	215 201
Chem.	221 210
Chem.	221 230
Chem.	221 250
Math.	245 100
Math.	245 150
Phys.	265 113
Phys.	265 114
Phys.	265 191
Phys.	265 193

Principles of Biology .....	4
Organismic Biology .....	4
Chemistry I .....	5
Chemistry II .....	3
Chemistry II Lab. ....	2
College Algebra .....	3
Plane Trigonometry .....	3
General Physics I .....	4
General Physics II .....	4
Descriptive Astronomy .....	3
Descriptive Meteorology .....	3

Additional course highly recommended:

C&I	415 614	Lab Techniques .....	2
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#### PHYSICAL SCIENCE (EPS 434)

##### Physics Option A:

Phys.	265 113
Phys.	265 114

General Physics I .....	4
General Physics II .....	4

##### Physics Option B:

Phys.	265 213
Phys.	265 214

Engineering Physics I .....	5
Engineering Physics II .....	5

4 hours Physics electives selected from the following:

Phys.	265 191
Phys.	265 193
Phys.	265 451
Phys.	265 506

Descriptive Astronomy .....	3
Descriptive Meteorology ....	3
Modern Physics .....	3
Physics Lab. I .....	3

Supporting courses required:

Chem.	221 210
Chem.	221 230
Chem.	221 250
Chem.	221 350
Chem.	221 351
Geol.	234 100
Geol.	234 130
Geol.	234 512

Chemistry I .....	5
Chemistry II .....	3
Chemistry II Lab. ....	2
General Organic Chem. ....	3
General Organic Chem. Lab. .	2
Geology I .....	3
El. Geol. Lab. ....	1
Earth Science .....	3



## Supporting courses required:

Biol.	215 198	Principles of Biology .....	4
Biol.	215 201	Organismic Biology .....	4
Math.	245 220	Analytic Geom. and Calc. I ...	4
Math.	245 221	Analytic Geom. & Calc. II ....	4

## Additional course highly recommended:

C&I	415 614	Lab Techniques .....	2
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## PHYSICS (EPH 435)

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 I .....	3

## Supporting courses required:

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 Geom. & Calc. I ....	4
Math.	245 221	Analytic Geom. & Calc. II ....	4
Math.	245 222	Analytic Geom. & Calc. III ...	4
Math.	245 240	Series & Differential Equations .....	4

## Additional courses highly recommended:

C&I	415 614	Lab Techniques .....	2
Geol.	234 512	Earth Science .....	3
Geol.	234 130	El. Geol. Lab. ....	1

## SOCIAL SCIENCE MAJORS

## ECONOMICS (EEC 437)\*

Econ.	225 110	Economics I .....	3
Econ.	225 120	Economics II .....	3
Econ.	225 510	Inter. Macroeconomics .....	3
Econ.	225 520	Inter. Microeconomics .....	3

15 hours of Economics courses numbered 500 and above, selected with advice of Economics and Education advisers.

## Supporting courses required:

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.	285 350	Bus. & Econ. Stat. I .....	3
		OR	
Stat.	285 330	Elem. Stat. for Soc. Sci. ....	3

## One of the following four courses:

B.A.	305 260	Fund. of Accounting .....	4
Math.	245 220	Analytic Geom. & Calc. I ....	4
Math.	245 500	Intro. to Analytic Processes .....	3
Stat.	285 351	Bus. & Econ. Stat. II .....	3

## Social Science electives:

Hist.	241	Additional courses in U.S. History .....	6
		OR	
Pol. Sci.	269	Political Science courses .....	9

## GEOGRAPHY (EGO 436)\*

Geog.	235 220	Environmental Geog. I .....	4
Geog.	235 420	Environmental Geog. II .....	4
Geog.	235 440	Geography of Extractive Industry .....	3
Geog.	235 450	Geography of Manufacturing and Commerce .....	3
Geog.	235 470	Cartography .....	3
Geog.	235 480	Pro-Seminar in Geography ...	2
Geog.	235	Additional Geography courses 600 level and above .....	9

## Supporting courses required:

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
Pol. Sci.	269 110	Principles of Pol. Sci. ....	3
Soc.	277 211	Intro. to Sociology .....	3

## HISTORY (EHI 438)\*

Hist.	241 101	Rise of Europe .....	3
Hist.	241 102	Modern Era .....	3
Hist.	241 251	U.S. History to 1877 .....	3
Hist.	241 252	U.S. History since 1877 .....	3
Hist.	241 397	Junior Seminar in Historiography .....	3
Hist.	241 599	Senior Seminar .....	3
		OR	
Hist.	241	Approved alt. above 500 .....	3

12 hours of courses numbered 500 and above distributed in three of the following fields:

- (a) Ancient, Medieval and Early Modern Europe
- (b) Modern Europe Including Britain
- (c) Third World (Asia, Africa, Latin America)
- (d) The United States
- (e) History of Science, History of Technology, Military History

## Supporting courses required:

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

## POLITICAL SCIENCE (EPL 439)\*

Pol. Sci.	269 110	Principles of Pol. Sci. ....	3
Pol. Sci.	269	Political Science courses .....	21

## Supporting courses required:

Econ.	225 110	Economics I .....	3
Geog.	235 100	World Regional Geography ..	3
Hist.	241 101	Rise of Europe .....	3
Hist.	241 102	Modern Era .....	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

## SOCIOLOGY (ESO 440)\*

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.) .....

## Supporting courses required:

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

## 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.

\* 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.



## 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 Field Experiences not later than December 20 of the year preceding the professional semester. This application must be made even though all admission requirements to the Professional Semester are not fully satisfied at the time of the application. The application will be obtained from the College of Education adviser and returned to the Coordinator of Field Experiences. Junior and senior transfer students from other educational institutions should file the application immediately upon enrollment.

## ADMISSION TO THE PROFESSIONAL SEMESTER

The Coordinator of Field Experiences 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 Field Experiences 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."

## PROFESSIONAL SEMESTER OPTIONS

### A. Requirements for ALL applicants to the Professional Semester:

1. Full admittance to a Teacher Education Program.
2. Completion of 90 semester hours.
3. An overall grade-point average of 2.2 in all course work attempted at KSU.
4. Satisfactory completion of:
  - 405 215 Educational Psychology I
  - 405 315 Educational Psychology II
  - 415 316 Introduction to Instructional Media
5. Recommendation by the College of Education Adviser.
6. Clearance by the Dean of Students. (Obtained by the Coordinator of Field Experiences.)
7. Physical Examination by the Student Health Center or by a licensed physician.

a. Physicals are taken no later than the semester preceding the professional semester.

b. A copy of the physical examination must be on file in the office of the Coordinator of Field Experiences before a student teaching assignment will be finalized.

### 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

**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
		<hr/>
		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
		<hr/>
		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
		<hr/>
		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
		<hr/>
		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
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		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
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### 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
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		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 request 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, social science, 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 may be obtained from the Office of the Coordinator of Field Experiences. This Request Form should be returned to the Office of the Coordinator of Field Experiences by:

September 25 for students participating in the Spring Professional Semester

February 25 for 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.

**Resident Graduate Credit in Off-Campus Centers.** The College of Education has established a series of Centers located throughout the State of Kansas for the purpose of offering course work to students in the field. Residence credit toward a graduate degree may be earned in courses that are offered through the College of Education. These courses will be offered as a convenience to graduate students who are working full-time in the areas nearby these Centers. It is not expected that students will complete all their requirements in Centers but will be using the Centers only during the academic year and finishing their course work during summers on campus.

**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, Occupational 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 the student's 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 the 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) General Education, (2) Adult & Continuing Education, (3) Educational Administration, (4) Educational Psychology, (5) Curriculum & Instruction (Elementary & Secondary), (6) Guidance and Counseling, (7) Special Education, and (8) Occupational Education. 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 or a report of the Miller Analogies Test score, and an autobiography indicating educational experience and aspirations. The adviser or the department may require additional information.

Additional requirements for the Ph.D. degree include a minimum of 90 semester hours of graduate study beyond the bachelor's and these 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 on campus.
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 in Elementary Education and in Secondary 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.S. 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 Mentally Retarded, Learning Disabled, or those who have personal and social adjustment problems (emotionally disturbed). Each program is considered as being primarily one that leads to a Master's Degree.
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.

## Departments and Course Offerings

### GENERAL COURSE IN EDUCATION

**400 100. Pre-Professional Laboratory Experiences.** (1) I, II. Supervised experiences in the field of education designed to facilitate orientation and investigation of teaching through the teacher aide program. Maximum credit of three (3) hours. No more than one credit per semester. 400-100-0808-2

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### ADMINISTRATION AND FOUNDATIONS

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Alfred P. Wilson,\* Head of Department

Professors Danskin,\* DeMand,\* Hoyt,\* and McCain;\* Associate Professors Hanna,\* Kaiser,\* Neely,\* Nolting,\* VanMeter,\* and Wilson;\* Assistant Professors Bradley,\* Canada, Carnine, Chalender, Chang,\* Garhart, Holen,\* Litz,\* Lynch, McIlvaine,\* Martin, Satterfield,\* Schurr, Sherrard, Steffen,\* and Stewart;\* Emeritus Professors Baker,\* Green,\* Moggie,\* and Olson.\*

The focus of the department is twofold: (1) Foundations of Education at the undergraduate level in Special Education and Educational Psychology and (2) Graduate studies in Educational Administration, Guidance Counseling, Educational Psychology, Special Education, and Higher Education.

The Foundations of Education include such topics as community education, 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 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. Per-



manent certification requires the completion of additional work at the graduate level. Program focus is to work with the mentally retarded, learning disabled and emotionally disturbed student at both the elementary and secondary levels. 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 and 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 and career development.

The program in the Educational Administration Area is designed to prepare individuals for positions of leadership at all levels of education and in professional organizations 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 Computing 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. 405-111-1-0801

**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. 405-211-1-0801

**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. 405-215-1-0822

**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. 405-315-1-0822

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**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. 405-511-3-0801

**405 550. Art for Exceptional Children.** (Same as Art 560). 405-550-2-0831

#### 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. 405-611-0-0801

**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. 405-622-1-0808

**405 628. 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. 405-628-1-0816

**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. 405-631-0-0818

**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. 405-632-0-0808

**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. 405-633-0-0808

**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. 405-634-0-0808

**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 is the study of administration of special services at the national, state, and local levels. Pr.: A&F 215 and C&I 300 or 451. 405-663-1-0808

**405 664. Mental Retardation.** (3) On sufficient demand. Etiological, psychological, sociological, and educational aspects of mental retardation. Pr.: A&F 663. 405-664-0-0808

**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. 405-687-2-0808

**405 715. Principles of Measurement.** (3) I, II, S. Principles of constructing, administering and evaluating tests and other measures used in schools. Focus on norm- and criterion-reference uses of teacher-made and standardized measures as an integral part of teaching. Pr.: A&F 315 and 823 or concurrent enrollment. 405-715-1-0825

**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. 405-720-1-0826

**405 721. Mental Hygiene in the School and 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. 405-721-0-0808



**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. 405-726-1-0804

**405 752. Educational and Career Development Information.** (3) I, S. A study of the competencies, skills and demands necessary for individual growth in various careers, with attention to the collection, evaluation, dissemination, and use of career development information in school and community settings by counselors. Particular emphasis will be given to the area of career life planning. Pr.: Senior standing and consent of instructor. 405-752-0-0801

**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. 405-753-1-0810

**405 755. Guidance in the Education of the Exceptional Individual.** (3) On sufficient demand. Strategies for teachers in working with the academic, vocational, personal, and social adjustment of the exceptional individual. The course will focus on the individual in pre-school, elementary, secondary, post-secondary, and adult settings. Federal programs and benefits relating to the various exceptionalities will be examined. Pr.: A&F 622, A&F 663 and permission of instructor. 405-755-0-0802

**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. 405-786-2-0808

**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. 405-795-3-0801

## 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. 405-810-0-0826

**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. 405-811-0-0826

**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. 405-812-0-0821

**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. 405-813-0-0801

**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. 405-814-0-0801

**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. 405-815-1-0825

**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. 405-816-1-0824

**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. 405-817-1-0824

**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. 405-818-1-0827

**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. 405-819-1-0801

**405 820. Individual Intelligence Testing.** (3-5) On sufficient demand. Theory of the appraisal of individual intelligence with emphasis on techniques of administration, scoring, interpreting and applying in school settings. Supervised practice and developed proficiency in the use of Stanford-Binet and WISC and/or WAIS. Pr.: A&F 715 and consent of instructor. 405-820-1-0825

**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. 405-823-1-0826

**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. 405-825-0-0821

**405 830. The School Plant.** (3) I, alt. 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. 405-830-1-0801

**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. 405-831-1-0827

**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. 405-832-1-0806

**405 833. Administration of Special Education Programs.** (2-3) I, II, S. The study of administrative units for special education, placement procedures, federal and state legislation, and program reimbursement and funding. Pr.: 405 818 or 405 811. 405-833-2-0808



**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. 405-834-0-0801

**405 835. The Principalship.** (3) I, alt. S. 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. 405-835-1-0827

**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. 405-836-1-0801

**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. 405-856-0-0826

**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. 405-857-0-0826

**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. 405-858-1-0826

**405 859. Principles of Student Personnel Administration.** (3) I. Principles, administrative organization, procedures, and problems of student personnel work in higher education; analysis of policy formulation, staff relationships, finance and controls, and physical plant needs; an introduction to the personnel services of: health, housing, food, student activities, placement, and counseling services. Pr.: Graduate standing and consent of instructor. 405-859-1-0826

**405 860. Adult Counseling.** (3) I, S. Study of adults and the problems they face in their educational, psychological, social, and career development. Particular emphasis will be given to counseling theories and strategies important for counselors working with adults experiencing these developmental problems. Pr.: 405 823 or concurrent enrollment. 405-860-0-0807

**405 861. Organization of Counseling Services for Adults.** (2) II. Strategies for the development and implementation of counseling services for adults in school, community, business and industrial settings. The course will focus on the integration of formal and informal educational, career development, and mental health programs developed for adults having life adjustment problems. Local, state, and federal programs and agencies and their role in adult counseling services will be examined. Pr.: A&F 860. 405-861-0-0807

**405 863. Vocational Psychology.** (3) On sufficient demand. Environment and human factors in occupational adjustment; appraisal of vocational fitness. Pr.: Consent of instructor. 405-863-0-0839

**405 865. Community Education for Post-Secondary Schools.** (2-3) II. Analysis of community education trends, techniques and evaluations as they relate to and are implemented into the post-secondary educational environment. Pr.: A&F 611. 405-865-0-0807

**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. 405-885-2-0826

**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. 405-886-2-0826

**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). 405-887-2-0826

**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. 405-888-0-0826

**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. 405-889-2-0827

**405 890. Seminars in Administration and Foundations.** 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. 405-890-0-0827

**405 898. Master's Report.** Credit arranged. I, II, S. Pr.: Consent of instructor. 405-898-3-0801

**405 899. Master's Research.** Credit arranged. I, II, S. Pr.: Consent of instructor. 405-899-4-0827

**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. 405-910-0-0805

**405 915. Theory of Measurement.** (3) I. A course designed to provide the theoretical background needed for students who wish to (1) develop greater competence in practical uses of tests in educational settings, (2) pursue academic study of measurement theory, and (3) develop instruments for research use. Pr.: A&F 715. 405-915-1-0825

**405 917. Experimental Design in Educational Research.** (3) II. Philosophy, planning and evaluation of research in education. Experimental designs appropriate for educational research with special emphasis on multivariable procedures. Computer oriented. Pr.: A&F 817. 405-917-1-0824

**405 920. Advanced Educational Psychology: Learning.** (3) On sufficient demand. The learning process, with special emphasis on human abilities and early and contemporary learning theories, with applications to selected recent developments in teaching and persistent problems and issues in education. Pr.: A&F 315 or its equivalent. 405-920-1-0822

**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. 405-921-1-0822

**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. 405-924-0-0839

**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. 405-925-0-0827



**405 926. Theory in Educational Administration.** (3) II. Organizational and administrative theory as 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. 405-926-0-0827

**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. 405-927-1-0827

**405 928. Educational Governance.** (3) II. An analysis of educational decision-making at the local, state and national levels. The internal decision-making practices of professional educational organizations is also considered. Pr.: A&F 818 and six additional hours in Educational Administration. 405-928-0-0801

**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. 405-933-1-0827

**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. 405-986-2-0826

**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. 405-987-2-0826

**405 988. Internship in Education—Special Education.** Cr. arr. 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. Pr.: Consent of instructor. 405-988-2-0808

**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 and Foundations.** 405-989-2-0827

**405 990. Student Personnel Services.** 405-990-2-0826

**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. Education Administration and Foundations.** 405-991-3-0827

**405 992. Educational Psychology.** 405-992-3-0822

**405 993. Research in Student Personnel.** 405-993-3-0826

**405 994. Special Education.** 405-994-2-0808

**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. 405-999-4-0801

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## ADULT AND OCCUPATIONAL EDUCATION

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Robert Meisner,\* Head of Department

Professors Apel,\* Johnson,\* Meisner,\* Prawl,\* and Scott;\* Associate Professors Albracht,\* H. Bradley,\* Campbell,\* Carpenter,\* Field,\* Griffith,\* Oaklief,\* and Terrass;\* Assistant Professors Harris,\* Jorns, R. Wilson and Zelenak;\* Instructor Wissman; Emeritus: Professor Rust;\* Associate Professor Hall.\*

The undergraduate and graduate programs in the Adult and Occupational area are designed for selected individuals seeking to prepare themselves for roles as professional educators in public and private institutions and agencies.

Undergraduate teacher education programs are designed to prepare prospective teachers for teaching and allied positions in Adult Education, Vocational Education in Agriculture and Home Economics, Business Education, Career Education and related fields of Adult and Occupational Education.

The Agricultural Education curriculum, described on page ??, is offered in cooperation with the College of Agriculture. Students completing the curriculum requirements are awarded a B.S. in Agriculture and may be certified to teach Vocational Agriculture in Kansas.

The Home Economics Education curriculum, offered in cooperation with the College of Home Economics, is described on page 245. Students completing the curriculum requirements are awarded a B.S. in Home Economics and may be certified 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 30, 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. 410-319-0-0899



**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. 410-500-0-0899

**410 501. Independent Study in Education.** (1-3). Selected topics in professional education. Maximum of three hours applicable toward degree requirements. Pr.: Consent of Department Head. 410-501-3-0899

**410 550. Methods of Teaching Home Economics.** (2) I, II. Selection of techniques: organization, preparation, and presentation of materials for teaching secondary programs. One hour rec. and two hours lab. a week. Pr.: Junior standing; A&O 621 or conc. enrollment; taken semester prior to A&O 586. 410-550-0-0899

**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. 410-560-0-0839

**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). 410-586-2-0803

**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. 410-605-0-0807

**410 610. Occupational Home Economics Education.** (3) I, II, S. Principles and procedures in planning and organizing home economics related occupational programs, including considerations of methods and teaching materials peculiar to these programs. Pr.: A&F 215 or conc. enrollment. 410-610-0-0899

**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. 410-620-0-0839

**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. 410-621-0-0839

**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.

**410 632. Career Education.** 410-632-2-0807

**410 633. Adult Education.** 410-633-2-0807

**410 634. Agriculture Related Occupations.** 410-634-2-0899

**410 635. Business and Office Occupations.** 410-635-2-0807

**410 636. Extension Education.** 410-636-2-0807

**410 637. Home Economics Related Occupations.** 410-637-2-0899

**410 638. Industrial Occupations.** 410-638-2-0839

**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. 410-639-0-0839

**410 680. Introduction to Adult Education.** (3) I, II, S. A survey of adult education. Consideration given to articulation with other levels of education. Identification of changing needs within the field are reviewed. Pr.: Consent of instructor. 410-680-0-0807

**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. 410-701-0-0839

**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. 410-703-0-0899

**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. 410-705-0-0839

**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. 410-707-0-0807

**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. 410-713-0-0807

**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. 410-750-0-0807

**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. 410-752-0-0807

**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. 410-753-0-0807

**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. 410-754-0-0807

**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. 410-788-0-0899

**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. 410-791-0-0839

**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. 410-792-0-0839

**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. 410-795-3-0807

## GRADUATE CREDIT

**410 805. Field Experience in Agricultural Education.** (2 or 3) 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. 410-805-0-0899

**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). 410-811-0-0807

**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. 410-820-0-0807

**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. 410-822-0-0899

**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. 410-823-0-0899

**410 830. Program Planning in Adult Education.** (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. 410-830-0-0807

**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. 410-834-0-0899

**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. 410-840-0-0899

**410 842. Curriculum in Agriculture II.** (2 or 3) S. Cont. of A&O 840. Pr.: A&O 840 or consent of instructor. 410-842-0-0899

**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. 410-845-0-0899

**410 854. Advanced Occupational Home Economics Education.** (2-3) I, II, S. Development of home economics related occupational programs with emphasis on curriculum, evaluation and techniques used in cooperative programs. Pr.: A&O 610 and teaching experience. 410-854-0-0899

**410 860. Nontraditional Study for Adults.** (3) II, S. Designed to provide a conceptual understanding of current forms of nontraditional study and accreditation with emphasis on organizing studies to serve adult needs. Pr.: A&O 680. 410-860-0-0807

**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.** 410-890-0-0899

**410 891. Agricultural Education.** 410-891-0-0899

**410 892. Adult Education.** 410-892-0-0807

**410 899. Master's Research.** Credit arranged. I, II, S. Pr.: Consent of instructor. 410-899-3-0839

**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. 410-910-0-0807

**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. 410-914-0-0839

**410 916. Foundations of Adult Education.** (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. 410-916-0-0807

**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. 410-929-0-0839

**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. 410-930-0-0839

**410 937. Organization and Administration of Adult Education.** (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. 410-937-0-0807

**410 940. Organization and Administration of Occupational Education.** (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. 410-940-0-0807

**410 952. Internship in Adult & Occupational 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. Pr.: Consent of instructor. 410-952-2-0807

**410 962. Advanced Seminars in Adult & Occupational Education.** Credit arranged. 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. 410-962-0-0807



**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. 410-999-4-0807

## CURRICULUM AND INSTRUCTION

Norbert W. Maertens, Head of Department

Professors Dixon,\* Keys,\* Littrell,\* Maertens,\* Owens,\* Schell,\* and Utsey,\* Associate Professors Bartel,\* Boyer,\* Clark,\* Hause,\* James,\* Kurtz,\* McAnarney,\* Price,\* Teague,\* and Trennepohl,\* Assistant Professors Alexander, Bailey,\* Byars,\* Caine,\* Calvano,\* Garcia,\* M. Harris, Hazlett, Hewitt, Jones, Loeb,\* Merrell, Sullivan, and L. Wilson,\* Instructors B. Newhouse and Stafford; 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. 415-050-1-0801

**415 300. Principles of Elementary Education.** (3) I, II. An over-all view of the elementary school: organization, management, purpose, curriculum trends, and pupil characteristics. Pr.: Junior standing. 415-300-0-0802

**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. 415-316-1-0801

**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. 415-325-1-0836

**415 326. Problem in Safety Education.** (1) Pr.: Consent of instructor. 415-326-3-0836

**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. 415-328-1-0836

**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. 415-330-1-0836

**415 331. Problem in Driver Education.** (1) Pr.: Consent of instructor. 415-331-1-0836

**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. 415-415-1-0831

**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. 415-451-0-0803

**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. 415-469-0-0802

**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. 415-470-1-0834

**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. 415-471-1-0802

**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. 415-472-1-0802

**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. 415-473-1-0833

**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. 415-474-1-0830

**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. 415-475-1-0830

**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. 415-476-1-0803

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**415 502. Independent Study in Education.** (1-3) I, II, S. Selected topics in professional education. Maximum of three hours applicable toward degree requirements. Pr.: Consent of Department Head. 415-502-3-0801

**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. 415-530-0-0801

**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. 415-583-2-0832

**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. 415-584-2-0832

**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. 415-585-2-0802



**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). 415-586-2-0803

#### UNDERGRADUATE AND GRADUATE CREDIT

**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. 415-614-1-0834

**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. 415-617-2-0817

**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. 415-630-2-0801

**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. 415-640-1-0801

**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. 415-645-1-0801

**415 662. Instructional Television.** (3) On sufficient demand. The principles of instructional television: its development, programming, techniques and application. Pr.: Junior standing. 415-662-1-0801

**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 high schools. Pr.: C&I 450, senior standing, or consent of instructor. 415-704-0-0803

**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. 415-706-1-0801

**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. 415-715-0-0830

**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. 415-719-0-0801

**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. 415-730-0-0813

**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. 415-735-1-0834

**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. 415-737-0-0801

**415 739. Environmental Education.** (1-3) I, II, S. The selection, adaptation, and development of environmental education K-12 curriculum materials; procedures for an integrated curricular implementation; the selection of appropriate instructional strategies. Pr.: A&F 302, a course in environmental studies and/or consent of instructor. 415-739-0-0801

**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. 415-756-0-0801

**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. 415-760-1-0801

**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. 415-765-1-0801

**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. 415-779-0-0823

**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. 415-780-0-0823

**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. 415-795-3-0823

#### 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. 415-803-0-0829

**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. 415-804-0-0829

**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.: 803 and/or consent of instructor. 415-808-0-0801



**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. 415-811-0-0829

**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. 415-820-0-0802

**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. 415-821-0-0833

**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. 415-822-0-0802

**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. 415-831-0-0801

**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. 415-832-0-0801

**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. 415-833-0-0801

**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. 415-835-0-0801

**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. 415-842-0-0803

**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. 415-843-0-0805

**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. 415-844-0-0805

**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. 415-845-1-0830

**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 847 and teaching experience or consent of instructor. 415-846-3-0817

**415 847. Clinical Practices in Reading.** (3) II, S. Supervised experience in diagnosing and teaching children with reading problems. Pr.: C&I 846. 415-847-1-0817

**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. 415-848-0-0817

**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. 415-860-0-0801

**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. 415-864-1-0829

**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. 415-866-1-0829

**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. 415-872-0-0830

**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. 415-873-0-0834

**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. 415-874-0-0833

**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. 415-875-0-0801

**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. 415-876-0-0803

**415 877. The Foreign Language Curriculum.** (3) On sufficient demand. New trends and materials in teaching the foreign languages, based on recent research and experimental programs. Pr.: C&I 803 and consent of instructor. 415-877-0-0829

**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. 415-879-0-0806

**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 consent of the instructor. 415-884-1-0801

**415 886. Seminars in Curriculum & Instruction.** 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. 415-886-0-0829

**415 898. Master's Report.** Credit arranged. I, II, S. Pr.: Consent of instructor. 415-898-3-0829

**415 899. Master's Research.** Credit arranged. I, II, S. Pr.: Consent of instructor. 415-899-3-0829

**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. 415-907-0-0829

**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. 415-908-0-0829

**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. 415-920-0-0829

**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. 415-990-2-0805

**415 991. Internship in Curriculum & Instruction.** 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. 415-991-2-0829

**415 999. Research in Curriculum and Instruction.** Credit arranged. I, II, S. Pr.: A&F 817 and/or consent of instructor. 415-999-4-0829



# the college of engineering

Donald E. Rathbone, Dean  
 Teddy O. Hodges, Associate Dean  
 Kenneth K. Gowdy, Assistant Dean  
 Robert E. Crank, Assistant to the 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 and excellent physical facilities provide a stimulating environment for the student to pursue his studies.

The College of Engineering offers the Bachelor of Science degree in each of the following fields:

Agricultural Engineering — curriculum on page 205.  
 Architectural Engineering — curriculum on page 205.  
 Construction Science — curriculum on page 206.  
 Chemical Engineering — curriculum on page 206.  
 Civil Engineering — curriculum on page 207.  
 Electrical Engineering — curriculum on page 207.  
 Industrial Engineering — curriculum on page 208.  
 Mechanical Engineering — curriculum on page 209.  
 Nuclear Engineering — curriculum on page 209.  
 Engineering Technology — curriculum on page 210.

A general description of each of these curriculums, including a list of the faculty and departmental course offerings, is presented on pages 214 through 236. Also

included in this section is a summary of the graduate program of each department. The Master of Science degree is offered in each of the preceding areas except Engineering Technology.

To round out the graduate program in the College of Engineering, the Doctor of Philosophy degree is offered. Additional information on the graduate program is included in the section on the Graduate School, page 30.

## 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
Hum. or Soc. Sci.	
Elective .....	3
Concepts in Phys. Ed. ....	0
Engineering Lectures .....	0
	<hr/> 17

### Spring Semester

English	229 120
Chemistry	221 230
Mathematics	245 221
Economics	225 110

Physical Education	261
Gen. Engg.	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
	<hr/> 16



# 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
Ag. Engg.	505 160	Ag. Engg. Concepts	2
		Humanities or Soc. Sci. Electives*	3
	261 001	Concepts in Phys. Ed.	0
	500 010	Engineering Lectures	0
			17

Spring Semester		Course	Sem. Hrs.
English	229 110	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. Electives*	3
		Lifetime Sport	0
Physical Education 261			16

## SOPHOMORE

Fall Semester		Course	Sem. Hrs.
Mathematics	245 222	Anal. Geometry & Calc. III	4
Physics	265 213	Engg. Physics I	5
Biology	215 198	Principles of Biology	4
Mech. Engg.	560 212	Graph. Comm., Anal. & Des. I	2
Speech	281 105	Oral Communication	2
			17

Spring Semester		Course	Sem. Hrs.
Mathematics	245 240	Series & Diff. Equations	4
Physics	265 214	Engg. Physics II	5
Ag. Engg.	505 312	Biol. Matis. & Machine Function	3
		Comp. and Data Processing	2
		Statics	3
Ind. Engg. 550 372			17
Civil Engg. 525 333			

## JUNIOR

Fall Semester		Course	Sem. Hrs.
Ag. Engg.	505 510	Env. Des. of Farm Bldgs.	3
Mech. Engg.	560 513	Thermodynamics I	3
Mech. Engg.	560 512	Dynamics	3
Civil Engg.	525 533	Mech. of Materials	3
Civil Engg.	525 534	Mech. of Materials Lab.	1
		Humanities or Soc. Sci. Elective*	3
			16

Spring Semester		Course	Sem. Hrs.
Ag. Engg.	505 566	Anal. Ag. Structures	3
Ag. Engg.	505 520	Energy Use & Control in Ag. Systems I	3
		Hydrology	2
		Fluid Mechanics	3
		Circuit Theory I	3
		Soil Mechanics I	3
		Phys. Env. of Crops & Soils	3
			17

## SENIOR

Fall Semester		Course	Sem. Hrs.
Ag. Engg.	505 530	Soil and Water Engg.	3
Ag. Engg.	505 536	Design of Ag. Machines	3
		Humanities or Soc. Sci. Electives*	3
		Technical Elective**	6
			15

Spring Semester		Course	Sem. Hrs.
Ag. Engg.	505 570	Energy Use and Control in Ag. Systems II	3
Ag. Engg.	505 581	Prof. Practice in Ag.E.	1
		Humanities or Soc. Sci. Electives*	3
		Technical Elective**	8
			15

Number of hours required for graduation is 130 \*\*\*

\*Humanities and Social Science Electives are to be selected from the approved catalog list.

\*\*To be chosen with the advice and approval of the faculty adviser and department head.

\*\*\*The engineering science requirements will be satisfied by the required courses in this curriculum. Any student is allowed to apply at least four hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

# CURRICULUM IN ARCHITECTURAL ENGINEERING

B.S. in Architectural Engineering

First Semester		Course	Sem. Hrs.	Second Semester		Course	Sem. Hrs.
104 210		Design Graph. I	3	104 211		Design Graph. II	3
229 100		Engl. Comp. I	3	229 120		Eng. Comp. II	3
281 105		Oral Comm. I	2	515 210		Intro. Const. Prog.	3
245 220		Anal. Geom. & Calc. I	4	245 221		Anal. Geom. & Calc. II	4
221 210		Chemistry I	5	221 230		Chemistry II	3
261 001		Phys. Ed.	0	261		Phys. Ed.	0
			17				16

Third Semester		Course	Sem. Hrs.	Fourth Semester		Course	Sem. Hrs.
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 Const. Tech. I	3	104 291		Basic Const. Tech. II	3
265 213		Engg. Physics I	5	265 214		Engg. Physics II	5
245 222		Anal. Geom. & Calc. III	4			** Limited Sci. Elec.	3-4
			18				17 / 18

Fifth Semester		Course	Sem. Hrs.	Sixth Semester		Course	Sem. Hrs.
105 401		Arch. Des. Stu. I	5	525 533		Mechanics Materials	3
525 333		Statics	3	525 534		Mech. Matis. Lab.	1
105 433		Arch. Constr. I	3	105 434		Const. Draw.	3
525 212		El. Surv. Engg.	3	560 512		Dynamics	3
		* Humanities Elective	3	105 301		Apprec. of Arch.	3
			17			* Social Sci. Elective	3
							16

Seventh Semester		Course	Sem. Hrs.	Eighth Semester		Course	Sem. Hrs.
525 535		Stat. Deter. Struct.	3	510 524		Theory of Struct. II (steel)	4
510 523		Timber Struct.	2	560 513		Thermodynamics I	3
525 522		Soil Mechanics I	3	510 536		Sanitation Systems	3
560 571		Fluid Mechanics	3	510 537		Stat. Indeter. Struc.	3
510 537		Acoustic Systems	2			* Social Sci. Elective	3
		* Humanities Elective	3				15
			16				

Ninth Semester		Course	Sem. Hrs.	Tenth Semester		Course	Sem. Hrs.
510 528		Theory of Struct. III (concrete)	4	510 780		Theory of Str. IV	3
530 519		Elect. Cir. & Contr.	4	510 535		Lighting Systems	3
510 534		Thermal Systems	3	525 528		Foundation Engg.	3
		Free Elective	3			Free Elective	5 / 4
			14				14 / 13

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

\*Humanities and Social Science Electives are to be selected from the list on page 211 and need not be taken in the order listed in the curriculum.

\*\*Limited Science Electives are to be taken from the following: Operations Research (3), Series and Diff. Equations (4), and Elements of Statistics (3).

\*\*\*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 CONSTRUCTION SCIENCE

## B.S. In Construction Science

## FRESHMAN

First Semester		Second Semester	
229 100	Engl. Comp. I ..... 3	229 120	Engl. Comp. II ..... 3
245 220	Anal. Geom. & Calc. I . 4	525 212	El. Survey Engg. .... 3
	OR	104 211	Des. Graph. II ..... 3
245 500	Intro. Anal. Proc. .... 3	515 210	Intro. Const. Prog. .... 3
104 210	Des. Graph. I ..... 3	265 113	Gen. Phys. I ..... 4
281 105	Oral Comm. I ..... 2		Lifetime Sport ..... 0
225 110	Econ. I ..... 3		
261 001	Phys. Ed. .... 0		
	* Social Science Elec. .. 3		
			16
	17 / 18		

## SOPHOMORE

First Semester		Second Semester	
104 290	Basic. Con. Tech. I .... 3	104 291	Basic Con. Tech. II ... 3
525 231	Applied Mech. A ..... 3	525 331	Str. Matls. A ..... 3
515 260	Site Constr. .... 3	525 332	Str. Matls. A Lab. .... 1
234 100	Geology I ..... 3	105 301	Apprec. Arch. .... 3
515 016	Constr. Seminar ..... 0	305 260	Fund. Acctg. .... 4
	* Humanities Elec. .... 3	515 016	Constr. Seminar ..... 0
			* Humanities Elec. .... 3
	15		17

## JUNIOR

First Semester		Second Semester	
105 433	Arch. Const. I ..... 3	515 413	Constr. Drawings ..... 3
510 522	Theory Str. I ..... 3	510 524	Theory Str. II ..... 3
510 523	Timber Str. .... 2	550 501	Industrial Mgmt. .... 3
515 540	Constr. Prob. I ..... 3	510 537	Acoustic Systems ..... 2
305 292	Business Law I ..... 3	285 320	El. Statistics ..... 3
510 536	Sanitation Systems ... 3		OR
515 016	Constr. Seminar ..... 0	285 350	Bus. & Econ. Stat. .... 3
		515 016	Constr. Seminar ..... 0
	17		15

## SENIOR

First Semester		Second Semester	
510 528	Theory Str. III ..... 4	525 322	Soil & Fdn. Const. .... 3
515 541	Constr. Estlm. .... 3	510 534	Thermal Systems .... 3
515 542	Constr. Mgmt. I ..... 3	515 543	Constr. Mgmt. II ..... 3
305 630	Industrial Rel. .... 3	510 535	Lighting ..... 3
	* Soc. Sci. Elec. .... 3		Free Elective ..... 5 / 4
515 016	Constr. Seminar ..... 0	515 016	Constr. Seminar ..... 0
	16		17 / 16

A minimum of 130 credit hours is required for graduation.

\* Humanities and Social Science Electives are to be selected from the list on page 211 and need not be taken in the order listed in the 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		Course		Sem. Hrs.
English	229 120	English Composition II	.....	3
Chemistry	221 230	Chemistry II	.....	3
Chemistry	221 271	Chemical Analysis	.....	4
Mathematics	245 221	Anal. Geometry & Calculus II	.....	4
		Elective*	.....	3
Physical Education	261	Lifetime Sport	.....	0
Chem. Engg.	520 015	Engineering Assembly	.....	0
				17

## SOPHOMORE

Fall Semester		Course		Sem. Hrs.
Mathematics	245 222	Anal. Geometry & Calc. III	.....	4
Physics	265 213	Engg. 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		Course		Sem. Hrs.
Mathematics	245 240	Series & Diff. Equations	.....	4
Physics	265 214	Engg. 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		Course		Sem. Hrs.
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		Course		Sem. Hrs.
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		Course		Sem. Hrs.
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		Course		Sem. Hrs.
Chem. Engg.	520 542	Chem. Engg. Lab. III	.....	2
Chem. Engg.	520 561	Chem. 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 is 133\*\*

\* Fifteen hours of electives must be selected from the list of Humanities and Social Science electives on page 211. 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 211.

\*\* 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 Communication 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
		Engg. Elective**	2
Economics	225 110	Economics I	3
Phys. Educ.	261	Lifetime Sport	0
C.E.	525 010	Freshman Assembly	0

15

### SOPHOMORE

Fall Semester		Course	Sem. Hrs.
Mathematics	245 222	Anal. Geometry & Calc. III	4
Physics	265 213	Engg. Physics I	5
Civil Engg.	525 333	Statics	3
		Engg. Elective**	2
Civil Engg.	525 212	Elementary Surveying Engg.	3
Civil Engg.	525 015	Engineering Assembly	0

17

Spring Semester		Course	Sem. Hrs.
Mathematics	245 240	Series & Diff. Equations	4
Physics	265 214	Engg. Physics II	5
Civil Engg.	525 533	Mechanics of Materials	3
Chemistry	221 250	Chemistry II Laboratory	2
C.E.	555 214	Route Surveying	3
C.E.	525 015	Engineering Assembly	0

17

### JUNIOR

Fall Semester		Course	Sem. Hrs.
C.E.	525 531	Analysis of Statically Determinate Structures	3
Mech. Engg.	560 512	Dynamics	3
M.E.	560 513	Thermodynamics I	3
Geology	234 100	Geology I	3
Geology	234 130	Elem. Geology Lab.	1
Civil Engg.	525 534	Mechanics of Materials Lab.	1
		Humanities or Soc. Sci. Elective*	3
C.E.	525 015	Engineering Assembly	0

17

Spring Semester		Course	Sem. Hrs.
C.E.	525 532	Analysis of Statically Indeterminate Structures	3
Mech. Engg.	560 571	Fluid Mechanics	3
C.E.	525 522	Soil Mechanics I	3
C.E.	525 563	Sanitary Engg. Fund.	3
		Engg. Elective**	4
C.E.	525 015	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
		Humanities or Soc. Sci. Elective*	9
C.E.	525 015	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
		Engg. Elective**	3
		Humanities or Soc. Sci. Elective*	2
C.E.	525 015	Engineering Assembly	0

Number of hours required for graduation is 132\*\*\*

17

\*Humanities and Social Science Electives are to be selected from the list on page 211 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		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
Civil Engg.	525 333	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	Engg. Physics II	5
Mathematics	245 240	Series & Diff. Equations	4
Mech. Engg.	560 512	Dynamics	3
Elec. Engg.	530 510	Circuit Theory I	3
		Humanities or Soc. Sci. Elective*	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. Elective*	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 Soc. Sci. 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. Elective*	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. Elective*	3

15

Number of hours required for graduation is 132. + +

\*Humanities and Social Science Electives are to be selected from the list on page 211 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 advisor. Note should be taken of the engineering science requirements on page ??.

+12 semester hours of Option Electives must be selected from Electrical Engineering courses upon consultation with 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.



## 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 communications 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	215 505	Comp. Anat. of Vertebrates ..	4
		OR	
Biology	215 525	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

## CURRICULUM IN INDUSTRIAL ENGINEERING

## B.S. in Industrial Engineering

## FRESHMAN

Fall Semester	Course	Sem. Hrs.
English	English Composition I .....	3
Mathematics	Anal. Geometry & Calculus I ..	4
Chemistry	Chemistry I .....	5
Economics	Economics I .....	3
Gen. Engg.	Engineering Concepts .....	2
Physical Education	Concepts In Phys. Ed. ....	0
Gen. Engg.	Engineering Lectures .....	0
		17

Spring Semester	Course	Sem. Hrs.
English	English Composition II .....	3
Mathematics	Anal. Geometry & Calculus II ..	4
Chemistry	Chemistry II .....	3
Mech. Engg.	Graph. Comm., Anal. & Design I .....	2
Ind. Engg.	Intro. to Ind. Engg. ....	2
	Humanities or Soc. Sci. Elective* .....	3
Physical Education	Lifetime Sport .....	0
Ind. Engg.	Engineering Assembly .....	0
		17

## SOPHOMORE

Fall Semester	Course	Sem. Hrs.
Physics	Engineering Physics I .....	5
Mathematics	Anal. Geom. & Calc. III .....	4
Bus. Ad.	Fund. of Accounting .....	4
Ind. Engg.	Production Processes .....	3
Ind. Engg.	Computers & Data Processing .....	2
Ind. Engg.	Engineering Assembly .....	0
		18

Spring Semester	Course	Sem. Hrs.
Physics	Engineering Physics II .....	5
Mathematics	Series & Diff. Equations .....	4
Ind. Engg.	Tool Engineering .....	3
	Humanities or Soc. Sci. Elective* .....	3
Ind. Engg.	Engineering Assembly .....	0
		15

## JUNIOR

Fall Semester	Course	Sem. Hrs.
Mech. Engg.	Thermodynamics I .....	3
Statistics	Intro. Prob. & Stat. I .....	3
Ind. Engg.	Engineering Materials .....	2
Ind. Engg.	Engineering Materials Lab. ..	1
Ind. Engg.	Work Design .....	3
Civil Engg.	Statics & Dynamics .....	4
Ind. Engg.	Engineering Assembly .....	0
		16

Spring Semester	Course	Sem. Hrs.
Civil Engg.	Mechanics of Materials .....	3
Elec. Engg.	Elec. Circuits and Control ...	4
Ind. Engg.	Engg. Rel. & Qual. Assur. I ...	3
Ind. Engg.	Ind. Project Eval. ....	3
Ind. Engg.	Industrial Management .....	3
Ind. Engg.	Ind. Plant Studies .....	0
Ind. Engg.	Engineering Assembly .....	0
		16

## SENIOR

Fall Semester	Course	Sem. Hrs.
Ind. Engg.	Prod. Plan. & Invent. Control ..	3
Ind. Engg.	Quant. Tech. In Ind. Engg. ...	3
Ind. Engg.	Intro. Oper. Res. I .....	3
Ind. Engg.	Ind. Management II .....	3
	Humanities or Soc. Sci. Electives* .....	6
Ind. Engg.	Engineering Assembly .....	0
		18

Spring Semester	Course	Sem. Hrs.
Ind. Engg.	Man-Environment Systems ..	3
Ind. Engg.	Ind. Facilities Layout & Des. ..	3
Ind. Engg.	Intro. to Oper. Res. II .....	3
Ind. Engg.	Indus. Simulation .....	3
	Humanities or Soc. Sci. Elective* .....	3
Ind. Engg.	Engineering Assembly .....	0
		15

Number of hours required for graduation 132

\*Humanities and Social Science Electives must be selected from the approved list on page 211 and need not be taken in the order listed in the curriculum.



## 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			
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.	
		Elective*	3
Physical Education	261	Lifetime Sport	0
Mech. Engg.	560 015	Engineering Assembly	0

## SOPHOMORE

Fall Semester			15
Physics	265 213	Engineering Physics I	5
Mathematics	245 222	Anal. Geom. & 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			
Physics	265 214	Engineering Physics II	5
Mathematics	245 240	Series & Diff. Equations	4
Civil Engg.	525 333	Statics	3
Ind. Engg.	550 350	Engg. Materials	2
		Humanities or Soc. Sci.	
		Elective*	3
Mech. Engg.	560 015	Engineering Assembly	0

## JUNIOR

Fall Semester			17
Mech. Engg.	560 513	Thermodynamics I	3
Elec. Engg.	530 510	Circuit Theory I	3
Ind. Engg.	550 351	Engg. Materials Lab.	1
Mech. Engg.	560 512	Dynamics	3
Civil Engg.	525 533	Mech. of Materials	3
		Humanities or Soc. Sci.	
		Elective*	3
Mech. Engg.	560 015	Engineering Assembly	0
			16
Spring Semester			
Mech. Engg.	560 523	Thermodynamics II	3
Elec. Engg.	530 525	Electronics I	3
Ind. Engg.	550 372	Comp. and Data Proc.	2
Mech. Engg.	560 571	Fluid Mechanics	3
Physics	265 551	Atomic Physics or	
Nucl. Engg.	580 410	Intro. to Nuclear Engg.	3
		Humanities or Soc. Sci.	
		Elective*	3
Mech. Engg.	560 015	Engineering Assembly	0

## SENIOR

Fall Semester			17
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			
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	
Mech. Engg.	560 622	Environmental Engg. I	3
		Hum. or Soc. Sci.	
		Elective*	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 211 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 211 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			
Nuc. Engg.	580 116	Nuc. Engg. Seminar	1
English	229 120	English Composition II	3
Chemistry	221 230	Chemistry II	3
Physics	265 213	Engineering Physics I	5
Mathematics	245 221	Anal. Geometry & Calculus II	4
Phys. Educ.	261	Lifetime Sport	0

## SOPHOMORE

Fall Semester			16
Nuc. Engg.	580 295	Elem. Nuclear Engg.	3
Ind. Engg.	550 350	Engg. Materials	2
Ind. Engg.	550 351	Engg. Materials Lab.	1
Physics	265 214	Engg. Physics II	5
Mathematics	245 222	Anal. Geom. & Calc. III	4
		Humanities or Soc. Sci.	
		Elective*	3
			18
Spring Semester			
Nuc. Engg.	580 290	Intro. to Nuc. Engg. Anal.	3
Elec. Engg.	530 510	Circuit Theory I	3
Civil Engg.	525 530	Statics & Dynamics	4
		Humanities or Soc. Sci.	
		Electives*	6

## JUNIOR

Fall Semester			16
Nuc. Engg.	580 511	Rad. Appl. Engg.	2
Nuc. Engg.	580 500	Ap. Nuc. Engg. Anal.	3
Nuc. Engg.	580 490	Neut. & Part. Inter. I	2
Mech. Engg.	560 513	Thermodynamics I	3
Elec. Engg.	530 525	Electronics I	3
		Humanities or Soc. Sci.	
		Elective*	3
			16
Spring Semester			
Nuc. Engg.	580 630	App. Reactor Theory	4
Nuc. Engg.	580 515	Nuclear Engg. Materials	2
Mech. Engg.	560 571	Fluid Mechanics	3
		Technical Electives***	6

## SENIOR

Fall Semester			16
Nuc. Engg.	580 590	Nuclear Fuel Cycle	3
Nuc. Engg.	580 555	Nuclear Reactor Fund.	3
Nuc. Engg.	580 655	Rad. Prot. Engg.	3
Nuc. Engg.	580 640	React. Oper. Lab.	2
		Technical Electives***	5
			16
Spring Semester			
Nuc. Engg.	580 692	Nuc. Reactor Tech.	3
Nuc. Engg.	580 695	Nuc. Reactor Tech. Lab.	1
		Technical Electives***	9
		Humanities or Soc. Sci.	
		Elective*	3

Number of hours required for graduation is 130\*\*

\*Humanities and Social Science Electives are to be selected from the catalog list.

\*\*Any student is allowed to apply at least four hours of Basic ROTC credit toward his degree without being required to take more credits than his non-ROTC colleagues.

\*\*\*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.



## ENGINEERING TECHNOLOGY

B.S. in Engineering Technology. 120 semester hours required.

The education of the engineering technologist parallels that of the engineer but is directed more to the practical aspects of engineering design and operations. The technologist may work with the engineer in a design group. However, he is not limited to such activity and may be involved in management or technical sales.

As a result of the general requirements of the curriculum the student in engineering technology is insured a broad preparation for contribution to an independent society. The technology core courses provide a basis for the interaction with other technical personnel. The professional training received from the group of courses in the area of specialization furnishes the fundamental expertise of that area. Finally, the management courses provide the skills required of a coordinator or supervisor.

### I. General Requirements (52 hours)

229 100	English Composition I	3
229 120	English Composition II	3
281 105	Oral Communications I	2
225 110	Economics I	3
245 100	College Algebra	3
245 150	Plane Trigonometry	3
245 200	Anal. Geom. & Calc. I	4
265 113	General Physics I	4
265 114	General Physics II	4
221 110	General Chemistry or	
221 210	Chemistry I	5
285 320	Elements of Statistics	3
	Soc. Sci. or Hum. Electives	15
	Physical Education (2 sem.)	0
		<hr/>
		52

### II. Engineering Technology Core (14 hours)

560 212	Graphical Communications I	2
550 372	Computers and Data Processing	2
540 510	Properties of Engineering Materials	3
540 530	Electrical Circuits and Machines	4
540 532	Instrumentation and Measurement Tech.	3
		<hr/>
		14

### III. Related Courses in Management and Electives (14 hours)

At least two courses in management and/or accounting required.

## AREAS OF SPECIALIZATION

### Civil Engineering Technology

The field of Civil Engineering Technology is very broad. It includes the areas of Surveying and Mapping, Transportation, Hydraulics, Sanitary, Structural, Geotechnical, Materials, and Construction Technology. The Civil Engineering Technology Program is planned to give the student basic background in all of these areas and to provide the opportunity for specialization in one or more of the areas. Employment opportunities for B.S. graduates include all levels of Government, Consulting Engineering Firms, and General Contractors.

### IV. Area of Specialization (40 hours)

#### A. Required Courses (19 hours)

Applied Mechanics A	3
Strength of Materials A	3
Strength of Materials Lab.	1
Elem. Surveying Engg.	3
Graphical Com. Anal. & Des. II	3
Mechanics of Fluids	3
Route Surveying	3
<hr/>	
19	

#### B. Area Electives (21 hours)

Elective topics include structures, water and waste treatment, construction management, geology, building systems, etc.

### Computer and Instrumentation

#### Engineering Technology

This program is designed to provide the basic education necessary for a career in one of the several areas of the electrical/electronics industry. Graduates should find initial employment closely paralleling the opportunities of the engineering graduate, although with more emphasis on immediate applications in production management, process and product development, quality control and process design. A few examples of careers employing the skills of technologists in this area are: computer and digital circuit design, nuclear instrumentation and measurement, and integrated process applications.

#### A. Required Courses (16 hours)

S30 S25	Electronics I	3
S30 S26	Electronics II	3
540 S34	Auto. Cont. Tech.	3
S30 241	Inf. Comp. Engg.	3
245 221	An. Geom. & Calc. II	4

#### B. Area Electives (24 hours)

Electives will be selected with an emphasis in electronic instrumentation, nuclear instrumentation, or computer technology.

### Environmental Engineering Technology

Environmental protection and control efforts represent a broad spectrum of work and consequently include a wide variety of occupational skills. Almost every occupation is related in some way to at least one phase of environmental concerns.

Employment opportunities for B.S. graduates include: inspection and field monitoring to assure compliance with the various federal, state, and local environmental standards; assisting engineers in the design, construction, inspection and maintenance of facilities to handle water supplies, sanitary wastes, storm runoff, etc.; performing chemical, biological or nuclear laboratory tests incidental to the protection and restoration of the environment.

#### A. Required Courses (23 hours)

S25 231	Applied Mechanics A	3
540 512	Mechanics of Fluids	3
540 514	Energy Conversion Technology	3
550 609	Occ. Safety & Health	3
500 202	Intro. to Env. Tech.	3
215 198	Prin. of Biology	4
215 S30	Ecology	3
215 S31	Ecology Lab.	1

#### B. Area Electives (17 hours)

Elective topics include soils, geology, nuclear radiation measurement, water treatment, waste treatment, etc.

### Food Engineering Technology

This program provides the student with an engineering technology education directed toward a career in the food industry. The food industry is large and of considerable economic and social significance in Kansas, the U.S., and the world. Employment opportunities at the B.S. level include production management, technical service, product and process



development, process design, project engineering, and quality control. Food preservation operations, fermentation operations, soybean processing, freeze drying, cereal grain processing, processing of dairy products, processing of fruits and vegetables, and meat processing are examples of activities that require the skills of food scientists, food engineering technologists, and engineers.

#### Recommended Program (40 hours)

A. At least 10 additional hours of chemistry including courses in organic and biochemistry .....	10
B. Microbiology or Dairy Bacteriology .....	4
C. Engineering Technology Courses	
Energy Conversion Technology .....	3
Technology of Fluids .....	3
Food Processing Operations I and II .....	8
D. Applied Food Science and Industry Electives .....	12

### Mechanical Engineering Technology

Industrial growth and the increased technical requirements associated with it have greatly increased the need for technically trained personnel. The Mechanical Engineering Technologist becomes a vital member of the industrial design team. Graduates will apply practical approaches to problems in many different technical fields, e.g. aerospace, pollution control, farm machinery, power and petroleum. Opportunities exist in development and testing laboratories as well as in the design of products or production facilities.

#### A. Required Courses (32 hours)

560 217	Graphical Comm., Anal. & Des. II .....	3
525 231	Applied Mechanics A .....	3
540 514	Energy Conversion Technology .....	3
550 241	Production Processes .....	3
525 331	Strength of Materials A .....	3
525 332	Strength of Materials A Lab .....	1
540 560	Kinematics & Mechanism .....	3
540 561	Machine Design .....	3
540 562	Mechanical Design Lab I .....	2
540 563	Mechanical Design Lab II .....	2
540 534	Automatic Control Technology .....	3
540 512	Mechanics of Fluids .....	3

#### B. Area Electives (8 hours)

Elective topics include tool engineering, material processing, foundry, heat treatment, material testing, etc.

### Production Management Technology

This program provides a management background for the industrial fabrication of consumer products with an emphasis on management, work measurement, production economics, plant layout, and quality control. Graduates are suited for employment in manufacturing firms and a variety of capacities including direct line positions such as production management and staff positions throughout the manufacturing organization. Current practices in industry are stressed throughout and laboratory procedures coincide with the best in industry.

#### A. Required Courses (31 hours)

IE 241	Prod. Processes .....	3
IE 501	Ind. Mgmt. I .....	3
IE 530	Ind. Proj. Eval. ....	3
IE 352	Tool Engg. ....	3
ET 552	Work Design .....	3
IE 609	Occ. Safety & Health .....	3
IE 554	Indus. Facilities Layout & Des. ....	3
ET 551	Materials Processes .....	4
IE 541	Engg. Reliability & Qual. Assur. I .....	3
CE 231	Applied Mech. A .....	3

#### B. Area Electives (9 hours)

An elective program will be structured to meet the career plans of the student.

### ENGINEERING SCIENCES

Engineering sciences have their roots in mathematics and basic sciences, but carry knowledge further toward applicability. Students pursuing a B.S. degree in 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 (2)
- c. EE 695 Solid State Engineering (3)

#### Analytical Mechanics

- Either  
CE 333 Statics (3)  
and  
ME 512 Dynamics (3)  
or  
CE 530 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 515 Chem. Engg. Thermo. I (2)
- b. ME 513 Thermodynamics (3)

#### Flow & Rate Processes

- a. ME 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 education and to help prepare 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 "Theatre 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.



## 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 areas 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 the partnership of medicine and engineering. It seems certain that 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). The Pre-Medicine adviser in the College of Arts and Sciences should be consulted prior to the junior year.

**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. The Pre-Law adviser in the College of Arts and Sciences should be consulted prior to the junior year.

**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 of areas. Appropriate courses include:

<b>Languages:</b>	
286 200	Fundamentals of Computer Programming
286 300	Introduction to Algorithmic Processes
286 305	Computer Organization and Programming I
286 405	Introduction to Programming Language
<b>Design:</b>	
530 241	Introduction to Computer Engineering
530 643	Computer Logic Design
530 644	Digital Circuits Laboratory
530 641	Design of Digital Systems I
<b>Computational Techniques:</b>	
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 could be enhanced by additional courses in mathematics and the basic sciences. Refer to the departmental listings on pages 133, 151, and 100 for possible electives.

**Bio-Engineering.** Bio-engineering is a very broad field overlapping the life sciences and many engineering disciplines. Some of the sub-areas 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 Design of Farm Buildings
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	Biotransport Phenomena
525 563	Sanitary Engineering Fundamentals
525 565	Sanitary Engineering Design
525 761	Sanitary Engineering Chemistry
525 762	Water Treatment Systems
525 766	Wastewater Treatment Systems I
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
			<hr/> 46

\*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 84).

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
		<hr/> 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 or 4
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 211 and the engineering science requirements on page 211.

## 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 transferable. However, there are small differences among the curricula so students electing this route should work closely with their advisers and KSU to ensure a proper selection of courses. Questions should be referred to The Dean's Office, College of Engineering.

## BASIC SUBJECTS APPLICABLE TO ALL CURRICULA

Subject	Credit Hours at KSU
Chemistry .....	8
Mathematics — (Anal. Geom. & Calc., Diff. Equa.) .....	16
Physics .....	10
Graphics I .....	2
Computer Programming .....	2
Statics .....	3
English Composition .....	6
Speech .....	2
Economics .....	3
Social Science & Humanities Electives (courses in economics, psychology, history, literature, etc.) .....	15
	<hr/> 67

## OTHER PRE-ENGINEERING SUBJECTS WHICH VARY WITH THE CURRICULUM

	AgE	ChE	CE	EE	IE	ME	NE
Graphics II .....						3	
Qualitative Analysis .....		4	2				2
Organic Chemistry .....		8		*			8
Geology .....	*		4				4
Biology .....	4						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:

**Civil Engineering** — Statics

**Chemical Engineering** — Introduction to Process Analysis

**Electrical Engineering** — Circuit Theory I

**Industrial Engineering** — Computers & Data Processing, Industrial Management I

**Mechanical Engineering** — Thermodynamics I, Dynamics

## 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 students' 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 Programs of the other Colleges at KSU and provides an excellent opportunity for interdisciplinary study. A student in the Honors Program may elect to withdraw from the program at anytime at his option.

### COOPERATIVE EDUCATION PROGRAM

The College of Engineering, through its Cooperative Education Program, offers students in engineering an opportunity to obtain experience in industry as an integral part of their formal education. After completion of the freshman year, engineering students alternate sessions of work and study taking three years (five work periods) to complete the sophomore and junior academic program. While one student is a full-time employee in industry, the other studies in his chosen professional engineering field. While the program extends the time required to earn a degree by one year, the student may obtain as much as 20 months of experience and earn a significant portion of his college expenses. 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 School Catalog is published each February for the coming summer.

## Departments and Course Offerings

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### AGRICULTURAL ENGINEERING

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William H. Johnson,\* Head of Department

Professors Fairbanks,\* Foster,\* Hodges,\* Johnson,\* Larson,\* Lipper,\* and Wendling; Associate Professors Chung,\* Clark,\* Converse, Holmes, Manges,\* Schindler, Spillman,\* Stermer,\* and Stevenson;\* Assistant Professors Axthelm, Baugher, Hay, Jepsen, Koelliker,\* McGinty, Murphy, Pope, Stephens, and TenEyck; Emeritus: Professor Fenton.

Agricultural Engineering is the profession that applies the science of engineering principles to the agricultural industry. Basic training enables the student to develop new ideas and methods as well as to further the application of engineering fundamentals in such areas as production mechanization; soil, water, and air resources; power and energy sources; plant and animal environment; 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 engineering, rural electrification, animal waste management, 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. 505-160-1-0903

**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. 213. 505-312-1-0903

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**505 510. Environmental Design of Farm Buildings.** (3) I. Fundamentals of psychrometrics, heat flow through walls, and air flow plus weather data and requirements of animals or stored products needed for environmental design of farm buildings. Two hours rec. and three hours lab. a week. I.E. 372; Pr. or conc.: M.E. 513. 505-510-1-0903

**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 rec. and three hours lab. a week. Pr.: M.E. 513. Pr. or conc.: E.E. 510. 505-520-1-0903

**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 rec. and three hours lab. a week. Pr.: Ag.E. 551. Pr. or conc.: C.E. 522 or Agron. 645. 505-530-1-0903

**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.: C.E. 533, Ag.E. 312. 505-536-1-0903

**505 551. Hydrology.** (2) I, II. A study of the sources of supply and movement of underground and surface waters. Two hours rec. a week. Pr. or conc.: M.E. 571. (Cross listed with C.E. 551.) 505-551-0-0903

**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.: C.E. 533. 505-566-0-0903

**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. Two hours rec. and three hours lab. per week. Pr.: Ag.E. 520. 505-570-1-0903

**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. 505-581-0-0903

### 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. 505-620-3-0903

**505 650. Agricultural Systems Engineering.** (2) I. 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, Ag.E. 566. 505-650-1-0903

**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.: M.E. 571, M.E. 513. 505-700-1-0903

**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.: Ag.E. 551, C.E. 522 or Agron. 645. 505-705-1-0903

**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. 505-710-1-0903

**505 780. Measurement Systems.** (3) I. Theory and application of measurement systems with emphasis on environments and processes related to soils, plants and animals. Two hours rec. and three hours lab. a week. Pr.: E.E. 510. 505-780-1-0903

### 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. 505-810-4-0903

**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. 505-815-0-0903

**505 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 505-898-3-0903

**505 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 505-899-4-0903

**505 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 505-999-4-0903

## 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. 506-151-1-0998

**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. 506-300-1-0998

**506 310. Farm Electrification and Soil Conservation.** (2) 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. 506-310-1-0998

**506 324. Tillage-Planting Machinery.** (2) I. Primary and secondary tillage machinery, power requirements, field operation, planting equipment, herbicide placement and incorporation, fertilizer application, tillage-planting systems, and cost analysis. Two hours rec. a week. Pr.: Agron. 205 or Agron. 150. 506-324-0-0998

**506 235. Crop Harvesting and Handling Systems.** (2) II. Hay, forage and crop residue handling systems; machinery



components, machinery operation and maintenance, system selection and cost; grain harvesting machinery, fundamentals of operation, adjustment, and maintenance. Two hours rec. a week. 506-325-0-0998

**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.: Ag.E. 300 or Phys. 113. 506-330-1-0998

**506 351. Farm Power.** (3) I, II. A study of small engines and farm tractors; ignition, injection, carburetion, fuels, lubricants, power transmission, control systems, tune-up and maintenance. Two hours rec. and three hours lab. a week. Pr.: Math. 100. 506-351-1-0998

**506 352. Agricultural Machinery Construction.** (3) I, II. Advanced shop processes and techniques for constructing and maintaining agricultural machinery; advanced welding, metallurgy and selection of materials for construction. One hour rec. and five hours lab. a week. Pr.: Ag.E. 151 and junior standing. 506-352-1-0998

**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. 506-353-1-0998

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**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 hour rec., five hours lab. a week. Pr.: Math. 100. 506-552-1-0998

**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 hour rec., five hours lab. a week. Pr.: Ag.E. 151, Ag.E. 352 and junior standing. 506-553-1-0998

**506 554. Planning and Management of Agricultural Buildings.** (3) I, II. Concepts and fundamentals required in the planning of livestock production facilities including the evaluation of strength and durability of a structure, planning for an efficient functional layout, and planning for environmental modification needed in animal shelters plus site selection and farmstead planning. Three hours rec. a week. Pr.: Math. 100 and junior standing. 506-554-0-0998

**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. 506-555-1-0998

**506 558. Conservation Surveying and Planning.** (3) II. Agricultural surveying; layout and checking waterways, terraces and farm ponds; conservation planning from aerial photograph. Two hours rec. and three hours lab. a week. Pr.: Math. 100. 506-558-1-0998

**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. 506-559-1-0998

**506 560. Farm Animal-Waste Management.** (3) I. Current practices, technology, knowledge and problems relating to disposal or use of farm animal wastes. Attention is given to environmental, ecological, and socio-economic consequences of alternative ways in which such wastes are

accumulated, handled, and cycled back into the environment. Three hours rec. a week. Pr.: Chem. 110 or 210 and junior standing. 506-560-0-0998

#### 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. 506-615-3-0998

**506 651. Managing Farm Grain and Forage.** (3) I. Principles of grain and forage conditioning and storage. Structures and equipment for quality preservation. Two hours rec. and three hours lab. a week. Pr.: Math. 100 and junior standing. 506-651-1-0998

**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 Ag.E. 558. 506-652-1-0998

**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 or Agron. 150. 506-653-1-0998

**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. 506-654-1-0998

**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, Ag.E. 559 plus one year's teaching experience or approval of instructor. 506-700-1-0998

**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. 506-703-1-0998

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#### ARCHITECTURAL ENGINEERING/ CONSTRUCTION SCIENCE

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I. Eugene Thorson, Head of Department

Professor Thorson; \* Associate Professors Bissey\* and Blackman; Assistant Professors Burton and Goddard.

The Construction Science curriculum is designed to prepare graduates for responsible positions in the construction industry. The curriculum leads to the degree Bachelor of Science in Construction Science.

The Architectural Engineering program 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 Science in Architectural Engineering.

The department also provides course work in the technical and management areas of the architecture and interior architecture programs.



## Courses in Architectural Engineering

### UNDERGRADUATE CREDIT AND GRADUATE CREDIT IN MINOR FIELD

**510 522. 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.: C.E. 331. 510-522-1-0904

**510 523. 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.: Arch. E. 522 or C.E. 533. 510-523-0-0904

**510 524. Theory of Structures II.** (4) I, II. Analysis and design of metal structures; emphasis on buildings. Six hours per week. Pr.: Arch. E. 522 and 523. 510-524-1-0904

**510 528. 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.: Arch. E. 522. 510-528-1-0904

**510 534. 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. 510-534-0-0904

**510 535. 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. Three hours per week. Pr.: Phys. 212 or 312. 510-535-0-0904

**510 536. 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. 510-536-0-0904

**510 537. 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. 510-537-0-0904

**510 538. Problems in Architectural Engineering.** Credit arranged. I, II, S. A study of specific design problems under the direct supervision of a member of the Architectural Engineering faculty. Pr.: Approval of the instructor. 510-538-3-0904

### UNDERGRADUATE AND GRADUATE CREDIT

**510 780. 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.: Arch. E. 522, 523, 524, and 528. 510-780-0-0904

### GRADUATE CREDIT

**510 885. Structural Systems Design.** (3) I, II. A study of integrated structural, mechanical and electrical systems; economic evaluation. Two hours rec. and three hours lab. a week. Pr.: Arch. E. 780 or consent of instructor. 510-885-1-0904

## Courses in Construction Science

### UNDERGRADUATE CREDIT

**515 016. 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 lec. per month. 515-016-0-0904

**515 210. Introduction to Construction Programming.** (3) I, II. Application of digital computer techniques to the solution of elementary problems in the field of Construction Science and Architecture. Pr.: Math. 150. Four hours per week. 515-210-0-0904

**515 250. 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. Four hours per week. 515-250-1-0904

**515 410 and 515 411. 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 lec. and rec. per week. To be taken concurrently with 105 510 and 105 502.

**515 410. S.I "A".** (3) I. Pr.: 104 341. 515-410-1-0904

**515 411. S.II "A".** (3) II, S. Pr.: 515 410. 515-411-1-0904

**515 413. Construction Drawings.** (3) II. Production of a set of construction drawings. Emphasis on construction procedures. Introduction to shop drawings. For Construction Science majors. Pr.: Arch. 433, Con. Sci. 250. Nine hours lab per week. 515-413-1-0904

### UNDERGRADUATE CREDIT AND GRADUATE CREDIT IN MINOR FIELD

**515 540. Construction Problems I.** (3) I. Practical problems encountered in the erection of buildings and use of construction equipment. Pr.: Con. Sci. 250 and 413. 515-540-0-0904

**515 541. Construction Estimating.** (3) I, II. Principles, theories and methods of building estimating. Nine hours lab. a week. Pr.: Con. Sci. 413 and 540. 515-541-1-0904

**515 542. Construction Management I.** (3) I. General business and management procedures of construction contracting; human relations and communications. Pr. or conc.: Con. Sci. 541. 515-542-0-0904

**515 543. Construction Management II.** (3) II. Construction safety; project planning and scheduling techniques. Computer applications. Pr.: Con. Sci. 210, 541, and 542. 515-543-0-0904

**515 544. 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. 515-544-3-0904

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## CHEMICAL ENGINEERING

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L. T. Fan,\* Head of Department

Professors Akins,\* Bates,\* Erickson,\* Fan,\* Honstead,\* and Kyle,\* Associate Professor Matthews,\* Assistant Professors Hall,\* and Walawender.\*

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, reaction engineering, 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 Master's 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.** 520-015-0-0906

**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. 520-314-0-0906

**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. 520-316-1-0906

#### 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. 520-520-0-0906

**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. 520-521-0-0906

**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. 520-522-1-0906

**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. 520-530-0-0906

**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. 520-531-0-0906

**520 532. Chemical Engineering Laboratory II.** (2) I, II. Cont. of Chemical Engineering Laboratory I. Five hours lab. a week. Pr.: Ch.E. 522. 520-532-1-0906

**520 542. Chemical Engineering Laboratory III.** (2) I, II. Cont. of Chemical Engineering Laboratory II. Five hours lab. a week. Pr.: Ch.E. 532. 520-542-1-0906

**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 Ch.E. 531. 520-550-0-0906

**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 Ch.E. 531. 520-560-0-0906

**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. 520-561-1-0906

**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 Ch.E. 560. 520-570-1-0906

**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. 520-571-1-0906

**520 580. Problems in Chemical Engineering.** Credit arranged. I, II, S. An introduction to chemical engineering research. Pr.: Approval of department head. 520-580-4-0906

#### 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. 520-715-0-0906

**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 and Ch.E. 530. 520-725-0-0906

**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. 520-735-0-0906

**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 and Ch.E. 550. 520-745-0-0906

**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). 520-795-1-0906

**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. 520-805-0-0906

#### 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. 520-810-4-0906

**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. 520-815-0-0906

**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. 520-822-0-0906

**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. 520-826-0-0906

**520 832. Advanced Unit Operations I.** (3) I, II, S. Advanced study of the operations involving mechanical separation of materials. Three hours rec. a week. Pr.: Ch.E. 560. 520-832-0-0906

**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. 520-850-0-0906

**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. 520-855-0-0906

**520 862. Advanced Transport Phenomena I.** (3) I, II, S. Advanced treatment of momentum, energy and mass transport, with emphasis on momentum transport in chemical engineering applications. Three hours rec. a week. Pr.: Ch.E. 735. 520-862-0-0906

**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. 520-867-0-0906

**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, Ch.E. 735. 520-871-0-0906

**520 875. Graduate Seminar in Chemical Engineering.** (1) I, II. Discussion of current advances and research in chemical engineering and related fields. 520-875-0-0906

**520 898 Master's Report.** Credit arranged. I, II, S. Topics selected with approval of department head and major professor. 520-898-4-0906

**520 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of department head and major professor. 520-899-4-0906

**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. 520-901-0-0906

**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. 520-910-0-0906

**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. 520-915-0-0906

**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 Ch.E. 832 and one course in chemical engineering numbered 851 or higher. 520-920-0-0906

**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. 520-925-0-0906

**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. 520-930-0-0906

**520 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of department head and major professor.

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## CIVIL ENGINEERING

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Robert R. Snell,\* Head of Department

Professors Best,\* Cooper,\* McCormick,\* Rosebraugh,\* Smith,\* and Snell,\* Associate Professors Knostman,\* Lindly,\* Russell,\* Schmid,\* Swartz,\* and Williams,\* Assistant Professors Crary, Hu,\* and Zovne,\* Emeritus: Professors Crawford 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 offered in the Department of Civil Engineering with areas of specialization in Structural Analysis and Design, Soil Mechanics and Foundations, Hydraulic Engineering, Sanitary/Environmental 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.

### Course in Civil Engineering

#### UNDERGRADUATE CREDIT

**525 010 Freshman Engineering Assembly.** (0) II. 525-010-0-0908

**525 015. Advanced Engineering Assembly.** (0) I, II. 525-015-0-0908

**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. 525-212-1-0908

**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. 525-214-1-0908

**525 231. 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. 525-231-0-0999

**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. Two hours rec. and three hours lab. a week. Pr. or conc.: Geol. 100. 525-322-0-0908

**525 331. 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.: C.E. 231. 525-331-0-0999

**525 332. 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.: C.E. 331. 525-332-1-0999

**525 333. 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. 525-333-0-0999

#### 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. 525-511-1-0908

**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 three hours lab. a week. Pr.: C.E. 533.

**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 three hours lab. a week. Pr.: C.E. 522. Pr. or conc.: C.E. 544. 525-528-1-0908

**525 530. 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 ac-



celeration, work-energy and impulse-momentum. Four hours rec. a week. Pr.: Math. 222. 525-530-0-0999

**525 533. 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.: C.E. 333; Pr. or conc: Math. 222. 525-533-0-0999

**525 534. 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.: C.E. 533. 525-534-1-0999

**525 535. 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.: C.E. 533. 525-535-1-0908

**525 536. 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. 525-536-1-0908

**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. 525-542-1-0908

**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. 525-544-1-0908

**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.: M.E. 571. (Joint listed with Ag.E. 551.) 525-551-0-0908

**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 hydropower 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. 525-552-1-0908

**525 553. Hydrologic Methods Laboratory.** (1) I. Application of hydrologic methods in design; precipitation data analysis; evapotranspiration; streamgaging; hydrograph generation and flood routing; rainfall and flood frequency analysis; design of multipurpose reservoirs; ground water flow analysis and water well design. Three hours lab. a week. Pr. or conc.: C.E. 551. 525-533-1-0908

**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. 525-563-1-0908

**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 C.E. 563. 525-565-1-0908

**525 571. Transportation Engineering.** (3) I, II. The development, economic feasibility, method of financing, location, geometric design, and operational analysis of trans-

portation systems. Two hours rec. and three hours lab. a week. Pr.: C.E. 214 and junior standing. 525-571-1-0908

**525 585. Civil Engineering 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. 525-585-2-0908

## 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. 525-680-0-0908

**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. 525-718-1-0908

**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. 525-722-0-0908

**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. 525-724-1-0908

**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. 525-728-1-0908

**525 730. 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.: C.E. 533, Math. 240. 525-730-0-0999

**525 731. Experimental Stress Analysis.** (3) I. Experimental methods of investigation 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.: C.E. 730 or approval of instructor. 525-731-1-0999

**525 732. Advanced Structural Analysis I.** (3) I. Classical methods of analysis of statically indeterminate structures; deflections and influence lines for indeterminate structures; analysis of space frames and trusses. Three hours rec. a week. Pr.: C.E. 532. 525-732-0-0908

**525 733. Advanced Structural Analysis II.** (3) II. Application of matrix methods of analysis to complex structures; selected topics in structural analysis. Three hours rec. a week. Pr.: C.E. 532. 525-733-0-0908

**525 734. 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. 525-734-2-0999

**525 736. 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.: C.E. 533. 525-736-0-0999

**525 737. 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.: C.E. 533, Math. 240. 525-737-0-0999

**525 740. 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.: M.E. 735 or G.E. 740. 525-740-0-0999

**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.: C.E. 534. 525-741-0-0908

**525 742. Advanced Steel Design.** (3) II. Plastic design of steel structures; stability problems in plastic design; design of complex steel structures. Three hours rec. a week. Pr.: C.E. 532, C.E. 542. 525-742-0-0908

**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. 525-743-0-0908

**525 751. Hydraulics of Open Channels.** (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. 525-751-0-0908

**525 752. Advanced Hydrology.** (3) II. Review basic principles; point and regional rainfall and flood frequency analyses; hydrologic and hydraulic flood routing; drainage and flood control facilities design; hydrologic modeling and simulation; flood plain analysis and planning. Three hours rec. a week. Pr.: C.E. 551. 525-752-0-0908

**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. 525-761-0-0908

**525 762. Water Treatment Systems.** (3) II. 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. 525-762-0-0908

**525 766. Wastewater Treatment Systems I.** (3) I. A study of wastewater treatment systems applied to domestic and industrial wastewaters. Emphasis is placed on the basic biological concepts applicable to the design of conventional wastewater treatment systems. Three hours rec. a week. Pr.: C.E. 565. 525-766-0-0908

**525 767. Wastewater Treatment Systems II.** (3) II. A study of advanced wastewater treatment systems including nutrient, suspended solids, and trace organic removals, along with treatment and disposal of the resultant solids. Emphasis is placed on synthesis of the various processes into the total treatment scheme. Pr.: C.E. 766 or consent of instructor. 525-767-0-0908

**525 770. Geometric Design of Highways.** (3) II. Criteria controlling geometric design of highways, vehicle requirements, speed volume, capacity of safe grades, alignment, and cross-section; intersections and interchanges. Two hours rec. and three hours lab. a week. Pr.: C.E. 571. 525-770-1-0908

**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. 525-771-1-0908

**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. 525-773-1-0908

**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. 525-774-1-0908

**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. 525-775-1-0908

**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. Pr.: Senior standing in Engineering or graduate standing in Regional and Community Planning. 525-786-1-0908

**525 790. Problems in Civil Engineering.** Credit arranged. I, II, S. Pr.: Approval of instructor. 525-790-3-0908

## 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. 525-810-3-0908

**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. 525-822-1-0908

**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. 525-823-1-0908

**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. 525-826-1-0908

**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. 525-831-0-0908

**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. 525-832-0-0908

**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 Math. 761. 525-834-0-0908

**525 835. Structural Dynamics.** (3) I. Analysis of structures subjected to dynamic loading. Three hours rec. a week. Pr.: C.E. 732, C.E. 834. 525-835-0-0908

**525 838. 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.: C.E. 730. 525-838-0-0999

**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. 525-843-0-0908

**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; prismatic and triangular plate structures. Three hours rec. a week. Pr. C.E. 732, C.E. 730. 525-845-0-0908

**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. 525-848-0-0908

**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. 525-849-0-0908

**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. 525-851-0-0908

**525 854. Analysis of Groundwater Flow.** (3) II. Principles of flow through porous media; applications of flow theory to well analysis and design; groundwater resource evaluation and regional groundwater systems analysis. Three hours rec. a week. Pr.: C.E. 552. 525-854-0-0908

**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. 525-863-0-0908

**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. 525-871-1-0908

**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. Pr. or conc.: Stat. 510. 525-875-1-0908

**525 898 Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 525-898-4-0908

**525 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 525-899-4-0908

**525 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 525-999-4-0908

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## ELECTRICAL ENGINEERING

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Wellington W. Koepsel,\* Head of Department

Professors Casey,\* Haft,\* Koepsel,\* Lucas,\* Rathbone,\* Ward, Jr.;;\* Associate Professors Ahmed,\* Gallagher,\* Harris,\* Hummels,\* Johnson,\* Kaufman,\* and Lenhart;\* Assistant Professor Cottom;\* Instructors 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, energy 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 engineering. 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. 530-241-0-0909

#### 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, E.E. 525, E.E. 557. 530-501-1-0909

**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, E.E. 581. 530-502-1-0909

**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, Phys. 214. 530-510-0-0909

**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. 530-511-1-0909

**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. 530-519-0-0909

**530 525. Electronics I.** (3) I, II, S. Fundamentals of electronic devices. Three hours rec. a week. Pr.: E.E. 510. 530-525-0-0909

**530 526. Electronics II.** (3) I, II, S. Analysis and design of electronic circuits. Three hours rec. a week. Pr.: E.E. 511, E.E. 525. 530-526-0-0909

**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. 530-530-0-0909

**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. 530-557-0-0909

**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 E.E. 557. 530-581-0-0909

**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. 530-590-0-0909

#### UNDERGRADUATE AND GRADUATE CREDIT

**530 603. Advanced Electrical Engineering Laboratory.** (2) I, II. A project-oriented laboratory in which a small group of students works with a faculty member in a special area of interest. Projects usually involve design, measurement methods or experimental work. May be repeated once. Pr.: E.E. 502. 530-603-1-0909

**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. 530-625-1-0909

**530 627. Communication Electronics.** (3) I, II. An introduction to analog communication systems. Includes amplitude modulation (AM) and frequency modulation (FM) by analog signals and the determination signal-to-noise ratio in AM and FM systems. Design of simple oscillators, modulators, mixers, and detectors. Three hours rec. a week. Pr.: E.E. 526. 530-627-0-0909

**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. 530-641-0-0909

**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. 530-642-1-0909

**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. 530-643-1-0909

**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. 530-644-1-0909

**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. 530-645-0-0909

**530 646. Fault Diagnosis in Digital Systems.** (3) I, II. Hazards, fault detection in combinatorial circuits and sequential machines using path sensitizing and fault matrix methods, state table analysis, etc.; system reliability through logical redundancy. Pr. or conc.: E.E. 641 or consent of instructor. 530-646-0-0909

**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. 530-647-0-0909

**530 648. Microcomputer Programming and Applications.** (2) I, II. Application of microprocessor-based microcomputers in data processing instrumentation, control and communications. One hour lec. and three hours lab. a week. Pr.: E.E. 241 plus concurrent enrollment in C.S. 658. 530-648-1-0909

**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. 530-649-1-0909



**530 658. Electromagnetic Theory II.** (3) I, II. Continuation of 530 557. Three hours rec. a week. Pr.: E.E. 557. 530-658-0-0909

**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. 530-659-0-0909

**530 661. Digital Communication Systems.** (3) I, II. An introduction to digital communication systems including modulation, transmission, demodulation and random noise. Principles of optimum digital receiver design and evaluation of receiver performance are included. Three hours rec. a week. Pr.: E.E. 526. 530-661-0-0909

**530 682. Energy Conversion II.** (3) I, II, S. Continuation of 530 581. Three hours rec. a week. Pr.: E.E. 581. 530-682-0-0909

**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. 530-685-0-0909

**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. 685. 530-686-0-0909

**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. 530-688-0-0909

**530 690. Problems in Electrical Engineering.** Credit arranged. I, II, S. 530-690-3-0909

**530 692. Operational Circuit Analysis.** (3) I. Properties and classification of linear systems, Fourier Series, Fourier transform and related power and phase spectra, energy density spectrum, Laplace transform of periodic and aperiodic signals, transform analysis of linear systems, ideal filters, two-port networks, system analysis by convolution. Three hours rec. a week. Pr.: E.E. 511. 530-692-0-0909

**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. 410 or N.E. 295. 530-695-0-0909

**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. 530 or M.E. 612. (Cross-listed with 560 730.) 530-730-0-0909

**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. 530-759-0-0909

**530 761. 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.: Senior standing in Electrical Engineering. 530-761-0-0909

**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. Also a basic physiology course. 530-771-0-0909

**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. 530-772-0-0909

**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. 692. 530-791-0-0909

## 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. 692 or consent of instructor. 530-816-0-0909

**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. 530-817-0-0909

**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. 530-830-0-0909

**530 836. Sampled-data Control Systems.** (3) On sufficient demand. Analysis and design of sampled-data control systems using Z-transforms; study of digital computer controlled systems. Three hours rec. a week. Pr.: E.E. 730. 530-836-0-0909

**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. 530-838-0-0909

**530 855. Advanced Electromagnetic Theory I.** (3) I. Mathematical development of electromagnetic wave theory. Three hours rec. a week. Pr.: E.E. 659. 530-855-0-0909

**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. 530-856-0-0909

**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. Three hours rec. a week. Pr.: E.E. 761. 530-862-0-0909

**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. 530-865-0-0909

**530 866. Signal Processing and Classification.** (3) I, II. Theoretical considerations of orthogonal transforms in digital signal processing with emphasis on data compression, generalized Wiener filtering, and feature selection in pattern recognition. Three hours rec. a week. Pr.: Stat. 510 or consent of instructor. 530-866-0-0909

**530 881. Topics in Electric Energy Systems.** (3) On sufficient demand. Subjects of current interest such as computer methods, distribution and transmission systems, systems planning and economics, extra high voltage transmission, exotic power sources. May be repeated. Three hours rec. a week. Pr.: E.E. 686. 530-881-0-0909

**530 890. Advanced Electrical Theory.** Credit arranged. I, II. For advanced study in specialized areas by M.S. students. Pr.: Consent of instructor. 530-890-3-0909



**530 891. Graduate Seminar in Electrical Engineering.** (1) I, II. Discussion of current advances and research in Electrical Engineering. 530-891-0-0909

**530 897. Research in Electrical Engineering.** Credit arranged. I, II, S. Special research problems in electrical engineering. Pr.: Consent of instructor. 530-897-4-0909

**530 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 530-898-4-0909

**530 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 530-899-4-0909

**530 957. Advanced Electromagnetic Theory Seminar.** (3) On sufficient demand. Advanced topics in electromagnetic theory. Three hours rec. a week. Pr.: E.E. 856. 530-957-0-0909

**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. 530-958-0-0909

**530 961. Advanced Topics in Communications, Information and Controls.** (3) On sufficient demand. Study of advanced topics and recent developments in the areas of communication and information theory, information processing and control systems. May be repeated. Three hours rec. a week. Pr.: E.E. 761. 530-961-0-0909

**530 971. Advanced Topics in Bioengineering.** (3) On sufficient demand. Study of complex physiological system simulation and analysis techniques, modern experimental and clinical electronic bioinstrumentation systems. Topics selected according to graduate student's interests. May be repeated. Three hours rec. a week. Pr.: E.E. 771 or E.E. 772. 530-971-0-0909

**530 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 530-999-4-0909

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## ENGINEERING TECHNOLOGY

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### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**540 510. Properties of Engineering Materials.** (3) I. Engineering requirements of materials: mechanical, thermal, electrical, and biological properties and behavior of materials. Two hours rec. and three hours lab. a week. Pr.: Chem. 110 and Phys. 113. 540-510-1-0925

**540 512. Mechanics of Fluids.** (3) I. Fluid properties, fluid statics. Fluid dynamics of high and low viscosity fluids including pipe flow, open channel flow, flow about immersed objects, fluid machinery, and flow measurements. Two hours rec. and three hours lab. a week. Pr.: Phys. 113. 540-512-1-0925

**540 514. Energy Conversion Technology.** (3) II. Introduction to energy conversion technology, energy, and power; thermodynamics, power cycles, and refrigeration. Three hours rec. a week. Pr.: Chem. 110 or Chem. 210, Phys. 113. 540-514-0-0925

**540 515. Materials Testing.** (4) I, II. Survey of ASTM testing procedures and laboratory application. Mechanical, thermal, electrical, optical, and chemical property determination. Analysis of structure through x-ray, electron microscopy, spectral analysis, thermal analysis, rheology and other methods. Introduction to experimental stress analysis. Three hours lec. and three hours lab. a week. Pr.: E.T. 510, C.E. 331. 540-515-1-0925

**540 520. Wastewater Treatment Technology.** (3) II. Application of waste treatment technology for pollution control. Emphasis is placed upon process operation and monitoring,

field sampling and data interpretation. Field trips and laboratory experiments are a major portion of the course. One hour rec. and six hours lab. a week. Pr.: C.E. 563. 540-520-1-0925

**540 521. Water Treatment Technology.** (3) I. Application of water treatment technology to design, operation, and monitoring in the water treatment industry. Emphasis is placed on process understanding through field trips and laboratory experience. Two hours rec. and three hours lab. a week. Pr.: C.E. 563. 540-521-1-0925

**540 522. Air Pollution Control Technology.** (2) I, II. An introduction to air pollution control, including Federal regulations, meteorology, and damages from air pollution. Control techniques for particulate and gaseous pollutants, and automobile exhausts are covered. Two one-hour lectures a week. Pr.: Consent of instructor. 540-522-0-0925

**540 530. Electric Circuits and Machines.** (4) I. Analysis of the basic behavior of D-C and steady state A-C circuits. Study of simple magnetic circuits. Investigation of magnetic and electric circuits combined to form transformers, alternators, etc. Three hours rec. and three hours lab. a week. Pr.: Math 500 and Phys. 114. 540-522-1-0925

**540 532. Instrumentation and Measurement Technology.** (3) II. Principles and application of instrumentation and measurement equipment. One hour rec. and six hours lab. a week. Pr.: E.T. 530. 540-532-1-0925

**540 534. Automatic Control Technology.** (3) II. Application oriented control systems technology including basic systems dynamics, regulatory, servo, and computer control; and system specifications. Two hours rec. and three hours lab. a week. Pr.: E.T. 530. 540-534-1-0925

**540 535. Digital Logic Systems I.** (4) I. Use of combinational and sequential circuits in the fashioning of digital systems and sub-systems. Three hours lec. and one three-hour lab. a week. Pr. or conc.: E.E. 525 and E.T. 532. 540-535-1-0925

**540 536. Digital Logic Systems II.** (4) II. Practical aspects of digital system design involving integrated and discrete circuit switching behavior, system interfacing, I/O devices, and A-D and D-A conversion, memory devices and system debugging. Three hours lec. and one three-hour lab. a week. Pr.: E.T. 535; Pr. or conc.: E.E. 526. 540-536-1-0925

**540 537. Electronic Measurements Laboratory.** (1) I, II. Practical experience in applying the techniques and methods of Instrumentation and Measurements Technology in the measurement of performance of various electronic circuits and devices. One three-hour lab. a week. Pr.: E.T. 532; Pr. or conc.: E.E. 526. 540-537-1-0925

**540 538. Computer and Instrumentation Technology Seminar.** (1) I, II. Preparation and oral presentation of a written technical report. One hour a week. Pr.: Senior standing in Engineering Technology. 540-538-0-0925

**540 550. Heat Treatment—Tool & Die Steels.** (3) I, II. Classification, selection, heat treating and testing of steels in tool and die applications. Two hours rec. and three hours lab. a week. Pr.: E.T. 510. 540-550-1-0925

**540 551. Materials Processing.** (4) I, II. Study of the fabrication techniques employed in the manufacture of consumer products. Discussion of forming operations including drawing, molding, casting, rolling, heat treatment and extrusion. Preparation of coatings, fibers, and composites. Discussion of machineability and surface finish characteristics. Three hours lec. and six hours lab. a week. Pr.: E.T. 510, I.E. 241. 540-551-1-0925

**540 552. Work Design.** (3) I, II. Motion and time study as applied to production processes; analysis and charting; principles of motion economy; work stations and environments; introduction to standard data systems. Two hours rec. and three hours lab. a week. Pr.: I.E. 241. 540-552-1-0925

**540 560. Kinematics and Mechanisms.** (3) II. Plane motion analysis and elementary synthesis of fourbar linkages and



cams, gears and gear trains. Two hours rec. and three hours lab. a week. Pr.: C.E. 231. 540-560-1-0925

**540 561. Machine Design.** (3) I. Applications of statics, strength of materials and kinematics to the design of machine components. Materials selection and fatigue loading are considered. Three hours rec. a week. Pr.: E.T. 560 and C.E. 331. 540-561-0-0925

**540 562. Mechanical Design Lab I.** (2) I, II. Application of the principles of the design process in solving design projects. Projects will be obtained from industry or developed by instructor. Six hours lab. a week. Pr. or conc.: E.T. 561. 540-562-1-0925

**540 563. Mechanical Design Lab II.** (2) I, II. Continuation of Mach. Des. Lab I project with completion of detail design and drawings. Possibly building and testing components designed. Six hours lab. a week. Pr.: E.T. 562. 540-563-1-0925

**540 580. Nuclear Engineering Technology.** (4) II. Concepts of nuclear energies, nuclear reactions, nuclear radiation, radioisotope application, nuclear reactors and associated plant facilities, waste disposal, radiation protection, and economics as applied to nuclear engineering. Three hours rec. and three hours lab. a week. Pr.: Math. 500 and Phys. 114. 540-580-1-0925

**540 581. Nuclear Radiation Measurements.** (3) I. Principles of nuclear radiation detection. Detectors and measurement systems. Application to radiation dosimetry and spectroscopy. Instrumentation for data analysis and system control with emphasis on reactor control. Two hours rec. and three hours lab. a week. Pr.: E.T. 532 and N.E. 460. 540-581-1-0925

**540 582. Radiation Protection Technology.** (5) II. Concepts of radiation protection. Radiation dosimetry; radiation shielding and exposure control; radiation biological effects. Licensing and regulation procedures. Three hours rec. and six hours lab. a week. Pr.: E.T. 581. 540-582-1-0925

**540 640. Food Processing Operations I.** (4) I, II. A study of food processing unit operations and their applications with emphasis on heat transfer operations such as evaporation, drying, sterilization, freezing and thawing. Three hours rec. and three hours lab. a week. Pr.: E.T. 530 and E.T. 563. 540-540-1-0925

**540 641. Food Processing Operations II.** (4) I, II. Continuation of 540 640 with emphasis on mass transfer operations such as distillation, extraction, adsorption, and ultrafiltration. Three hours rec. and three hours lab. a week. Pr.: E.T. 640. 540-541-1-0925

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## GENERAL ENGINEERING

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Donald E. Rathbone, 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 a week. 500-160-1-0901

**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. 500-200-2-0901

**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 lec. and one hour rec. a week. 500-202-0-0901

**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. 500-250-0-0901

**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. 500-299-0-0901

**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. 500-325-2-0901

**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. 500-399-0-0901

**500 401. Seminar in Engineering.** (1) I, II, S. Selected topics of general interest. Open to undergraduate students from all colleges. 500-401-0-0901

**500 402. Research in Engineering.** Variable credit. I, II, S. Individual or group research problem selected with approval of faculty adviser. 500-402-4-0901

**500 499. Honors Research in Engineering.** (1) I, II. Individual research problem selected with approval of faculty adviser. Open to seniors in the Engineering Honors Program for two semesters. Written report is presented at end of second semester. 500-499-4-0901

**500 740. 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, differential, and integral equations. Concepts of characteristic, impedance, transfer and influence functions. Three hours rec. a week. Pr.: Math. 240. 500-740-0-0999

**500 745. Applied Nonlinear Analysis.** (3) II. Study of mechanical or electrical systems governed by nonlinear equations, elliptic integrals, geometry of integral curves, and phase plane, Lienard's graphical construction, Poincare's classification of singular points, stability and instability. Three hours rec. a week. Pr.: Math 240. 500-745-0-0999

**500 870. 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. 500-870-0-0999

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## INDUSTRIAL ENGINEERING

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Frank A. Tillman,\* Head of Department

Professors Bennett,\* Hwang,\* Konz,\* Lee,\* Smaltz,\* and Tillman;\* Associate Professors Bussey,\* L. Grosh,\* Roth,\* and Woodard;\* Assistant Professors Byers, D. Grosh,\* and Hansen; Emeritus: Professors Clifton, Darby, 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 Arts and Sciences.

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.

A University Remote Computing Laboratory is located in Seaton Hall. This adjunct facility contains a card reader and printer in addition to typewriter units connected directly to the university's IBM 370/158 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 lec. a week, sophomore, junior, and senior years. 550-015-0-0913

**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. 550-050-2-0913

**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. 550-120-0-0913

**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. 550-241-1-0913

**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. 550-271-1-0913

**550 350. Engineering Materials.** (2) I, II. Engineering requirements of materials; arrangements of atoms in materials; metallic and ceramic phases and their properties; polymers; multiphase equilibrium and non-equilibrium relationships; modification of properties through changes in microstructure; stability under service stresses, thermal behavior in service; corrosion; behavior in electromagnetic fields; effect of radiation on materials. Two hours rec. a week. Pr.: Chem. 230; Pr. or conc.: Phys. 213. 550-350-0-0913

**550 351. Engineering Materials Laboratory.** (1) I, II. Laboratory experiments supplementing I.E. 350. Pr. or conc.: I.E. 350. 550-351-1-0913

**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. 550-352-1-0913

**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. 550-372-1-0913

#### 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. 550-501-0-0913

**550 502. Industrial Management II.** (3) I. Theory and practice of industrial management planning, execution and evaluation as a basis for coordination of the factors of an industrial system. Three hours rec. a week. Pr.: I.E. 501. 550-502-0-0913

**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. 550-530-0-0913

**550 533. Design Ergonomics.** (3) I, II. Factors influencing the human use of interior spaces. Design for health, safety, performance, comfort and pleasantness. Emphasis on human characteristics, evaluation and environmental effects. Three hours rec. a week. Pr.: Consent of instructor. 550-533-0-0913



**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. 550-541-0-0913

**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. 550-551-1-0913

**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. 550-553-0-0913

**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. 550-554-1-0913

**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. 550-571-0-0913

**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. 550-572-0-0913

**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. 550-573-0-0913

**550 575. Quantitative Techniques in Industrial Engineering.** (3) I, II. Problem formulation and conceptual models; application of finite mathematics and other techniques to problems of industrial engineering and management. Three hours rec. a week. Pr.: Math. 222. 550-575-0-0913

#### UNDERGRADUATE AND GRADUATE CREDIT

**550 601. Introduction to Systems Management.** (3) I, II. A general introduction to the formulation and mathematical solution of management and business problems. Includes the formulation of business and management problems and their solutions, utilizing optimization theory, finite mathematics and statistical techniques. Three hours rec. a week. Pr.: Math. 222 and consent of instructor. 550-601-0-0913

**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, I.E. 571, or consent of instructor. 550-603-0-0913

**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. 550-609-1-0913

**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. 550-625-0-0913

**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. 550-651-0-0913

**550 652. Industrial Ergonomics.** (3) I, II. The design process, work analysis techniques, principles of work organization,

work station and hand tools. Facilities management. Lighting, noise and industrial hygiene. Time determination. Work standards. Three hours rec. a week. Pr.: Math. 222 and consent of instructor. 550-652-0-0913

**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. 550-655-1-0913

**550 660. Material Imperfections.** (3) II. The nature of a crystal and the structures of materials; X-ray methods involved in the study of materials; preferred orientation and fiber textures; defects in crystals; phase transformation in the solid state; the effects of physical treatments on the crystal lattice of metals; defects in crystals. Two hours rec. and three hours lab. a week. Pr.: Phys. 214, I.E. 350. 550-660-1-0913

**550 661. Industrial Metallurgy.** (3) II. The physical behavior of metals while undergoing various industrial fabrication processes; responses involving plastic flow allotropic transformations, recrystallization, grain growth, diffusion, mechanical and crystallographic fibering, solid-state solution and precipitation. Two hours rec. and three hours lab. a week. Pr.: I.E. 241, I.E. 351. 550-661-1-0913

**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. 550-663-1-0913

**550 664. Electrochemical Behavior of Metals.** (3) I. The electrochemical processes involved in corrosion of metals and the basic factors determining the nature and rate of attack; consideration of corrosion problems and methods of combatting corrosion. Two hours rec. and three hours lab. a week. Pr.: Chem. 230, Phys. 213. 550-664-1-0913

**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. 550-671-0-0913

**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. 550-672-0-0913

**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, I.E. 372. 550-721-1-0913

**550 762. Advanced Metallurgy.** Credit arranged. II. Studies in specialized phases and current concepts of metallurgy. Pr.: I.E. 351. 550-762-3-0913

**550 766. Powder Metallurgy.** (3) II. Production of powders by mechanical and chemical methods; theoretical concepts associated with consolidation, heat treating and internal structural changes of parts produced from powder metals and cermets. Two hours rec. and three hours lab. a week. Pr.: I.E. 663. 550-766-1-0913

#### GRADUATE CREDIT

**550 801. Problems in Industrial Engineering.** Credit arranged. I, II, S. Pr.: Graduate standing. 550-801-3-0913

**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. 550-805-1-0913



**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. 550-811-0-0913

**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. 550-830-0-0913

**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. 550-842-0-0913

**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. 550-850-0-0913

**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. 550-865-0-0913

**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. 550-872-0-0913

**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. 550-874-0-0913

**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. 550-881-0-0913

**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. 550-892-0-0913

**550 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 550-898-4-0913

**550 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 550-899-4-0913

**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 I.E. 865) and I.E. 830. 550-930-0-0913

**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. 550-950-0-0913

**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 Stat. 770. 550-951-0-0913

**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. 550-971-0-0913

**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. 550-973-0-0913

**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. 550-975-0-0913

**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. 550-976-0-0913

**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. 550-982-0-0913

**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. 550-983-0-0913

**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. 550-985-0-0913

**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. 550-990-0-0913

**550 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 550-999-4-0913

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## MECHANICAL ENGINEERING

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Paul L. Miller,\* Acting Head of Department

Professors Appl,\* Azer,\* Crank,\* Duncan,\* Huang,\* Gorton,\* Lindholm,\* Miller,\* Rohles,\* Tripp,\* and Wood; Associate Professors Gowdy,\* Kipp,\* Nesmith, Thompson,\* Turnquist,\* and Walker,\* Assistant Professors Annis,\* Ball,\* and Pauli; Emeritus: Dean Durland; Professors Brainard, Flinner, 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. 560-015-0-0910

**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. 560-212-1-0910

**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. 560-217-1-0910

**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. 560-390-0-0910

**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. 560-440-0-0910

#### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**560 512. 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.: C.E. 333, Math. 222. 560-512-0-0910

**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. 560-513-0-0910

**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. 560-523-0-0910

**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.: M.E. 571, Math. 240. 560-527-1-0910



**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.: M.E. 512. 560-533-0-0910

**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. 560-535-1-0910

**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. 560-560-0-0910

**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.: C.E. 533, M.E. 533. 560-563-0-0910

**560 571. 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.: M.E. 512; Pr. or conc.: M.E. 513. 560-571-0-0910

**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, M.E. 533. 560-575-1-0910

**560 583. Mechanical Engineering Laboratory II.** (2) I, II, S. Analysis of heat transfer and fluid flow processes, mechanical systems, automatic control; instrumentation, design of experiments. Six hours lab. a week. Pr.: M.E. 535. 560-583-1-0910

**560 595. 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.: M.E. 512 or C.E. 530, or consent of instructor. 560-595-0-0910

#### 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. 560-606-0-0910

**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. 560-613-0-0910

**560 620. Internal Combustion Engines.** (3) II. Analysis of cycles, design and performance characteristics. Three hours rec. a week. Pr.: M.E. 523. 560-620-0-0910

**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. 560-622-0-0910

**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. 560-625-1-0910

**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.: M.E. 571, Math. 240. 560-628-1-0910

**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, M.E. 571, Math. 240. 560-631-0-0910

**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. 560-633-0-0913

**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, M.E. 563. 560-651-1-0910

**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.: M.E. 512, Math. 240. 560-656-0-0910

**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. 560-671-0-0910

**560 699. Problems in Mechanical Engineering.** Credit arranged. I, II, S. Pr.: Approval of department head. 560-699-3-0910

**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.: M.E. 571. 560-712-0-0910

**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, M.E. 571, Math. 240. 560-713-0-0910

**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, M.E. 523, M.E. 571. 560-715-0-0910

**560 716. 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.: M.E. 512, Math. 240. 560-716-0-0999

**560 718. 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.: M.E. 512, Math. 240. 560-718-0-0999

**560 720. 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.: M.E. 571, Math. 240. 560-720-0-0999

**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. 560-722-0-0910

**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. 560-725-0-0910



**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. 560-728-1-0910

**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. (Cross-listed with 530 730.) 560-730-0-0910

**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. 560-733-1-0910

**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, or consent of instructor. Pr.: M.E. 712. 560-735-1-0910

**560 736. 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.: C.E. 730. 560-736-0-0999

**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.: M.E. 571 and one course in statistics or consent of instructor. 560-742-0-0910

**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. 560-746-0-0910

**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. 560-756-0-0910

**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. 560-757-0-0910

**560 758. 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. 560-758-0-0910

**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 and senior standing in engineering. 560-760-0-0910

**560 761. 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 M.E. 718, M.E. 736 or G.E. 740 or consent of instructor. 560-761-0-0999

**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, M.E. 631, M.E. 728. 560-766-1-0910

**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, M.E. 571. 560-771-1-0910

#### 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, M.E. 527 or consent of instructor. 560-813-0-0910

**560 822. 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.: M.E. 718. 560-822-0-0999

**560 830. Thermoelasticity.** (3) I. Theory and analysis of thermal stresses in elastic and inelastic systems. Pr.: M.E. 735 or M.E. 822 or consent of instructor. 560-830-0-0999

**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. 560-831-0-0910

**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. 560-850-0-0910

**560 851. 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.: M.E. 736 or M.E. 822. 560-851-0-0999

**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. 560-860-0-0910

**560 862. 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.: C.E. 730. 560-862-0-0999

**560 880. 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.: M.E. 718 or M.E. 720, Math. 551. 560-880-0-0999

**560 890. Laboratory Investigations in Mechanical Engineering.** Credit arranged. I, II, S. Pr.: Approval of department head. 560-890-4-0910

**560 898. Master's Report.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 560-898-4-0910

**560 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 560-899-4-0910

**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. 560-915-0-0910

**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. 560-916-0-0910

**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. 560-922-0-0910

**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. 560-925-0-0910

**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. 560-931-0-0910

**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. 560-935-0-0910

**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. 560-942-0-0910

**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. 560-943-0-0910

**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. 560-965-0-0910

**560 999. Dissertation Research in Mechanical Engineering.** Ph.D. level. Credit arranged. I, II, S. Pr.: Approval of dept. head and major professor. 560-999-4-0910

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## NUCLEAR ENGINEERING

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Richard E. Faw,\* Head of Department

Professors Donnert,\* Faw,\* and Mingle;\* Associate Professors Eckhoff,\* Krick,\* Merklin,\* and Shultis;\* Assistant Professors Clack, Hightower, and Lester.

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 materials, 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 management, industrial isotope ap-

plications, 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: **250-kilowatt TRIGA Mark II Reactor** with pulsing capability to 250,000 kilowatts; **Radiation Shielding Facility** on a 180-acre remote site with a full scale house and other experimental shielding test structures; **Neutron Activation Analysis Laboratory** with two 4096-channel analyzers, an on-line mini-computer, gamma-ray spectrometers (GeLi, SiLi, and NaI), high speed printers, plotters and magnetic tape recorders; **Nuclear Instrumentation Laboratory** with lab stations containing digital logic training systems, instrumentation modules for pulse analysis and systems timing, dual-beam oscilloscopes, pulse and waveform generators; **Radio-isotope Application Laboratory** with instructional equipment for radiation detection and analysis, neutron and beta radiography, material density and thickness gaging, mechanical wear studies, radioactive tracer techniques; **Environmental Monitoring Laboratory** with radiation survey meters, two thermoluminescent dosimetry systems, air samplers, Tri-Carb liquid scintillation spectrometer, and chemical separation facilities; **Radiation Effects and Fuel Processing Laboratory** with two gas chromatographs, an atomic absorption spectrometer, a Cary-14 spectrophotometer, a DU-spectrophotometer, a spinning band distillation column, and a zone refiner; **Other:** pressurized water heat transfer loop, neutron generator ( $10^{11}$ n/sec, 14MeV), graphite subcritical pile, gamma irradiator (2,000Ci), an auto- and cross-correlation noise analysis system, three analog computers, five desktop electronic calculators, two programmable desktop electronic calculators, and a liquid-scintillation neutron spectrometer.

### Courses in Nuclear Engineering

#### UNDERGRADUATE CREDIT

**580 110. Nuclear Engineering Concepts.** (2) I. This first course in the Nuclear Engineering curriculum acquaints freshman students with the professional activities and responsibilities of nuclear engineers. It presents this information through lectures, recitations, and laboratory demonstrations. Two hours lec. a week. 580-110-0-0920

**580 116. Nuclear Engineering Seminar.** (1) II. Introduction to professional nuclear engineering. Student career planning. One hour rec. a week. 580-116-0-0920

**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. 580-290-0-0920



**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. Three hours lec. a week. Pr.: Math. 221, Phys. 213. 580-295-0-0920

**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. 580-410-0-0920

**580 490. Neutron and Particle Interactions I.** (2) I. Engineering approach to the classical mechanics of the interaction of neutrons and other radiation with matter; production and detection of neutrons and other types of nuclear radiation. Two hours rec. a week. Pr.: N.E. 295. 580-490-0-0920

#### 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. 580-500-0-0920

**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. 580-510-1-0920

**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. 580-511-1-0920

**580 515. Nuclear Engineering Materials.** (2) II. An investigation of the properties and behavior of structural materials, fuels, and components in nuclear radiation environments. Two hours lec. per week. Pr.: N.E. 295, I.E. 350 and I.E. 351. 580-515-0-0920

**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, M.E. 571, M.E. 513. 580-555-0-0920

**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. 580-590-0-0970

#### 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. 580-615-0-0920

**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. 580-620-3-0920

**580 630. Applied Reactor Theory.** (4) II. Theory of diffusion and slowing down of neutrons with application to critical and sub-critical nuclear reactors. Measurement of various reactor physics parameters. Three hours rec. and three hours lab. a week. Pr.: N.E. 490. 580-630-0-0920

**580 640. Reactor Operations Planning.** (2) I. Licensing, nuclear safety, and reactor operations. Measurement of nuclear reactor parameters. One hour lec. and three hours lab. a week. Pr. or conc.: N.E. 655. 580-640-0-0920

**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. 580-650-0-0920

**580 655. Radiation Protection Engineering.** (3) I. 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, N.E. 511 or consent of instructor. 580-655-0-0970

**580 675. Neutron and Particle Interactions II.** (2) II. Engineering approach to the quantum mechanics of the interaction of neutrons and other nuclear radiations with matter; theoretical methods for the evaluation of nuclear reaction cross sections required for engineering applications. Two hours rec. a week. Pr.: N.E. 490, N.E. 500. 580-675-0-0920

**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, N.E. 630. 580-692-0-0920

**580 695. Nuclear Reactor Technology Laboratory.** (1) II. Experimental investigation of thermal and hydraulic characteristics of nuclear reactors. Three hours lab. a week. Pr. or conc.: N.E. 692. 580-695-1-0920

**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, N.E. 490 or consent of instructor. 580-699-0-0920

**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. 630. 580-705-0-0920

**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. 580-708-1-0920

**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. 580-715-0-0920

**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. 580-720-0-0920

**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, magneto-



hydrodynamic and electrochemical processes. Three hours rec. a week. Pr.: N.E. 555. 580-750-0-0920

**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. 580-761-0-0920

**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. 580-762-1-0920

**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. 490. 580-772-0-0920

**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. 490, Chem. 595, or consent of instructor. 580-774-0-0920

**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. 490 or consent of instructor. 580-791-0-0920

**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). 580-795-1-0970

#### 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. 580-810-4-0920

**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. 580-815-0-0920

**580 851. Nuclear Engineering Laboratory.** (2) I. Reactor kinetics, reactor noise analysis determinations of B/I, 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. 580-851-1-0920

**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. 580-860-0-0920

**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.: G.E. 740 or Math. 761 or consent of instructor. 580-865-0-0920

**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. 580-890-0-0920

**580 895. Nuclear Systems Design.** (3) I. Design analysis of nuclear power reactor systems, including criticality deter-

minations, 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, N.E. 815. 580-895-0-0920

**580 899. Master's Thesis.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 580-899-4-0920

**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, N.E. 720. 580-920-0-0920

**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. 580-940-0-0920

**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, N.E. 705. 580-945-0-0920

**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, N.E. 940, N.E. 945. 580-955-0-0920

**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. 580-970-0-0920

**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. 580-991-0-0920

**580 999. Dissertation Research.** Credit arranged. I, II, S. Topics selected with approval of major professor and department head. 580-999-4-0920

#### ENGINEERING EXPERIMENT STATION

Teddy O. Hodges, Director

In the dynamic state that engineering finds itself today, there is no way to separate research activity and teaching activity.

Since engineering is constantly changing to meet the demands of society, there is an inseparable relationship between the instructional program and the research activity of the College. Thus, the significance of the Engineering Experiment Station's work is best measured by both its research and its contribution to the total education effort.

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 several 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 and energy generation from wastes.
- Food science and grain processing.
- Electromagnetic wave propagation.
- Evaluation of information concerning resources from earth satellites.
- 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 problem solution.
- Air and water pollution control.
- Water use efficiency.
- Wind and solar energy.
- Heat, mass and momentum transfer.
- Effects of environmental factors on human work performance and health.
- Systems engineering.
- Bioengineering.
- Gasification and liquefaction of coal and wastes.
- Instrumentation and measurement.

## INSTITUTE FOR ENVIRONMENTAL RESEARCH

Frederick H. Rohles, Jr., 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 executive council, research associates from the university faculty, graduate research assistants, technicians and clerical workers. The executive council 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 research associates 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 research associates 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.

Two centers, the Center for Energy Studies and the Center for Transportation Research and Training, are authorized as interdisciplinary research and educational units under the auspices of the Institute for Systems Design and Optimization.

### Center for Energy Studies

N. Dean Eckhoff, Director

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**

Bob L. Smith, Director

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 simulation by computer modeling.

The Institute is administered through the College of Engineering and provides a University-wide center for information concerning computational engineering. Other functions of the Institute include the preparation of research proposals; the dissemination of information through conferences, workshops and reports; the encouragement of creative uses of computers, especially mini- and micro-computers; and the development of software engineering. In addition the impact of mass-produced computational aids such as hand calculators and economically-priced computers is an Institute concern.

#### **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

Merlyn S. Krick, Director, Nuclear Reactor Facility

N. Dean Eckhoff, Director, Neutron Activation Analysis Laboratory

Kansas State University has a TRIGA Mark II pulsing nuclear reactor and a well-equipped neutron activation analysis laboratory within its Department of Nuclear Engineering. The reactor, which is licensed for steady-state operation to 250 kilowatts and pulsed operation to 250 megawatts, is used for teaching and research by many departments. The reactor is used in part for radiation effects studies and for neutron activation analysis, an analytical technique which is essentially non-destructive and offers sensitivities better than one part per billion for some elements. 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.

#### **KANSAS INDUSTRIAL EXTENSION SERVICE**

William H. Honstead, Director

The Kansas Industrial Extension Service provides an avenue for making the facilities of the College of Engineering available to Kansas manufacturing industries. Information, technical assistance, and continuing education are the areas of activity through which the Extension Service functions. The Farrell Library on the campus, the Linda Hall Library in Kansas City, and other informational sources can be utilized. The laboratory facilities and the faculty of the college can also be used to provide answers to technical questions.

Short courses, conferences, seminars and workshops are arranged to provide continuing education for technical people including practicing engineers and manufacturing personnel.

To use the Service, write or call Kansas Industrial Extension Service, 150 Seaton Hall, Kansas State University, Manhattan, Kansas 66506, Tel. No. (913) 532-5720.



# the college of home economics

Ruth Hoeflin,\* 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

- Fashion Marketing
- Textile Research
- Fashion Design
- Interior Design
- Community Services
- Early Childhood Education
- Consumer Interest
- Housing and Equipment
- Foods and Nutrition in Business
- Foods and Nutrition Science

- Dietetics and Institutional Management
- Home Economics Education—Vocational Teaching
- Home Economics Extension
- General Home Economics

2. Curriculum in Home Economics and Mass Communications
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 ADVANCED 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 Advanced Degree Project is for outstanding students with demonstrated ability for graduate work. Students with a "B" average or better their first semester on campus are invited to join. Selected members of the graduate faculty advise those who choose to participate. The student and graduate



faculty adviser plan educational experiences that can lead to a graduate program in the 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, as well as General Home Economics, and Home Economics Education, offer the Master of Science degree. The Doctor of Philosophy degree is offered by the Department of Foods and Nutrition. Beginning fall, 1975, a Doctor of Philosophy degree in Home Economics will be offered on an interdepartmental basis by Clothing, Textiles and Interior Design, Family and Child Development, Family Economics, and Institutional Management (refer to page 38).

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 without loss of credit. A student who plans to transfer for the junior year should write for suggestions or preferably come to the KSU campus for a conference before beginning the sophomore year. The courses listed below can be transferred to the College of Home Economics although not all courses are required for every major. A list of required courses for each major is available from the Home Economics Dean's Office.

Courses Required in All Home Economics Majors:		Credit Hours*
English Composition .....	6	6
Speech .....	2	2
General Psychology .....	3	3
Economics .....	3	3
Transferable Courses; some may apply as Electives if not required for specific major:		
American Government or Political Science .....	3-6	3-6
Sociology .....	3-6	3-6
Civilization or World History .....	3-6	3-6
Literature or Modern Language .....	6	6
Art Appreciation .....	3	3
Design I .....	2	2
Drawing I .....	2	2
College Algebra .....	3	3
General Chemistry ** .....	5	5
Organic Chemistry .....	5	5
Biology (with lab) .....	4	4
Child and Adolescent Psychology .....	3	3
Human Growth and Development .....	3	3
Meal Management .....	3	3
Nutrition *** .....	3	3
Clothing Selection or Socio-economics of Clothing .....	3	3
Clothing Construction .....	3	3
Family Relations .....	2	2
Child Development .....	3	3
Textiles .....	3	3

\*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.

## 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 consists of a wide choice of options from which a student may select a major. All options consist of the following: (1) a broad general education that includes courses from the humanities, social, biological and physical sciences; (2) a home economics core that is a small group of home economics courses planned to introduce students to the total profession; (3) an area of specialization, to give the student the opportunity to develop interest and ability in a specific field of home economics; and (4) unrestricted electives that permit students to take courses in any KSU department.

### 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, 50 to 70 Hours**

(See specific option)

**Unrestricted Electives, 4 to 24 Hours****Other**

Physical Education (2 semesters) .....	0
Total for Graduation .....	124

\* Not required in Home Economics Education

**OPTION IN FASHION MARKETING**

Department of Clothing, Textiles, and Interior Design

Concentration in fashion marketing prepares students for careers in apparel production management; retail management, including buying; sales promotion at industry and retail levels; and with fashion publications, trade associations, and consultant services. A highlight of the senior year is the Fashion Store Service Laboratory, in which students work for 6-8 weeks in a department or specialty store under supervision of the retailer and the university.

Option requirements in addition to courses in basic curriculum:

**Liberal-General Education Courses**

Hist.	241 501	Heritage of Western World ...	3
Math.	245 100	College Algebra .....	3
Chem.	221 110	General Chemistry .....	5
Chem.	221 190	Elem. Organic Chemistry ....	3
Chem.	221 191	Elem. Organic Chem. Lab. ...	2
		Communications Elective ....	3

**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
		Bus. or Econ. Elective .....	3
C.&T.	610 131	Clothing and Society .....	3
		OR	
C.&T.	610 440	Socio-Psychological Aspects of Clothing .....	3
C.&T.	610 150	Principles of Clothing Construction .....	3
C.&T.	611 215	Fundamentals of Interior Design .....	2
		OR	
C.&T.	610 220	Fundamentals of Costume Design .....	2
C.&T.	610 230	Fashion Marketing .....	3
C.&T.	610 260	Textiles .....	3
C.&T.	610 395	Visual Merchandising .....	3
C.&T.	610 450	Fashion Store Ser. Lab. ....	5
C.&T.	610 636	Fashion Merchandising .....	4
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

Unrestricted Electives ..... 19-20

**OPTION IN TEXTILE RESEARCH**

Department of Clothing, Textiles, and Interior Design

Textile Research Option is designed specifically for students interested in one of the many textile areas such as quality control, fiber and fabric development, and textile testing. The option also is designed for students interested in pursuing graduate degrees for teaching, research and extension service.

Concentration is focused on courses which will prepare the student for rewarding careers in the textile industry. Positions are available in areas of quality control, textile technology, technical services,

promotion and sales, research and product development.

Option requirements in addition to courses in basic curriculum:

**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
		OR	
Chemistry	221 190	Elem. Organic Chem. ....	3
Chemistry	221 191	Elem. Organic Chem. Lab. ...	2
		OR	
Chemistry	221 531	Organic Chem. I .....	3
Chemistry	221 532	Organic Chem. I Lab. ....	2
Chemistry	221 271	Chemical Analysis .....	4
		OR	
Biochemistry	211 521	Gen. Biochemistry .....	3
		OR	
Chemistry	221 540	Research Techniques .....	3
Mathematics	245 100	College Algebra .....	3
Physics	265 115	Des. Physics .....	4
Statistics	285 320	Elements of Statistics .....	3
C.S.	286 200	Fund. Computer Prog. ....	2
C.S.	286 202	PL / 1 Lang. Lab. ....	1
C.&T.	610 131	Clothing and Society .....	3
		OR	
C.&T.	610 440	Socio-Psych. Aspects of Clothing .....	3
C.&T.	610 150	Prin. Clothing Construction ..	3
C.&T.	610 260	Textiles .....	3
C.&T.	610 645	Textile and Apparel Ind. ....	3
C.&T.	610 745	Intermediate Textiles .....	3
C.&T.	610 756	Phys. Analysis of Textiles ....	3
I.Des.	611 215	Fund. of Interior Design ....	2
F. Ec.	630 420	The House .....	3
		OR	
F. Ec.	630 605	Consumer and the Mkt. ....	3
Unrestricted Electives .....			19-21

**OPTION IN FASHION DESIGN**

Department of Clothing, Textiles, and Interior Design

The Fashion Design Option initiates students in the basic skills and knowledge required in careers in custom design, fashion design at industry level, fashion illustration and pattern drafting. Students take courses in the areas of clothing construction and design, studio art, pattern development, textiles, and costume history. An extensive textile and costume collection is available for study.

Option requirements in addition to courses in basic curriculum:

**Liberal-General Education Courses**

Chem.	221 110	General Chemistry .....	5
Chem.	221 190	Elem. Organic Chemistry ....	3
		OR	
Phys.	265 101	Man's Physical World I .....	3
Phys.	265 103	Man's Phys. World I Lab. ....	1
Phys.	265 102	Man's Physical World II .....	3
Phys.	265 104	Man's Phys. World II Lab ....	1
Hist.	241 501	Heritage Western World ....	3
Soc.	277 211	Intro. Sociology .....	3
		Biological Science .....	3
		Modern Language Sequence ..	6-8

**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	209 210	Drawing II .....	2
Art	209 220	Water Color I .....	2
Art	209 225	Fig. Drawing I .....	2
C.&T.	610 131	Clothing and Society .....	3
		OR	
C.&T.	610 440	Socio-Psych. Aspects of Clothing .....	3
C.&T.	610 150	Prin. Clothing Construction ..	3
C.&T.	610 220	Fund. Costume Design .....	3
C.&T.	610 260	Textiles .....	3
C.&T.	610 315	Costume Illustration .....	2
C.&T.	610 400	Tailoring .....	3
C.&T.	610 500	Inter. Costume Design .....	3



C.&T.	610 610	Pattern Dev. Theory I	3
C.&T.	610 720	Design by Draping	3
C.&T.	610 730	History of Costume	3
C.&T.	610 740	Advanced Costume Design	3
I. Des.	611 740	History of Fabric Design	3

Unrestricted Electives ..... 21-24

## OPTION IN INTERIOR DESIGN

Department of Clothing, Textiles, and Interior Design

The course of study prepares students for professional practice as Interior Designers. Opportunities for graduates exist in residential interior design, design consulting, specialized merchandising, extension, and research.

Students participate in a series of studio exercises and lecture courses. Practical insights into the profession are gained through an Interior Design Field Experience.

Option requirements in addition to courses in basic curriculum:

### Liberal-General Education Courses

Art	209 195	Survey Art Hist. I	3
Art	209 196	Survey Art Hist. II	3
Hist.	241 504	Heritage Western World	3

### Professional and Supporting Courses

Arch.	104 207	Arch. Graphics I	3
Arch.	104 208	Arch. Graphics II	3
Art	209 100	Design I	2
Art	209 190	Drawing I	2
Art	209 200	Design II	2
Art	209 230	Sculpture I	2
		OR	
Art	209 265	Ceramics I	2
Art	209 260	Design in Crafts	2
		OR	
Art	209 270	Metalcrafts and Jewelry	2
Arch.	104 510	Man and His Surroundings	3
		OR	
Ind. Engg.	550 531	Design Ergonomics	3
C.&T.	610 260	Textiles	3
C.&T.	610 565	Weaving	2
I. Des.	611 240	Interior Design I	3
I. Des.	611 540	Interior Design II	3
I. Des.	611 545	Interior Des. Practicum	3
I. Des.	611 650	Contemporary Homes	3
I. Des.	611 730	Interior Design III	3
I. Des.	611 740	Historic Fabric Design	3
I. Des.	611 745	Historic Furniture Design	3
I. Des.	611 780	Interior Design Seminar	2

### Professional Electives

I. Des.	611 600	I. Des. Field Exper.	2-6
Bus. Ad.	305	Bus. Admin. Electives	6
		OR	
Bus. Ad.	305	Bus. Admin. Elective	3
F. Ec.	630 420	The House	3
		Additional hours to be selected with approval of adviser	2-6

Unrestricted Electives ..... 17-22

## 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 include work with parents and community resources as well as with young children.

Option requirements in addition to courses in basic curriculum:

### Liberal-General Education Courses

* Biol.	215 198	Prin. of Biology	4
Soc.	277 211	Intro. to Sociology	3
		Literature or Language	6

### Professional Courses

Health	261 373	First Aid	1
Sp. Path. & Aud.	283 255	Language Development	3
F. C. Dev.	620 210	The Preschool Child	3
F. C. Dev.	620 211	The Preschool Child Lab.	1
F. C. Dev.	620 320	Interactional Techniques	3
F. C. Dev.	620 350	Family Relationships	2
F.&N.	640 603	Child Nutrition	3
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.	620 625	Directed Experiences	8
F. C. Dev.	620 626	Child Dev'l. Center Prog.	3
F. C. Dev.	620 650	The Family	3
F. C. Dev.	620 670	Parent Education	3
F. C. Dev.	620 720	Infant Behavior and Development	3
F. C. Dev.	620	FCD Prof. Elective	3
		Family/Community Health Elective	3

Unrestricted Electives ..... 12

## OPTION IN COMMUNITY SERVICES

Department of Family and Child Development

This option is for students interested in youth and family life programs.

Option requirements in addition to courses in basic curriculum:

### Liberal-General Education Courses

Soc.	277 211	Intro. to Sociology	3
		Social Science Electives at 300 Level or above	6
		Biological & Physical Sci.	12

### Professional and Supporting Courses

F. C. Dev.	620 210	Preschool Child	3
F. C. Dev.	620 211	Preschool Child Lab.	1
F. C. Dev.	620 230	Intro. to Human Development	3
F. C. Dev.	620 272	Helping Relationships	3
F. C. Dev.	620 330	Middle Child	2
F. C. Dev.	620 331	Middle Child 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. C. Dev.	620 260	Intro. to Social Work	3
F. C. Dev.	620 400	Field Study	8
F. C. Dev.	620 670	Parent Education	3
		Prof. Electives*	21

Unrestricted Electives ..... 3-16

\* Selected in consultation with faculty adviser and to include at least 6 hours from the College of Home Economics (other than the FCD department).

## OPTION IN CONSUMER INTEREST

Department of Family Economics

This option allows 31 hours of electives for combinations of course work in consumer affairs, marketing, financial counseling, consumer education, business or public service. The curriculum is planned so students can consider a variety of consumer-related job opportunities in business or government.

Option requirements in addition to courses in basic curriculum:

### Liberal-General Education Courses

Econ.	225 120	Economics II	3
Math	245 100	College Algebra	3
Pol. Sci.	269 110	Prin. Pol. Sci.	3
		OR	
Pol. Sci.	269 325	U.S. Politics	3



Soc. Stat.	277 211 285 330	Social Science Electives ..... 9 Intro. to Sociology ..... 3 Elem. Stat. for Soc. Sci. .... 3
<b>Professional and Supporting Courses</b>		
C.&T.	610 131	Clothing and Society ..... 3 OR
C.&T.	610 260	Textiles ..... 3 OR
C.&T.	610 440	Socio-Psych. Aspects of Clothing ..... 3 Preschool Child ..... 3 OR
F.C. Dev.	620 210	The Family ..... 3
F.C. Dev.	620 650	Family Finance ..... 3
F.Ec.	630 405	The House ..... 3
F.Ec.	630 420	Household Equipment ..... 3 OR
F.Ec.	630 440	Household Equip. Theory .... 3
F.Ec.	630 630	Home Management ..... 2
F.Ec.	630 460	Home Management Lab. .... 2 OR
F.Ec.	630 705	Fin. Prob. of Families ..... 2
F.Ec.	630 605	Consumers & The Market .... 3
F.Ec.	630 700	Families in Amer. Econ. .... 3
F.&N.	640 132	Basic Nutrition ..... 3 Prof. Electives* ..... 15
<b>Unrestricted Electives</b> .....		15-16

\* Selected in consultation with faculty adviser.

## OPTION IN HOUSING AND EQUIPMENT

### Department of Family Economics

This option permits specialization. Professional electives allow for further choice: in equipment for those interested in design and evaluation of household equipment and education; in housing for those interested in house planning, kitchen designing or research; and in home management for those interested in developing homemaker/home health aide services and home management services, and for positions as consultants in business, government, and communications. This option also provides basic training for those who wish to prepare for research.

#### Option requirements in addition to courses in basic curriculum:

##### Liberal-General Education Courses

Biol.	215 198	Prin. of Biology ..... 4
Math.	245 100	College Algebra ..... 3
Stat.	285 320	Elem. of Statistics ..... 3
		Humanities Elective ..... 3

#### Students concentrating in Housing are required to take:

Poi. Sci.	269 320	Stat. & Local Govt. .... 3
Soc.	277 211	Intro. to Sociology ..... 3
Soc.	277 430	Population and Human Ecol. . 3

#### Students concentrating in Household Equipment are required to take:

Chem.	221 110	Gen. Chemistry ..... 5
Biochem.	211 120	Intro. Organic & Biochem. . 5
Physics	265 115	Descriptive Physics ..... 4

##### Professional and Supporting Courses

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.	630 700	Families in Amer. Econ. .... 3 OR
F. Ec.	630 605	Consumers and the Mkt. .... 3 Prof. Electives * ..... 16-23

#### Students concentrating in Household Equipment are required to take:

Biology	215 220	Bact. of Man ..... 3 OR
Biology	215 550	Microbiology ..... 4
C. & T	610 260	Textiles ..... 3
F. Ec.	630 465	Home Management Lab. .... 2
F. Ec.	630 650	Product Safety ..... 3
F. Ec.	630 740	Adv. Household Equipment .. 3
F. & N.	640 400	Food Preparation ..... 3
F. & N.	640 599	Prin. of Food Demonstration . 2

#### Students concentrating in Housing are required to take:

Architecture	109 315	Intro. to Planning ..... 3
Sociology	277 531	Urban Sociology ..... 3
F. Ec.	630 620	Soc. Effect of Housing Envir. . 3
F. Ec.	630 720	Housing Req. of Families .... 3

#### Unrestricted Electives ..... 18-23

\* Selected in consultation with faculty adviser.

## 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.

#### Option requirements in addition to courses in basic curriculum:

##### Liberal-General Education Courses

Soc.	277 211	Intro. to Sociology ..... 3
Mass Comm.	289 235	Survey Mass Media ..... 3 OR
Mass Comm.	290 260	Radio-TV Continuity ..... 3
		Communication Electives .... 5
		Humanities Elective (minimum) ..... 6

##### Supporting Courses

Biology	215 198	Principles of Biology ..... 4
Biology	215 555	General Microbiology ..... 4 OR
Chemistry	215 220	Bacteriology and Man ..... 3
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		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
I.M.	660 440	Quantity Foods ..... 4
		Business Electives ..... 6
		Professional Electives ..... 2-5

##### Area II — Extension Service

A.&O.	410 605	Ext. Organ. and Prog. .... 3
A.&O.	410 752	Prin. Tch. Adults in Ext. .... 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
I.M.	660 440	Quantity Foods ..... 4
		Professional Electives ..... 8-11

##### Area III — Communication Services

JMC	289 275	Reporting I and Lab. .... 3
JMC	289 320	Principles of Advertising .... 3 OR
JMC	289 630	Public Relations ..... 3
JMC	289 330	Editing I ..... 3
JMC	289 525	Jism. for Mod. Living ..... 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
I.M.	660 440	Quantity Foods .....	4
		Professional Electives .....	5-8

Unrestricted Electives ..... 13-21

\*Option requirement, unless taken as part of Home Economics Core.

## 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.

Option requirements in addition to courses in basic curriculum:

#### Liberal-General Education Courses

Biol.	215 198	Prin. of Biology .....	4
Biol.	215 220	Bacteriology & Man .....	3
		OR	
Biol.	215 555	Microbiology .....	4
Math.	245 100	College Algebra .....	3
		OR	
Math.	245 220	Anal. Geom. & Calc. I .....	4

#### Supporting Courses

Biochemistry	211 201	Elem. Biochemistry .....	3
Biochemistry	211 202	Elem. Biochemistry Lab. ....	2
Biology	215 240	Human Body .....	6
Chemistry	221 110	General Chemistry .....	5
Chemistry	221 190	El. Org. Chem. ....	3
		with	
Chemistry	221 191	El. Org. Chem. Lab. ....	2
Physics	265 115	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	Foods and Nutrition Elective .	3

Plus Required Courses in Group I or Group II

Group I			
F.&N.	640 613	Applied Normal Nutrition ....	3
F.&N.	640 614	Nutrition in Medical Science .	6
F.&N.	640 615	Nutr. Care of Patients .....	6
		OR	

Group II			
F.&N.	640 500	Practicum in Foods and Nutr. .	5
F.&N.	640 680	Seminar Foods and Nutr. ....	2
F.&N.	640 700	Community Nutrition .....	3
F.&N.	640 710	Nutr. Throughout Life Cycle .	3
F.&N.	640 712	Diet Therapy .....	3

### 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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Unrestricted Electives ..... 19-22

\*Take course not included in home economics core.

## 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.

Option requirements in addition to courses in basic curriculum:

#### Liberal-General Education Courses

Soc.	277 211	Intro. to Sociology .....	3
		Social Science & Humanities Electives .....	9

#### Supporting Courses

Biochem.	211 120	Intro. Organic Blochem. ....	5
Biology	215 198	Prin. of Biology .....	4
Biology	215 525	Human Physiology .....	4
Biology	215 555	Microbiology .....	4
		OR	
Biology	215 220	Bacteriology and Man .....	3
Chemistry	221 110	General Chemistry .....	5

## CHOOSE ONE OF THE PROFESSIONAL AREAS I, II, III

### Area I — College and School Food Service

ASI	005 671	Meat Sel. Utiliz. ....	3
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.	305 531	Personnel and Wage Admin. .	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 Services .....	3
Ins. M.	660 650	Food Service Systems .....	6
		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.	305 531	Personnel and Wage Admin. .	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 Serv. .	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 Dietetic Association. Selected admission. (See below)

Bus. Ad.	305 420	Management Concepts .....	3
		OR	
Bus. Ad.	305 531	Personnel and Wage Admin. .	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. Prof. Dietetic Practice .	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.

Unrestricted Electives ..... 7-23

## OPTION IN HOME ECONOMICS EXTENSION

**Department of General Home Economics**

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.

**Option Requirements in addition to courses in basic curriculum:****Liberal-General Education Courses**

Biol.	215 198	Prin. Biology .....	4
Chem.	221 110	Gen Chemistry .....	5
Chem.	221 190	Elem. Organic Chem. ....	3
		WITH	
Chem.	221 191	Elem. Organic Chem. Lab. ...	2
		OR	
Biochem.	221 120	Intro. Organic & Biochem. ...	5
Soc.	277 211	Intro. to Sociology .....	3

**Professional and Supporting Courses**

Art	209 100	Design I .....	2
A.&O.	410 605	Ext. Organ. & Prog. ....	3
A.&O.	410 752	Prin. Teach. Adults in Ext. ...	3
C.&T.	610 210	Pattern Study .....	3
C.&T.	610 260	Textiles .....	3
I. Des.	611 215	Intro. to Interior Design .....	2
F.C. Dev.	620 210	The Preschool Child* .....	3
F.C. Dev.	620 230	Intro. to Human Development* .....	3
F.C. Dev.	620 350	Family Relationships* .....	2
F.C. Dev.	620 650	The Family .....	2-3
F.Ec.	630 405	Family Finance .....	3
F.Ec.	630 420	The House .....	3
F.Ec.	630 440	Household Equipment .....	3
		OR	
F.Ec.	630 630	Household Equipment Theory .....	2-3
F.&N.	640 300	Meal Management .....	3
F.&N.	640 601	Food Science .....	3
F.&N.	640 602	Prin. Nutrition .....	3

**Select 11 hours from the following:**

A.&F.	405 730	Educ. of Disadvantaged .....	3
A.&O.	410 636	Pract. in Exten. Education ...	5
A.&O.	410 707	Intro. Comm. Educ. Dev'l. ...	3
H.P.E.&R.	261 201	Personal & Comm. Health ...	3
		OR	
F.C. Dev.	620 332	Concepts of Family Health ...	3
F.Ec.	630 460	Home Management .....	2

Unrestricted Electives ..... 15-20

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\*If not taken in Home Economics core.

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 187-189 for admission requirements to teacher education and the Professional Semester.

**Option requirements in addition to courses in basic curriculum:****Liberal-General Education Courses**

Art	209 100	Design I .....	2
Biol.	215 198	Prin. Biology .....	4
Chem.	221 110	Gen. Chemistry .....	5
Chem.	221 190	Elem. Organic Chem. ....	3
		WITH	
Chem.	221 191	Elem. Organic Chem. Lab. ...	2
		OR	
Biochem.	211 120	Intro. Organic & Biochem. ...	5
Pol. Sci.	269 110	Prin. Pol. Science .....	3
		OR	
Pol. Sci.	269 325	U.S. Politics .....	3
Soc.	277 211	Intro. to Sociology .....	3
		Literature or Language .....	6
		Social Science Elective .....	3
		Liberal-General Educ. Electives .....	5

**Professional Courses**

A.&F.	405 215	Educ. Psych. I .....	3
A.&F.	405 315	Educ. Psych. II .....	3
A.&O.	410 586	Teaching Part. Sec. School ...	8
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	Practica in Home Economics Related Occupations .....	1-3
A.&O.	410 639	Coordination of Cooperative Vocational Education .....	3
C.&I.	415 316	Intro. to Instructional Tech. ...	1
C.&T.	610 210	Prin. Clothing Const. ....	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

Unrestricted Electives ..... 4-8

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Home Economics Core not required.

## CURRICULUM IN HOME ECONOMICS AND MASS COMMUNICATIONS

**B.S. in Home Economics and Mass Communications**

This curriculum provides for a specialization in either the Print Media or Broadcast Media. Students take courses in journalism, radio and television to prepare for careers with newspapers, magazines, radio-television, and in public relations and promotion with

## OPTION IN HOME ECONOMICS EDUCATION— VOCATIONAL TEACHING

This option prepares the student for teaching home economics in Kansas secondary schools. With a B.S.



business and industry or government. A home economics background, plus courses in mass communications gives graduates in this curriculum a broad base when making a career decision.

#### 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 .....	12-15		
Econ. ....	225 110	Economics I .....	3
Pol. Sci. ....	269 110	Prin. Pol. Sci. ....	3
		OR	
Pol. Sci. ....	269 225	U.S. Politics .....	3
Psych. ....	273 110	General Psychology .....	3
Soc. ....	277 211	Intro. to Sociology .....	3

\* Biological Science

\* Physical Science

\* Humanities

\* At least 26 hours among the starred disciplines with one course in each area; and in one area, two courses in sequence plus one other 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, 61-70 Hours

##### 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

#### SELECT AREA "A" OR "B"

##### A. Print Media Emphasis (30-34 Hours)

JMC .....	289 275	Reporting I .....	3
JMC .....	289 285	Reporting II .....	3
JMC .....	289 330	Editing I .....	3
JMC .....	289 525	Jism. for Mod. Living .....	3

##### \* Professional Electives in Journalism and Mass

Communications ..... 18-22 |

##### B. Broadcast Media Emphasis (31-34 Hours)

JMC .....	290 240	Fund. of R-TV Prod. ....	3
JMC .....	290 250	Fund. of R-TV Perf. ....	3
JMC .....	290 260	R-TV Continuity .....	3
JMC .....	290 275	Reporting I .....	3
JMC .....	290 330	Reporting II (R-TV) .....	3

Remaining 16-19 hours selected from the following course groupings in consultation with adviser.

##### Group I (4-7 Hours)

(Students may take not more than 4 hours of participation course and not more than 3 hours in either course.)

JMC .....	290 355	KSDB-FM Participation ....	1
JMC .....	290 375	Cable TV Participation ....	1
JMC .....	290 640	Advanced Radio Prod. ....	3
JMC .....	290 650	Advanced TV Prod. ....	3

##### Group II (3-9 Hours)

JMC .....	290 600	History of Broadcasting ....	3
JMC .....	290 685	R-TV Regulation and Responsibility .....	3
JMC .....	290 630	R-TV Programming .....	3
JMC .....	290 750	R-TV Management .....	3

##### Group III (3-9 Hours)

JMC .....	290 675	Broadcast Criticism .....	3
JMC .....	290 610	R-TV Drama Writing .....	3

JMC .....	290 615	R-TV Series Writing .....	3
JMC .....	290 621	R-TV Advertising .....	3

#### Unrestricted Electives, 6-16 Hours

##### Other

Physical Education (two semesters) ..... 0 |

Total for Graduation ..... 124 |

\* Selected in consultation with Home Economics faculty adviser.

## CURRICULUM IN HOME ECONOMICS WITH LIBERAL ARTS

### B.S. in Home Economics

This curriculum is for the student who wishes to combine a broad liberal arts education with home economics. Maximum flexibility is provided for the selection of courses best suited to individual abilities and interests. The student in consultation with a faculty adviser selects a sequence of courses for concentration in one or more academic areas. This curriculum provides excellent background for professional careers, graduate study, and the responsibilities of homemaking and citizenship.

#### Liberal-General Education Courses, 65-68 Hours

Communications .....	8		
English .....	229 100	English Composition I .....	3
English .....	229 120	English Composition II .....	3
Speech .....	281 105	Oral Communication I .....	2
Social Science .....	12		
Economics .....	225 110	Economics I .....	3
Psychology .....	273 110	General Psychology .....	3
		Electives in Soc. Sci. ....	6
Humanities .....	17-18		
Philosophy, Mathematics, Logic .....	3		
Literature or History .....	6		
Electives in Humanities .....	8-9		
Physical Science .....	8-10		
Biological Science .....	8		
Concentration in one subject matter area .....	12		

#### Home Economics, 33-34 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 throughout the time students are enrolled in this curriculum.

**Liberal-General Education Courses, 47 Hours**

Communications	11	English Composition I	3
English	229 100	English Composition II	3
English	229 120	Oral Communication I	2
Speech	281 105	Communications Elective	3
Humanities Electives	Minimum 3		
Social Science	12	Economics I	3
Economics	225 110	Economics II	3
Economics	225 120	General Psychology	3
Psychology	265 110	Intro. to Sociology	3
Sociology	277 211		
Biological Science	4	Principles of Biology	4
Biology	215 198		
Physical Science	10	General Chemistry	5
Chemistry	221 110	Intro. Org. & Biochem.	5
Biochemistry	211 120		

**Professional and Supporting Courses, 60-61 Hours**

ASI	005 671	Meat, Sel. and Util.	3
Biology	215 555	Microbiology	4
		OR	
Biology	215 220	Bacteriology and Man	3
Bus. Ad.	305 260	Fund. of Accounting	4
Bus. Ad.	305 270	Managerial Accounting	3
Bus. Ad.	305 420	Management Concepts	3
Bus. Ad.	305 292	Business Law I	3
Bus. Ad.	305 531	Personnel and Wage Admin.	3
Bus. Ad.	305 440	Marketing	3
I. Des.	611 101	Design for Contemp. Living	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
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.	215 555	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. & Calc. 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.	630 300	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
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
Hort.	040 305	Fund. of Food Processing	3
Gr. Sc.	045 305	Fund. of Food Processing	3
Dy. Sc.	025 311	Intr. Food Chemistry	3
Gen. Ag.	035 301	Intro. to Food Sc. & Tech.	3
Gr. Sc.	045 651	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
		AND	
ASI	005 260	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.	040 792	Harvesting, Handling, and Processing of Fruits and Vegetables	3
Gr. Sc.	045 120	Intr. Bakery Tech.	2
Gr. Sc.	045 636	Baking Science I	2
Gr. Sc.	045 637	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.	045 602	Cereal Science	3
Gr. Sc.	045 661	Qualities of Fd & Feed Ingredients	3
Gr. Sc.	045 700	Adv. Cereal Chemistry	3
Gr. Sc.	045 711	Prin. of Food Analysis	3
Biol.	215 201	Organismic Biology	4
Biol.	215 525	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

Theresa Perenich,\* Head of Department

Associate Professors Perenich\* and St. John;\* Assistant Professors Newby and Pierce; Instructors Cross, Munson, Peterson, Schrock, Sweat, and Trautman; Emeritus: Professors Barfoot,\* Brockman,\* and Latzke;\* Associate Professors Cormany,\* Hess,\* Hill,\* Howe,\* and Lienkaemper;\* Assistant Professor Craigie.\*

The Department of Clothing, Textiles and Interior Design offers opportunities for study in socio-economics of clothing, textiles, clothing construction, fashion merchandising, history of costume, and design of interiors. Four options leading to a Bachelor of Science degree are: (1) fashion marketing, (2) fashion design, (3) textile research, and (4) interior design. Major sequences leading to the Master of Science degree in the field of clothing, textiles and interior design may be selected according to the individual's choice.

Facilities include an extensive University Library, well-equipped studios, laboratories, and equipment for physical and chemical analysis of textiles.

#### Graduate Study

The Department offers advanced work leading to a Master of Science degree. Programs of study are individually planned for the students and are aimed at developing skills and concepts which will promote professional and personal advancement.

The department of Clothing, Textiles and Interior Design will participate in the new graduate program for the Ph.D. in Home Economics.

#### Courses in Clothing and Textiles

##### UNDERGRADUATE CREDIT

**610 131. Clothing and Society.** (3) I, II, alt. S. Cultural, social, psychological, and economic aspects of clothing needs and practices of individuals and groups. Two hours lec. and one hour discussion. Pr.: Only open to freshmen and sophomores. 610-131-0-1303

**610 150. Principles of Clothing and Construction.** (3) I, II. Selection and alteration of commercial patterns; principles and standards of construction; construction of garments. Six hours lab. a week. 610-150-1-1303

**610 220. Fundamentals of Costume Design.** (3) I, II. Application of function, form, and color to costume design. Pr.: Art 100. 610-220-1-1303

**610 230. Fashion Marketing.** (3) I, II. Overview of the fashion profession: career opportunities and influences on the marketing of fashion goods. 610-230-0-1303

**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. 610-260-0-1303

**610 300. Advanced Clothing Construction.** (3) I, II. Advanced techniques and experimentation with diverse fabrics; construction of a couture garment; principles of constructing men's wear. Six hours lab. a week. Pr.: C & T 150 and C & T 260 or concurrently. 610-300-1-1303

**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. 610-315-0-1303

**610 395. Visual Merchandising.** (3) I, II. Basic principles and techniques of merchandising display; experience through cooperation with retail stores. Pr.: Art 100. 610-395-1-1303

**610 400. Tailoring.** (3) I, II, alt. S. Beginning tailoring techniques applied in the construction of a coat or suit based on a commercial pattern. Pr.: C & T 300. Six hours lab. a week. 610-400-1-1303

**610 440. Socio-Psychological Aspects of Clothing.** (3) I, II. 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. Pr.: Soc. 211 and Psych. 110. Not open to freshmen, sophomores or students who have taken C & T 131. 610-440-0-1303

**610 450. 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. 260. Junior or senior in 610 option, 2.2 Cum. GPA, and 2.5 GPA in professional courses. 610-450-2-1303

##### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**610 500. Intermediate Costume Design.** (3) I. Design by illustration; emphasis on functional and original design solutions, and on fashion sources. Pr.: C & T 315 and Art 220. 610-500-1-1303

**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. 610-565-1-1303

##### UNDERGRADUATE AND GRADUATE CREDIT

**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. 610-610-1-1303

**610 636. Fashion Merchandising.** (4) I. The processes involved in managing fashion departments. Pr.: C & T 230, and junior or senior standing. 610-636-0-1303

**610 645. Textile and Apparel Industry.** (3) I. The textile industry from fiber production to the ultimate consumer. Pr.: Econ. 110; C & T 260. 610-645-0-1303

**610 670. Textiles for Merchandising.** (3) I, II. Application of principles of textiles to end-uses; characteristics of fibers used in household textiles, apparel, and accessories; emphasis on serviceability and comparison shopping. Pr.: C & T 260, Chem. 191, and junior or senior in 610 or 613 option. 610-670-0-1303

**610 710. Advanced Tailoring.** (3) II, alt. S. Construction of a garment, using different fabrics and utilizing custom tailoring techniques. Pr.: C & T 400 and 610 or 720. 610-710-1-1303

**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. 610-715-1-1303

**610 720. Designing by Draping.** (3) II, alt. S. Social significance of fashion; application of design principles in dress. Designs draped in muslin and then completed in suitable fabrics. Six hours lab. a week. Pr.: Six hours clothing construction, C & T 610 recommended. Fashion Design majors must take concurrently with Advanced Costume Design. 610-720-1-1303

**610 725. Pattern Development Theory III.** (3) I, alt. S. A critical analysis of pattern styling for women's fashions with emphasis on the development of original designs. Pr.: C & T 500 and C & T 715. 610-725-1-1303

**610 730. History of Costume: Western Dress to 1815.** (3) I, II, alt. S. Interrelationships of costume and social, cultural, political, economic environments from antiquity to 1815; evolution of garments. Pr.: Hist. 501. 610-730-0-1303

**610 731. History of Costume: Western Dress from 1815 to Present.** (3) II, alt. S. Interrelationships of costume and social, cultural, political, economic environments from 1815 to present with emphasis on fashion cycles, development of ready-to-wear and haute couture designing. Pr.: C & T 730. 610-731-0-1303

**610 735. Fashion Promotion.** (3) II alt. years. Promotion of fashion merchandise including advertising, fashion show production, special events, selling techniques, and other promotional activities in industry and retailing. Pr.: C & T 230 and B.A. 420. 610-735-0-1303

**610 740. Advanced Costume Design.** (3) Alt. years. Design orientation for market size range. Pr.: C & T 500. 610-740-1-1303

**610 745. Intermediate Textiles.** (3) I, alt. S. Study of fibers and finishes. Two hours rec. and two hours lab. per week. Pr.: C & T 260, and Chem. 191 or 351. Consent of instructor if students have taken C & T 670. 610-745-0-1303

**610 750. Experimental Textiles.** Credit arranged. Offered on sufficient demand. Individual investigation into textile research. Pr.: C & T 755. 610-750-2-1303

**610 756. Physical Analysis of Textiles.** (3) I. Methods of textile research used in assessing the end-use performance of textile products. One hour rec. and six hours lab. a week. Pr.: C & T 670 or 745, Chem. 191 or 351. 610-756-1-1303

**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. 610-760-0-1303

**610 765. Chemical and Optical Analysis of Textiles.** (3) II. Application of organic chemistry and optical analysis to fibers, dyes, and finishes. One hour rec. and six hours lab. Pr.: C & T 670 or 745, Chem. 191 or 351. 610-765-1-1303

**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. 610-780-3-1303

**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. 610-785-3-1303

#### GRADUATE CREDIT

**610 831. Experimental Clothing Construction.** (2-3) I, alt. S. Recent developments in clothing construction, utilizing experimental projects and innovative methods. Six hours lab. a week. Pr.: Six hours of clothing and textiles. 610-831-1-1303

**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. 610-835-0-1303

**610 845. Clothing and Human Behavior.** (3) II in alt. years. Influences of the psychological, cultural, and social aspects

of clothing upon human behavior. Pr.: Anthro. 200 and C & T 131 or C & T 440. 610-845-0-1303

**610 851. Textile and Clothing Literature.** (2) I, alt. S. Review of current literature with implications for future research. Pr.: Eight hours of clothing and textiles and eight hours of physical science. 610-851-3-1303

**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. 610-860-0-1303

**610 870. Case Studies in Fashion Marketing.** (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. 610-870-0-1303

**610 898. Master's Report.** (1 or 2) I, II, S. Written report to meet the requirements for the degree Master of Science. Subject chosen in consultation with major instructor. Pr.: Consent of department head. 610-898-4-1303

**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. 610-899-4-1303

#### Courses in Interior Design

##### UNDERGRADUATE CREDIT

**611 101. Design for Contemporary Living.** (3) I, II. Development of critical awareness of the application of principles of design in contemporary living. 611-101-0-1399

**611 215. Fundamentals of Interior Design.** (2) I, II. Aesthetic, social, and functional aspects of the home and its furnishings. One hour rec. and two hours lab. a week. Pr.: Art 100. 611-215-1-1399

**611 240. Interior Design I.** (3) I, II. Design concepts related to color, space planning, materials, and furnishings within living environments. Six hours lab. a week. Pr.: Art 100, 190 and Arch. 208 (or concurrent enrollment). 611-240-1-1399

##### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**611 540. Interior Design II.** (3) I, II. The analysis and design of interior space. Emphasis on design and awareness of human ecological requirements. Pr.: I. Des. 240. 611-540-1-1399

**611 545. Interior Design Practicum.** (3) I, II. Sources and professional practice; materials and constructions used in home furnishings. Pr.: I. Des. 540. Required of seniors in interior design option. 611-545-0-1399

##### UNDERGRADUATE AND GRADUATE CREDIT

**611 600. Interior Design Field Experience.** (2-6). Supervised work experience. Pr.: Senior standing, 2.2 cumulative GPA and 2.5 GPA in Professional Area and consent of Department Head. 611-600-2-1399

**611 650. Contemporary Home.** (3) I. Living environments explored in three-dimensional studies. 2 hours lec.; 2 hours lab. Pr.: I. Des. 240. 611-650-0-1399

**611 730. Interior Design III.** (3) II. Creative design of furnishings; introduction to markets and selling; designer-client relationships; qualifications of the professional designer. Pr.: I. Des. 540. 611-730-1-1399

**611 740. Historic Fabric Design.** (3) II. Interrelationships of fabric design and social, cultural, political, economic and geographical environments from prehistoric times to present. Pr.: Hist. 501. 611-740-0-1399

**611 745. Historic Furniture Design.** (3) II. Design expressed in furniture in each of the great art periods. Pr.: I. Des. 240 or consent of instructor. 611-745-0-1399



**611 751. Designing for Exceptional Needs.** (3) II. Problems encountered in designing interiors for the handicapped, the aging, and children. Pr.: I. Des. 730. 611-751-0-1399

**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. 611-780-0-1399

**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. 611-782-3-1399

#### 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. 611-820-3-1399

**611 899. Research in Interior Design.** Credit arranged. I, II. Research which may form the basis for the master's thesis. Pr.: Graduate standing. 611-899-4-1399

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### FAMILY AND CHILD DEVELOPMENT

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Marjorie Stith,\* Head of Department

Professors Kennedy,\* McCord,\* and Stith,\* Associate Professors Bollman\* and Davis,\* Assistant Professors Bergen,\* Jurich,\* Larson, Poresky,\* Russell, and Quarton; Instructors McNeil, Price, Warren, and Woods; Emeritus Professors Kell\* and Williams,\* Assistant Professor Raffington.

Family and Child Development offers unique opportunities for study of children, youth, and their families, with enriching experiences in the Child Development Laboratory, the Infant and Child Care Center, the Manhattan community, and through the Wichita semester. Courses are planned to create an awareness of the dynamics of family relationships through the study of children, youth, families, and one's self.

Two options are available in the Department: **Early Childhood Education** and **Community Services**. Requirements for each are outlined on page 242.

**Out-of-Classroom Experiences:** This department places great emphasis on the importance of laboratory and field experiences along with academic preparation. Laboratories are an integral part of many course offerings. The Child Development Laboratory and the Infant and Child Care Center provide on-campus 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. Off-campus observation and participation with children of various ages are arranged in connection with a number of courses. A research room with one-way vision glass and an inter-communication system provide further opportunities for students to observe individuals or groups in an experimental setting.

Field experiences off campus involving direct contact with families, youth and children are available through the Friendship Tutoring Program, Larned Semester, the Family Resources Center, and additional programs in Manhattan, Topeka, Kansas City, and other Kansas communities. There are two special professional semesters which provide responsible, supervised, professional involvement for students.

**Student Teaching:** Each student in the **Early Childhood Education Option** has a full semester of student teaching with pre-kindergarten aged children. There are a limited number of places in Manhattan for this experience, along with many excellent centers in Topeka, Kansas City, Salina, Clay Center, and other nearby communities. Some students elect to live in the community where they are teaching, if it is outside Manhattan; others choose to commute. One day each week is scheduled for course work in Manhattan during this semester.

**Wichita Semester:** The **Community Services Option** has a requirement of one semester of work in Wichita, which students have found exciting and beneficial. During this period the student is involved in various private and public agencies concerned with families, youth, and children such as: Mid-American All Indian Center, Neighborhood Youth Corps, Elks Training Center, Store Front Counseling Center, Sedgwick County Mental Health Center, Community Action Program, and the American Red Cross.

Concurrently, the student is enrolled in at least two courses, taught in Wichita by Family and Child Development staff. During this time of professional involvement and study, students meet together for planning, direction, and evaluation. They have guidance from agency personnel and from Family and Child Development faculty. Each participant, with assistance from Family and Child Development staff, makes arrangements for housing during this semester.

**Early Childhood Certification:** Completion of the **Early Childhood Education Option** meets the academic requirements for a Degree Three-Year Early Childhood Education 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 which must be attained before enrolling in student teaching; 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.

**Dual Major—Community Services and Social Work:** Students in the **Community Services Option** may choose a double major in **Social Work**, planning with an adviser in Family and Child Development and an adviser in Social Work. Those electing this course of action will work closely with the Family and Child Development advising staff to include preliminary requirements and to make proper arrangements for entry into the dual program at Junior level. Such a program will give the student an opportunity for understanding human development and the varied concerns of families along with beginning social work skills. The Social Work major, housed in the Department of Sociology and Anthropology, is currently under consideration for final accreditation by the Council on Social Work Education.

**Graduate Study:** 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, or research in child development, marriage, and family life. Current emphasis on day care programs and on disadvantaged families and children provides varied professional opportunities to the home economist with a graduate degree in child development and family relations.

The Department of Family and Child Development will participate in the new graduate program for the Ph.D. in Home Economics to be initiated Fall, 1975.

## 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. 620-210-0-1305

**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. 620-211-1-1305

**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. 620-212-1-1305

**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 lec. and two hours rec. a week. 620-230-0-1305

**620 250. You and Your Sexuality.** (3) I, II. Study of the role and meaning of human sexuality in relation to oneself as well as in inter-relationships with others. Limited to freshmen and sophomores. 620-250-0-1305

**620 260. Introduction to Social Work.** (3) I, 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) 620-260-0-1305

**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. 620-272-0-1305

**620 300. Problem in Family and Child Development.** Credit arranged. I, II, S. Independent or small group study. Pr.: Consent of instructor. 620-300-3-1305

**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. 620-315-0-1305

**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 lec. and one hour lab. 620-320-0-1305

**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. 620-330-0-1305

**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. 620-331-1-1305

**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. 620-332-0-1305

**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. 620-350-0-1305

**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. 620-400-2-1305

**620 499. Human Service Data.** (2-3) I, II, S. Preparation and interpretation of interviews, social histories, observations, surveys, and agency records. Techniques in planning, implementing, and evaluating human services. Pr.: F.C. Dev. 210 and 230. 620-499-0-1305

### UNDERGRADUATE AND GRADUATE CREDIT IN MINOR FIELD

**620 560. Skills and Techniques in Practice of Social Work.** (3) I. 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 562. Pr.: F.C. Dev. 260, Soc. 510, and consent of instructor. (Same as Soc. 560) 620-560-0-1305

**620 561. Skills and Techniques in Practice of Social Work II.** (3) I, II, S. Concentration on assessment skills and planning decisions for intervention, strategies and roles. Evaluation, termination of change efforts, and selected work skills such as collaboration, consultation, and supervision. Pr.: F.C. Dev. 560 (Same as Soc. 561) 620-561-0-1305

**620 562. Field Experience.** (3) I, II, S. 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.) 620-562-2-1305

**620 563. Social Work Professional Seminar.** (3) I, II, S. A review of psychological and behavioral theories which influence the practice of social work. Primary focus on the use of theories in implementing change in client systems. Pr.: To be taken concurrently with F.C. Dev. 562. (Same as Soc. 563) 620-563-0-1305

**620 565. Social Welfare Program and Policy Formulation and Analysis.** (3) II. Emphasis on analysis of existing policies and programs developed to cope with various social problems. Attention given to formulation of alternative policies and to policy change through legislative action. Pr.: F.C. Dev. or Soc. 260, 510, 560 and consent of instructor. (Same course as Soc. 565). 620-565-2-1305

**620 580. Directed Field Experience.** (6-8). A block field placement in agencies outside of Manhattan. Faculty-supervised experience in direct service to clients: individuals, groups, and communities. Weekly seminar during placement emphasizes theory underlying the practice. Pr.: F.C. Dev. 260 and consent of instructor. 620-580-2-1305

### 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. 620-610-0-1305

**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. 620-611-1-1305

**620 620. Advanced Study of Children.** (3) I, II. 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. 620-620-0-1305

**620 625. Directed Experiences in Early Childhood Education** (with children 2-5). (8) I, II. Participation in a preschool program; planning, instruction, evaluation. Pre-arrangement and consent of instructor required. Pr.: F.C. Dev. 610 and 611. 620-625-2-1305

**620 626. Child Development Center Programming.** (2 or 3) I, II, alt. 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. 620-626-0-1305

**620 630. The Adolescent.** (2) I, II, alt. S. Focus on interpersonal processes; principles and characteristics of the helping relation in light of developmental aspects of adolescence. Take F.C. Dev. 631 concurrently. Pr.: Five hours of F.C. Dev. or five hours of a combination of Psych. and Educ. Psych. and junior standing. 620-630-0-1305

**620 631. The Adolescent Lab.** (1) I, II, alt. 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. 620-631-1-1305

**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 lec. and two hours lab. a week. 620-640-0-1305

**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. 620-650-0-1305

**620 652. Black Family.** (2-3) I, II. 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. 620-652-0-1305

**620 654. Death and the Family.** (2-3) I, II, S. Exploration of contemporary attitudes toward death and dying; related influences on individual development and family life. Pr.: F.C. Dev. 650 or Soc. 640. 620-654-0-1305

**620 670. Parent Education.** (2 or 3). I, II, alt. 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. 620-670-0-1305

**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. 620-700-3-1305

**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. 620-704-2-1305

**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. 620-708-0-1305

**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. 620-710-0-1305

**620 720. Infant Behavior and Development.** (3) II, alt. S. 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. 198. 620-720-0-1305

**620 750. Low-Income Families.** (2-3) I, II, alt. S. Factors affecting family life in disadvantaged families; life styles of sub-cultures; proposed programs; implications for persons working with low-income children and families. Pr.: F.C. Dev. 650 or consent of instructor. 620-750-0-1305

**620 760. Marital Interaction.** (3) I, alt. 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. 620-760-0-1305

**620 765. Human Sexuality.** (3) II, alt. 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. 620-765-0-1305

## GRADUATE CREDIT

**620 820. Theories of Child Development.** (3) I, 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. 620-820-0-1305

**620 824. Parent-Child Interaction: Theory and Research.** (2-3) I, II, S. Developmental theories and empirical research concerning the reciprocal interactions between parents and their children focusing on the socialization of the child within the family. Pr.: F.C. Dev. 820. 620-824-0-1305

**620 830. Advanced Program Development.** (2-3) I, II, S. Analysis of the process and application of child development theory to early childhood program planning. Pr.: F.C. Dev. 820. 620-830-0-1305

**620 840. Social Processes in Human Development.** (3) I, alt. 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. 620-840-0-1305

**620 842. Physiological Processes in Human Development.** (3) Alt. years. 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. 620-842-0-1305

**620 843. Self-Processes in Human Development.** (3) II, alt. 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. 620-843-0-1305

**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. 620-860-0-1305

**620 870. Principles of Marriage and Family Counseling.** (3) I, alt. 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. 620-870-0-1305



**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. 620-880-2-1305

**620 881. Practicum in Family and Community Services.** Pr.: 9 hours Social Science. 620-881-2-1305

**620 882. Practicum in Study of Student Development.** Pr.: F.C. Dev. 640. 620-882-2-1305

**620 883. Practicum in Early Childhood Education.** Pr.: F.C. Dev. 620. 620-883-2-1305

**620 884. Practicum in Parent Education.** Pr.: F.C. Dev. 670. 620-884-2-1305

**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. 620-888-0-1305

**620 890. Research Methods in Family and Child Development.** (2-3) II. 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. 620-890-0-1305

**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. 620-892-4-1305

**620 894. Readings in Family and Child Development.** (3) I, 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. 620-894-3-1305

**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. 620-899-4-1305

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## FAMILY ECONOMICS

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Richard L. D. Morse,\* Head of Department

Professor Morse;\* Assistant Professors Annis,\* and Rasmussen; Emeritus: Associate Professor Agan.\*

This department prepares students for professional work in the areas of housing, household equipment, home management, consumer education, consumer finance, financial counseling 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. Family Economics will participate in the new graduate program for the Ph.D. in Home Economics. Graduate students can prepare for positions in home management, financial counseling,

consumer education, or as specialists in extension or college and university faculty. Field study and research are conducted in community programs, consumer affairs, aging, public policy on health, 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

**630 110. Consumer Action.** (2) I, II. Consumer rights and responsibilities emphasizing issues and problems confronting students, their families, and others as consumers. Political, social, economic, and legal implications of consumer decisions. Competencies and techniques for taking effective action. 630-110-0-1304

**630 400. Family Economics.** (3) I, II, S. Economic forces affecting families, and management by families of their economic resources. Pr.: Econ. 110 or equiv. 630-400-0-1304

**630 405. Family Finance.** (3) I, II, S. Financial problems involved in the effective management of the family's resources. 630-405-1-1304

**630 410. Consumer Relations Practicum.** (Arr.) I, II, S. Supervised experiences in business-consumer relations and study of consumer issues, including consumer redress. Pr.: Consent of instructor. 630-410-2-1304

**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 lec., two hours lab. a week. Pr.: Sophomore standing. 630-420-1-1304

**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 hours lab. a week. 630-440-1-1302

**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. 630-460-0-1304

**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. 630-465-1-1304

### 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. 630-605-0-1304

**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. 630-615-0-1304

**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. 630-620-0-1304



**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. 630-630-1-1302

**630 650. Consumer Product Safety.** (3) I, II, S. Evaluation of measures that assure consumer public of safe products, consumer recourse, business protection and responsibility, methods of surveillance, investigation, and reporting. Pr.: Ten hours of 400 or higher level courses in engineering or home economics. 630-650-0-1304

**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. 630-670-2-1304

**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. 630-680-0-1304

**630 700. Families in the American Economy.** (3) II. 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. 630-700-0-1304

**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. 630-705-0-1304

**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. 630-710-0-1304

**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. 630-712-2-1304

**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. 630-720-0-1304

**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. 630-740-0-1302

**630 760. Management of Family Resources.** (3) I, alt. S. Identifying and analyzing problems of management in the home which affect the needs of individuals and create a satisfying environment for the family. Pr.: 630 460 Home Management and consent of instructor. 630-760-0-1304

**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. 630-780-0-1304

#### 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. 630-810-0-1304

**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) 630-811-0-1304

**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 and 700. 630-815-0-1304

**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. 630-820-0-1304

**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. 630-840-1-1302

**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. 630-860-0-1304

**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. 630-899-4-1304

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#### FOODS AND NUTRITION

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Lucille Wakefield,\* Head of Department

Professors Bowers,\* Caul,\* Finkelstein,\* Harrison,\* and Wakefield,\* Associate Professor Fryer,\* Assistant Professors McCarty and Newell; Instructors Carter and Clark; Emeritus: Professor Tinklin,\* 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. 640-132-0-1306

**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. 640-133-0-1306

**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. 640-300-1-1306

**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. 640-301-0-1306

**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. 640-400-1-1306

### 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. 640-500-2-1306

**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. 640-599-1-1306

### 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 hours rec. and five hours lab. a week. Pr.: Chem. 190 and 191 or 350 and 351, or Biochem. 120. 640-601-1-1306

**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 and 191, or 350 and 351 or Biochem. 120; and Biol. 198. 640-602-1-1306

**640 603. Maternal and 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. 640-603-0-1306

**640 612. Principles of Food Product Development and Control.** (3) I, II, S. Food product concept, feasibility and evaluation. Pr.: F. & N. 601 or consent of instructor. 640-612-0-1306

**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, one credit of supervised experience. Pr.: Biochem. 200 or 521, Biol. 525, consent of instructor. 640-613-2-1306

**640 614. Nutrition in Medical Science.** (6) I, II. Therapeutic nutritional principles related to anomalies in disease. Supervised experience. Three credits recitation and three credits of supervised experience. Pr.: Biochem. 200 or 521, Biol. 525, consent of instructor. 640-614-2-1306

**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. 525, consent of instructor. 640-615-2-1306

**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. 640-680-0-1306

**640 700. Community Nutrition.** (3) I, 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. 640-700-0-1306

**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. 525, F. & N. 602. 640-710-0-1306

**640 712. Diet Therapy.** (3) II. Dietary modifications for pathological conditions. Pr.: F. & N. 602, Biochem. 200 or 521, Biol. 525. 640-712-0-1306

**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. 640-760-1-1306

**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. 640-780-3-1306

**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. 640-790-1-1306

### 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. 640-809-1-1306

**640 811. Advances in Foods.** (1-3) S. Recent developments and concerns related to foods. Pr.: F. & N. 601 and consent of instructor. 640-811-0-1306

**640 813. Advances in Nutrition.** (1-3) S. Recent developments and concerns related to nutrition. Pr.: F. & N. 602 and consent of instructor. 640-813-0-1306

**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. 640-814-0-1306

**640 815. Practicum in Community Nutrition.** (3) I, II, S. Supervised experience in community nutrition agencies. Pr.: F. & N. 700. 640-815-2-1306

**640 816. Application of Food Flavor Analysis.** (2) I, II, S. Application of flavor panel analysis to food research problems. One hour lec., two hours lab. a week. Pr.: F. & N. 760, or consent of instructor. 640-816-1-1306

**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 hours of nutrition, Biol. 525 and Biochem. 521 or consent of instructor. 640-817-0-1306

**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 and conc. enrollment in ASI 818. 640-818-1-1306

**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. 640-880-0-1306

**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. 640-890-3-1306

**640 898. Master's Report.** (2) I, II, S. Survey in depth of the literature. 640-898-4-1306

**640 899. Master's Thesis.** (6-8) I, II, S. Research in area of specialization. 640-899-4-1306

**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. 525 and F. & N. 602. 640-900-0-1306

**640 901. Advanced Nutrition.** (3) II, S. Current knowledge of metabolic functions of food in the human organism. Pr.: Biochem. 200 or 521, Biol. 525, F. & N. 602. 640-901-0-1306

**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. 640-902-1-1306

**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. 640-903-1-1306

**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. 640-904-0-1306

**640 905. Lipids in Food Systems.** (3) I or II, alt. years. 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. 640-905-0-1306

**640 906. Proteins in Food Systems.** (3) I or II, alt. years. Behavior and function of proteins in food systems. Pr.: Biochem. 521 and F. & N. 902, consent of instructor. 640-906-0-1306

**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 an M.S. degree or four hours toward a Ph.D. degree. Pr.: consent of instructor. 640-981-0-1306

**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. 640-999-4-1306

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. The Department of Institutional Management will participate in the new graduate program for the Ph.D. in Home Economics.

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. 660-400-0-1307

**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. 660-410-0-1307

**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. 660-430-0-1307

**660 440. Quantity Foods.** (4) I, II. Principles and methods of preparing food items in quantity with emphasis on acceptability by people. 2 hours rec. and 6 hours lab. Pr. or concurrent: 3 hour foods course and Biochem. 120 or Chem. 190 and 191. 660-440-1-1307

**660 445. School Food Service Management.** (2-3) II, S. Managerial functions in the school food service system. Pr.: Ins. M. 440 or equiv. 660-445-0-1307

**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. 660-450-2-1307

### UNDERGRADUATE AND GRADUATE CREDIT

**660 635. Food Service Equipment and Layout.** (2) I, II. Factors affecting the selection and arrangement of equipment in food service systems. Pr.: Ins. M. 440. 660-635-0-1307

**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. 660-640-0-1307

**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. rec., 4 cr. lab. Pr.: Ins. M. 440 and consent of instructor. 660-650-2-1307

**660 660. Management in Dietetics.** (9) I, II. Functions of management in food service; financial control policy making,

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## INSTITUTIONAL MANAGEMENT

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Professor Spears; Associate Professors Riggs and Zeigler;\* Assistant Professors Roach and Vaden;\* Instructor Miller; Emeritus: Professors Shugart\* and West.\*

The Department of Institutional Management provides instruction for students preparing to become dietitians or managers in hospital, college, university,



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. 660-660-2-1307

**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. 660-670-0-1307

**660 710. Readings in Institutional Management.** (1-3) I, II, S. Directed study of current literature in Institutional Management and related areas. 660-710-3-1307

**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. 660-755-0-1307

**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, consent of instructor. 660-780-3-1307

#### 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. 660-805-1-1307

**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. 660-880-0-1307

**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 and consent of department head. 660-885-0-1307

**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. 660-890-0-1307

**660 899. Research in Institutional Management.** Credit arranged. I, II, S. Pr.: Consent of instructor. 660-899-4-1307

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### GENERAL HOME ECONOMICS

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Ruth Hoeflin,\* 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. 650-110-0-1301

**650 208. Home Economics Colloquium.** Credit arranged. I, II, S. Special topics for home economics majors. 650-208-2-1301

**650 385. Problem in General Home Economics.** Credit arranged. I, II, S. Independent study. Pr.: Consent of instructor. 650-385-3-1301

**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. 650-399-0-1301

**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. 650-400-0-1301

##### 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. 650-780-3-1301

##### 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. 650-800-0-1301

**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. 650-850-0-1301

**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. 650-851-2-1301

**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. 650-860-2-1301

**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. 650-865-2-1301

**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. 650-880-0-1301

**650 899. Research in General Home Economics.** Credit arranged. I, II, S. Individual research problems. Pr.: Consent of instructor. 650-899-4-1301

#### Graduate 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. The area of General Home Economics will participate in the new graduate program for the Ph.D. in Home Economics. 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.

**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 197-199. Graduate faculty members in Home Economics Education serve as major advisers.



# the college of veterinary medicine

Donald M. Trotter,\* Dean

Lee T. Railsback, Assistant Dean

## REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF VETERINARY MEDICINE

**Enrollment in the College of Veterinary Medicine is limited** to 100 well-qualified students after a minimum of two years of college work which includes the required 64 hours of pre-veterinary medical courses (see Pre-Veterinary Medical Requirements). The 100 students are selected from 800-plus applicants, with preference to Kansans. A student must have at least a B (3.0) average in order to be competitive for selection. Nonresidents from states without a College of Veterinary Medicine need at least a B average (3.0 on a 4.0 system) to receive an application for the professional curriculum and consideration for selection. Personal interviews are required of all students under consideration. Selection is based upon academic achievement and professional potential as determined by the Interview and Admissions Committees. **Nonresidents from a state with a College of Veterinary Medicine should seek admission in their home state.**

**Beginning with the first year professional class selected for the fall of 1976,** selection for admission to the professional program in Veterinary Medicine will be on individual merit from qualified applicants as listed above, but: Who are graduates of Kansas high schools and who, with their parents, have maintained residence in Kansas, or: Who together with their parents are residents of Kansas and have been residents for at least three years immediately prior to the deadline for application to Veterinary Medicine, or: Who have been wholly independent residents of Kansas for five years immediately prior to the deadline

for application to Veterinary Medicine. After all qualified Kansans are selected, nonresidents from states with whom K-State has a contract for reimbursement; and thereafter, nonresidents from states without Colleges of Veterinary Medicine, and which do not have contracts for reimbursement with K-State, will be considered. Nonresidents from states having Colleges of Veterinary Medicine will not normally be considered.

On October 1 applications for admission to the professional curriculum may be obtained from the Assistant Dean of the College of Veterinary Medicine for consideration in the next class.

No applications are usually accepted after January 15 from off-campus students or after February 1 from Kansas State University students.

## 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
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
Physics I and II .....	8
Trigonometry .....	3
General Zoology or Principles of Biology .....	4
Genetics .....	3
Dairy Science .....	1
Poultry Science .....	1
Social Science and / or Humanities Electives .....	12
Electives* .....	1-3
Total Semester Hours .....	64

\* Number depending on selection of other courses.



A Kansas State University student who completes the pre-veterinary curriculum in the College of Arts and Sciences or the College of Agriculture\*\* may be awarded a Bachelor of Science Degree at the end of his successful completion of the second year in the Professional Veterinary Medical Curriculum.

### VETERINARY MEDICAL LIBRARY

As a result of generous contributions from alumni and friends plus a federal grant, the College of Veterinary Medicine has a well-equipped library consisting of approximately 6,000 volumes which deal with all phases of veterinary medical literature and many allied fields. Numerous additional textbooks and journals are available at the main Library on campus.

### FEES FOR VETERINARY MEDICAL STUDENTS

Assessments	Kansas Residents or Staff Members	Non-residents
Per semester (if enrolled in more than six hours)		
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) .....	19.25	19.25
6. Stadium Bonds .....	4.25	4.25
Total for Veterinary Medical Students .....	\$316.00	\$736.00

### 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 M.S. and Ph.D. degrees.

For admission to the curriculum in Veterinary Medicine consult the previously listed "Pre-veterinary Medical Requirements."

The carefully planned two or two and one-half year pre-veterinary program plus the four year (total of at least six years) professional curriculum may lead to the two degrees, Bachelor of Science and Doctor of Veterinary Medicine. (Hours required for graduation: Pre-veterinary—64; professional—149; total—213.)

### FIRST PROFESSIONAL YEAR

Fall Semester	Course	Semester Hours
Physiological Sci. 740 700	Gross Anatomy I .....	7
Physiological Sci. 740 710	Microscopic Anatomy I .....	5
Physiological Sci. 740 737	Veterinary Physiology I .....	6
Physiological Sci. 740 740	Veterinary Orientation .....	1
		19

Spring Semester	Course	Semester Hours
Physiological Sci. 740 705	Gross Anatomy II .....	5
Physiological Sci. 740 715	Microscopic Anatomy II .....	3
Physiological Sci. 740 747	Veterinary Physiology II .....	8
Physiological Sci. 740 748	Methods of Physi. Exam. ....	1
		17

### SECOND PROFESSIONAL YEAR

Fall Semester	Course	Semester Hours
Animal Sci. & Ind. 005 601	Livestock Feeding .....	3
Infectious Diseases 720 710	Vet. Microbiology I .....	5
Pathology 730 703	General Pathology .....	5
Physiological Sci. 740 770	Pharmacology .....	6
		19

Spring Semester	Course	Semester Hours
Infectious Diseases 720 720	Vet. Microbiology II .....	5
Infectious Diseases 720 775	Clinical Pathology .....	3
Infectious Diseases 720 795	Vet. Parasitology I .....	3
Pathology 730 710	Systemic Pathology .....	5
Surgery 750 810	Propaedeutic Medicine .....	2
		18

### 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
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,\* Minocha,\* and Moore;\* Assistant Professor Bailie; Emeritus: Professors Leasure and Kitzelman; Instructor Kimball.

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 ex-

\*Those receiving the B.S. degree in Agriculture must use Agriculture in Our Society (2 hours) for 2 hours of their electives.



perience, 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. 720-645-1-1218

**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. 720-650-0-1218

**720 710. Veterinary Microbiology I.** (5) I. 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. 720-710-1-1218

**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. 720-715-2-1218

**720 720. Veterinary Microbiology II.** (5) II. 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. 720-720-1-1218

**750 751. 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. 750-751-0-1218

**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. 720-753-0-1218

**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. 720-775-1-1218

**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. 720-790-1-1218

**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. 720-795-1-1218

**720 797. Veterinary Parasitology II.** (3) 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. 720-797-1-1218

### 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. 720-810-3-1218

**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. 720-820-1-1218

**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. 720-825-1-1218

**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. 720-830-0-1218

**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. 720-835-0-1218

**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. 720-850-2-1218

**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. 720-875-1-1218

**720 880. Principles and Techniques of Research in Medical Investigations.** (4) I, S. A study of the procedures in planning and evaluating medical experiments and the use of special research instruments in medical research. Three hours rec. and three hours lab. a week. Pr.: Path. 703, Physi. 745. 720-880-1-1218

**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. 720-899-4-1218

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## PATHOLOGY

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S. M. Dennis,\* Head of Department

Professors Dennis\* and Cook;\* Associate Professors Leipold,\* McGavin,\* Smith,\* and Straffuss.\*

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. 730-703-1-1218

**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. 730-710-1-1218

### GRADUATE CREDIT

**730 845. Advanced Diagnostic Pathology.** (3) I, S. Study of pathologic alterations of disease with emphasis on diagnostic characteristics. Pr.: Path. 710 and consent of instructor. 730-845-1-1218

**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. 730-847-0-1218

**730 848. Avian Pathology.** (2) II. Study of etiology, pathogenesis, gross and microscopic characteristics of avian diseases. Pr.: Path. 847 or consent of instructor. 730-848-1-1218

**730 849. Pathological Technique and Diagnosis.** (3) I, II, S. Practical experience in mammalian necropsy, avian necropsy, clinical pathology, histologic techniques, and diagnostic laboratory procedures. Pr.: Path. 710 and consent of staff. 730-849-1-1218

**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. 730-851-1-1218

**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. 730-855-1-1218

**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. 730-857-1-1218

**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. 730-860-1-1218

**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. 730-862-1-1218

**730 870. Pathology Seminar.** (1) I, II, S. Pr.: Consult department head. 730-870-0-1218

**730 880. 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. 730-880-2-1218

**730 885. 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. 730-885-3-1218

**730 899. 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. 730-899-4-1218

**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. 730-947-1-1218

**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 and nervous systems, and special senses. Pr.: Path. 947 and consent of staff. 730-950-1-1218

**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. 730-965-0-1218

**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. 730-966-1-1218

**730 970. Pathology Seminar.** (1) I, II, S. Pr.: Consult department head. 730-970-0-1218

**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. 730-980-2-1218

**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. 730-985-3-1218

**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. 730-999-4-1218

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## PHYSIOLOGICAL SCIENCES

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R. A. Frey, Head of Department

Professors Clarenburg,\* Fedde,\* Frey,\* Oehme,\* Trotter,\* and Upson;\* Associate Professors Chapman,\* Chen,\* Gronwall,\* Klemm,\* Weinman, and Westfall;\* Assistant Professors Hartke and Purinton;\* Instructors Erichsen, Johnson, 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, two electron microscopes, 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 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. 740-530-1-1218

**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. 740-531-0-1218

### 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. 740-700-1-1218

**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.: Physiol. Sci. 700. 740-705-1-1218

**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. 740-710-1-1218

**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.: Physiol. Sci. 710. 740-715-1-1218

**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. 740-720-1-1218

**740 737. Veterinary Physiology I.** (6) I. Physiological functions at the molecular and various structural levels in domestic animals are integrated. Physiological control mechanisms, criteria for evaluating animal health, and conditions leading to loss of control are emphasized. Four hours rec. and six hours lab. a week. Pr.: First year standing in College of Veterinary Medicine. 740-737-1-1218

**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. 740-740-0-1218

**740 747. Veterinary Physiology II.** (8) II. Function and control of nervous, muscular, respiratory, cardiovascular, endocrine, reproductive, digestive and renal systems of domestic animals. Six hours lec. and six hours lab. a week. Pr.: Physiol. Sci. 737 and Physiol. Sci. 700 or consent of instructor. 740-747-0-1218

**740 748. Methods of Physiological Examination.** (1) II. Techniques for determination of the functional status of body systems of domestic animals. Two hours lab. per week. Pr.: Second semester, first-year standing in College of Veterinary Medicine. 740-748-1-1218

**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.: Physiol. Sci. 737 and 747 or equiv. 740-770-1-1218

### 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. 740-803-0-1218

**740 812. Canine Anatomy.** (2 to 4) I, II, S. Pr.: Consent of staff. 740-812-3-1218

**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.: Physiol. Sci. 700, 705 or equiv. 740-825-3-1218

**740 850. Anatomical Techniques.** (1 to 2) I of odd-numbered years and each S. Pr.: Consent of staff. 740-850-3-1218

**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, Physiol. Sci. 530 or equiv. 740-855-0-1218

**740 860. Neuroscience.** (2) I. An advanced multidisciplinary study of the central nervous system; including neurochemistry, neuropharmacology, neuroanatomy, neurophysiology, clinical neurology, and behavioral science. Pr.: Consent of staff. 740-860-0-1218

**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.: Physiol. Sci. 747 and consent of staff. 740-865-1-1218

**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. 740-885-0-1218

**740 890. Problems in Pharmacology.** (V) I, II, S. Individual investigation into the interactions of chemical compounds and living systems. Pr.: Consent of instructor. 740-890-4-1218

**740 898. Master's Report.** (2) I, II, S. Pr.: Consent of staff. 740-898-4-1218

**740 899. Research.** (1 to 4) I, II, S. For graduate students in the field of anatomy working toward the M.S. degree. Pr.: Consent of staff. 740-899-4-1218

**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.: Physiol. Sci. 747 and consent of staff. 740-900-0-1218

**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. 740-915-0-1218

**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.: Physiol. Sci. 747 and consent of staff. 740-925-1-1218

**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. 740-995-4-1218

**740 999. Research in Physiology.** (1 to 6) I, II, S. For graduate students working toward the Ph.D. degree. Pr.: Consent of staff. 740-999-4-1218



## SURGERY AND MEDICINE

J. E. Mosier,\* Head of Department

Professors Mosier,\* Butler,\* Noordsy,\* and Oehme;\* Associate Professors Anderson,\* Carnahan, Frey,\* Guffy,\* and Schneider; Assistant Professors Blauch,\* Brandt, Dorn, Gabbert, Harris,\* Howard, Jernigan, Olson, Samuelson, Schoneweis, Taussig, and Vestweber; Instructors Bradley and Schroeder; 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 programming animal health and for diagnosing and treating the various diseases affecting livestock and poultry. Consultation services result in frequent referral cases or investigational trips.

Third- and fourth-year students are active participants in the hospital and clinical services. Students are regularly assigned on a rotation basis during the year to various specialists within the clinical and pathology staffs. In addition to daily assignments, fourth-year students are required to serve a two-week internship in the veterinary hospital, during which time they are responsible for the various management phases of the hospital.

The department presents courses in medicine, surgery, obstetrics and gynecology to veterinary students.

Opportunities leading to the Master of Science degree are offered. Prerequisite to graduate work in the department is the completion of a four-year curriculum substantially equivalent to that required of students majoring in veterinary medicine at this University.

Good library facilities, adequate physical equipment, and an abundance of cases offer excellent resources for research in surgery and medicine.

### Courses in Surgery

#### GRADUATE CREDIT

**750 802. Research in Surgery.** (1 to 6) I, II, S. The objectives of the course are to attempt to solve problems confronting the veterinary surgeon. Pr.: Anat. 700, 705, 720; Surg. 805, 815. Offered especially for graduates in veterinary medicine. 750-802-4-1218

**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. 750-805-0-1218

**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. 750-815-0-1218

**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. 750-832-3-1218

**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. 750-867-3-1218

**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. 750-872-2-1218

**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. 750-877-2-1218

**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. 750-887-3-1218

### 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. 750-235-0-1218

#### 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. 750-500-0-1218

#### 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. 750-800-1-1218, 750-803-1-1218

**750 810. Propaedeutic Medicine.** (2) II. Introduction to the principles of animal hospitalization, physical examination, 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. 750-810-0-1218

**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. 750-812-3-1218

**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. 750-822-3-1218

**750 823, 750 825. Clinical Medicine I. (4) and II. (4)** I and II respectively. Study of the 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. 750-823-1-1218, 750-825-1-1218

**750 826. Systemic Medicine I.** (3) I, II, S. Study of the medical aspects of diseases of the urinary, nervous and integumentary systems and special senses. Pr.: D.V.M. degree or consent of staff. 750-826-2-1218

**750 827. Systemic Medicine II.** (3) I, II, S. Study of the medical aspects of diseases of the cardiovascular, respiratory, musculoskeletal and endocrine systems. Pr.: D.V.M. or consent of staff. 750-827-2-1218



**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. 750-830-0-1218

**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. 750-837-0-1218

**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. 750-840-0-1218

**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. 750-842-3-1218

**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. 750-850-0-1218

**750 865. Laboratory Animal Medicine.** (3) II. Consideration of the management and health of common species of laboratory animals, zoo animals and wildlife. Three hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine. 750-865-0-1218

**750 870. Medicine III.** (6) I. Consideration of the medical and pathological aspects of infectious diseases and noninfectious diseases of special sense organs affecting the body as a whole. Six hours lec. a week. Pr.: Fourth-year standing in College of Veterinary Medicine. 750-870-0-1218

**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. 750-882-0-1218

**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. 750-885-0-1218

**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. 750-887-3-1218

**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. 750-890-0-1218

**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. 750-892-3-1218

**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 or consent of instructor. 750-895-0-1218

## VETERINARY DIAGNOSTIC LABORATORY

H. D. Anthony, Director

Professors Anthony\* and West,\* Associate Professors Gray\* and Milleret,\* Instructor Baugh.

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 to 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 land-grant tradition at k-state

## SERVICE, RESEARCH AND EDUCATION

Kansas State University, one of the first land-grant institutions in the country, has established its educational program on the concept of service to Kansas and Kansans. In recent years this dedication to service has been global in scope. The land-grant tradition is a commitment to relevance. The educational programs are practical and pragmatic while the goal of research is to improve the quality of life.

This "distinctive spirit" of the land-grant schools was described by James A. McCain, president of Kansas State University from 1950-1975. He writes: "This spirit defies definition since it consists of many things. It rejects the ivory tower and embraces the market place; it is experimental and not authoritarian; it is service motivated; among undergraduates it exudes informality, seriousness of purpose, and capacity for hard work."

At Kansas State University this distinctive spirit is translated into statewide educational programs such as Continuing Education. Service and research programs include Cooperative Extension, Engineering and Agricultural Experiment Stations, Kansas Water Resources Research Institute, Food and Feed Grain Institute, Center for Community and Regional Planning, Konza Prairie Research Natural Area, Tuttle Creek Fisheries Research Laboratory, Population and Demographic Laboratory, Wind and Soil Erosion Laboratory, Center for Extended Services in Education, Center for Community Education, Institute for Environmental Research, Center for Energy Studies, Center for Transportation Research and Training, Kansas Industrial Extension Service and the Veterinary Diagnostic Laboratory.

## AGRICULTURE AT KANSAS STATE UNIVERSITY

Roger L. Mitchell, Vice President for Agriculture

Historically the foundation of K-State's educational program has been service to the citizens of a state which was basically agricultural. In modern times with the threat of starvation enveloping the globe, K-State's particular specialty is even more relevant.

Agriculture at Kansas State University includes instruction, research, extension, and international agriculture. County agents, branch experimental stations, and experimental fields throughout the state are 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.

### International Agricultural Programs

Vernon C. Larson, Coordinator

Since 1956 the University has been involved in technical assistance programs throughout the world, helping the developing countries establish land-grant type of institutions, geared towards increasing food production and improving the country's economy. These programs have included sending K-State faculty overseas and bringing faculty members from abroad to KSU for advanced study.

The office also serves as a focal point on campus for international visitors. These visits vary in length from one day to six months. For those overseas guests seeking academic course work, the office provides special counseling. The office also assists departments of the university in developing an international dimension. The Food and Feed Grain Institute has responded to several requests to provide assistance on a worldwide basis with special emphasis on grain storage processing and marketing.



# division of continuing education

E. Norman Harold, Director  
Michael Williamson, Assistant Director

Assistant Professors Lockhart, Miller, Noble, Steffen, and Williamson; Instructors Ayres, B. Biles, L. Biles, Carlin, Dieckhoff, Harold, Hebert, Maes, Martin, Michael, Quinn, Reichow, Stamey, and Terry.

The function of the Division of Continuing Education is to make the resources of Kansas State University available to the people of Kansas. The Division offers a variety of educational services on almost any level of interest or desire. Each year from 8,000 to 9,000 persons participate in credit courses, both graduate and undergraduate; and from 10,000 to 12,000 participate in non-credit courses, conferences, and short courses through the Division.

## STATEWIDE CONTINUING EDUCATION NETWORK

Many courses and other educational programs normally offered on the K-State campus are available to the people of Kansas by means of the Statewide Continuing Education Network. The Network is a system of 24 educational centers located throughout Kansas linked together via telephone lines. The locations include Chanute, Colby, Concordia, Dodge City, El Dorado, Emporia, Garden City, Goodland, Hays, Hutchinson, Independence, Johnson County, Lawrence, Liberal, Manhattan, Norton, Paola, Pittsburg, Sabetha, Salina, Stockton, Topeka, Wellington, and Wichita.

Each center is equipped with amplifying telephone equipment allowing easy "two-way" communication

between all 24 locations. In addition to the amplified telephone system, each of the 24 centers is equipped with general types of audio-visual support equipment. A monitor is present at each location to operate the equipment, distribute handout materials, and provide general educational support.

Each year several thousand people participate in credit and non-credit courses on the Network. Instruction usually originates from KSU or one of the other regents' institutions. However, the flexibility of the system allows resource people from throughout America to be hooked electronically into the system. Thus, people across the state can have access to national educational resources.

Meetings and conferences also are held on the Network. The telephone hookup allows national resource people to participate in local activities with a minimum of cost and maximum of effectiveness.

## KSU AND CONTINUING EDUCATION RESPOND TO NEEDS

Kansas State University strives to understand the educational needs of the people throughout the state and to respond to those needs with appropriate educational programs. The Division of Continuing Education offers a wide range of educational programs for individuals and organizations either on the K-State campus or at any location interested in educational service. The Division is anxious to respond to the requests of citizens and to provide available resources depending on the needs and interests of the community.



## **CONTINUING EDUCATION SERVES INDIVIDUALS AND ORGANIZATIONS**

The Division of Continuing Education serves individuals and organizations in numerous ways. Many state-wide organizations in education, industry and business, agriculture, veterinary medicine, home economics, real estate, and numerous others are given assistance through Continuing Education programs.

**Extension art courses** for adults are regularly offered by the Division. A Rural-Urban Art program is held each fall in eight Kansas communities to promote amateur art. This year marks the twenty-third annual Art Program. From these district exhibits representative work is selected for the State Art Exhibition held each year at Kansas State University. In a similar way programs are conducted for other groups.

**Intersession** offers a variety of credit courses. Those who want to diversify their educational experience, take a required subject, or simply try something new may enroll in these short courses, field experiences, or interdisciplinary courses during Intersession. Suggestions for other types of courses and programs are encouraged.

**The Servicemen's Opportunity College [SOC]** is affiliated with Kansas State University. The program maintains a commitment to servicemen and women interested in pursuing a college education. Through the Division of Continuing Education, KSU offers courses at

Fort Riley and Fort Leavenworth. These courses are scheduled to avoid conflicts with military duties and to facilitate the opportunity for an education.

## **CONTINUING EDUCATION COORDINATORS**

The Division's coordinators offer a variety of services to individuals and organizations. These specialists assist in the total development and operation of a program, whether it be a short course, a workshop, large conference, or special interest program.

The coordinators' services may include: developing the program, designing and printing the brochures, publicizing the conference, making meal and room arrangements, arranging and negotiating for guest speakers and special conference materials or equipment, registration, payment of bills and preparing name tags. Partial services for conferences are also available through the Division of Continuing Education.

Further information on these programs and others is available through the KSU Division of Continuing Education, Room 301, Umberger Hall (phone 913 532-5566).

## **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.



# agricultural experiment station

Floyd W. Smith, Director  
Lowell Brandner, Editor  
Grace Muilenberg, Associate 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, the McIntire-Stennis Act of 1962, and the Rural Development Act of 1972.

Each session of the Kansas legislature and each session of the U.S. Congress provide funds to operate the experiment station. Fees and commercial organizations also provide some support, as do sales of experimental crops and animals.

The unique responsibility of the Agricultural Experiment Station is to conduct original research in the broad field of agriculture and to publish and disseminate the results of agricultural research. Attention is devoted largely to the solution of problems related to agriculture, including farm homes.

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

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 \$11.3 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, Phillips, and Stegmeier; Assistant Professors Baxter 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 Professors Davis and Herron; Assistant Professors Condray, 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 Bordovsky, Lawless, Schwulst, 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; Instructors Chyba, Ibbetson.

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 12 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), Irrigation (Scandia), Southwest Kansas (Minneola), Sandyland Irrigation and Dryland (St. John), South Central Kansas (Hutchinson), Newton, East Central (Ottawa), Kansas River Valley Irrigation (Topeka: Rossville and Silver Lake).

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

### THE KANSAS WATER RESOURCES RESEARCH INSTITUTE

William L. Powers, Director

Cooperating with the Water Resources Institute, University of Kansas

The Kansas Water Resources Research Institute was established by the Board of Regents October 31, 1964, at Kansas State University after Congress passed the Water Resources Research Act of 1964. By Regents' stipulation, Kansas State University and the University of Kansas 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

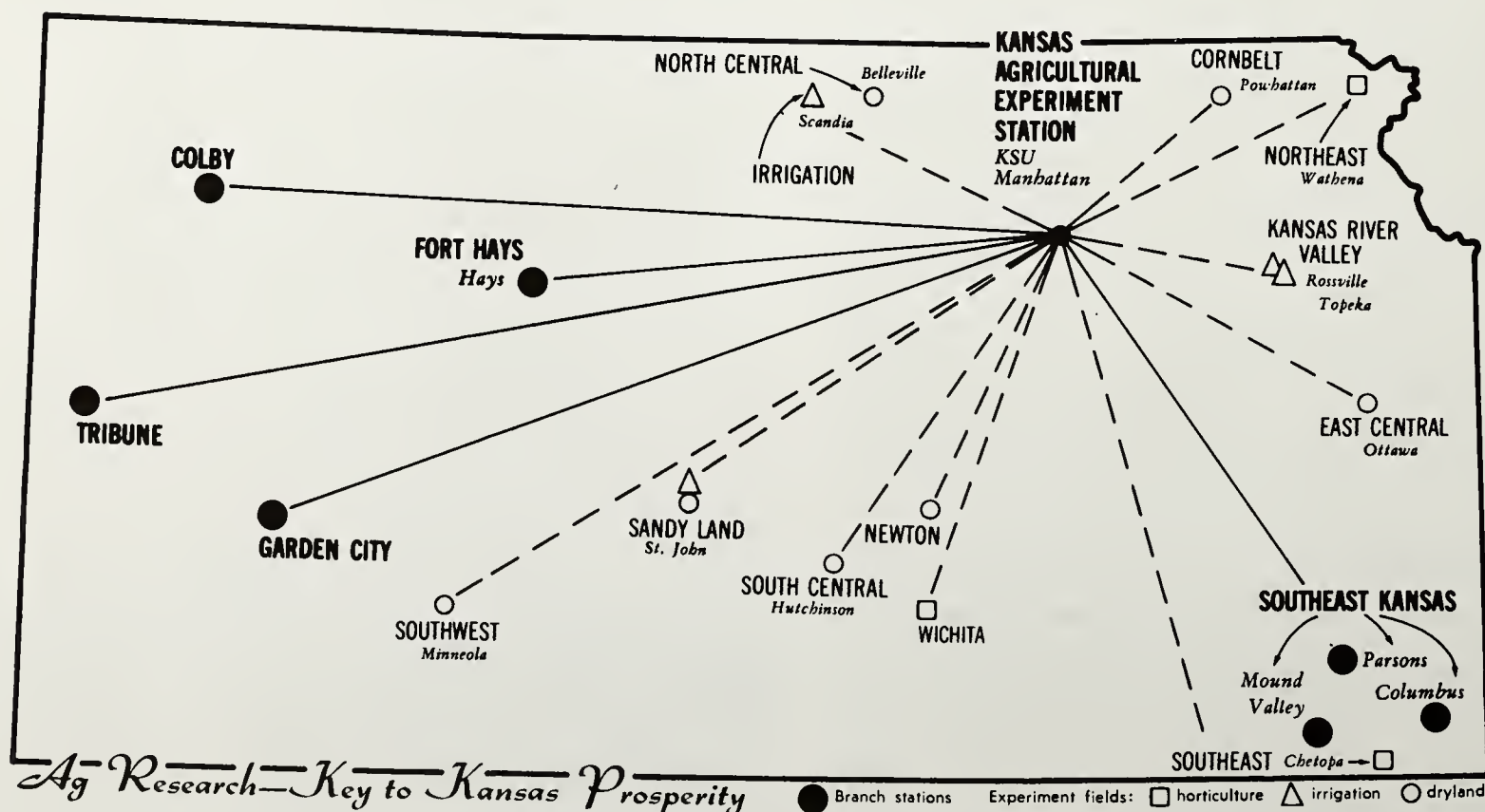
Leonard W. Schruben, Associate Director

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

A. D. Dayton, Acting 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.





# division of cooperative extension

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 instructions from members of the faculty in the Division of Cooperative Extension. They become, in effect, assistant instructors without pay.



Extension agents extend information through the newspapers, farm 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 such 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.

## **STAFF AND PROGRAM DEVELOPMENT**

Robert L. Johnson, State Leader

Professors Johnson and Prawl; Assistant Professor Jorns.

The Department of Staff and Program Development has responsibilities in program development, orientation and induction training of new staff, coordination of in-service training, scheduling of specialists, advanced study of staff, recruitment of county Extension staff and other duties related to staff and program development.

The Cooperative Extension Service's educational program must constantly be oriented toward the most current and pressing problems facing people. This requires a systematic, orderly procedure of program development throughout the Extension Service. It must be a continuous process that helps people identify their problems as individuals and as members of their community.

In-service training is the means by which the Extension Service modifies and retools its staff for meeting new challenges. An excellent foundation is provided by academic course work in a college or university, but this must be built upon throughout a professional Extension worker's career. One of the major purposes of the department is helping professional staff experience satisfaction and growth through professional improvement programs.

Staff development includes recruitment and selection of qualified staff for professional county Extension positions vacated by retirements, resignations and transfers. It also consists of pre-service, induction, in-service and graduate training.

Extension education courses are taught for undergraduates at the pre-service level 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, taught by experienced staff, are designed to help each new staff member become a successful Extension educator.



In-service training schools for county, area and state staff members are an important, integral part of the Extension Service. In subject 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. Extension personnel are informed of opportunities for graduate study and of available fellowships and scholarships. Each professional Extension worker is encouraged to maintain a professional improvement plan to give direction to his or her efforts.

## EXTENSION INFORMATION

Kenneth E. Thomas, Head of Department

State Leader and Director, Division of University Communications

The state leader of the Department of Extension Information also is the director of the Division of University Communications. 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 Instructional Media and Special Projects.

### Offices of Extension Radio-Television-Film, Extension News, Extension Publications, and Extension Instructional Media and Special Projects

Jack M. Burke, Associate State Leader and Manager, Radio Station KSAC

Chester R. Unruh, Associate State Leader and Extension Editor, Publications

Ralf O. Graham, Associate State Leader and Extension Editor, Instructional Media and Special Projects

Associate Professors Burke, Graham, Parris, Springer, Titus, and Unruh; Assistant Professors DeWeese, Kahl, Kuehn, Medlin, Musil, Nelson, Peck, Sampson, Stockard, Sullins, Tennant, and Wright; Instructors Ballou, Blevins, Brewer, Crawford, Dierking, Harmes, and Nagel; Emeritus: Professor Warner and Associate Professors Dexter and 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.

## EXTENSION AGRICULTURAL PRODUCTION PROGRAMS

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 proper management and conservation of fields and forests—as related to commercial production and recreation—to gain clientele and legislative approval and support.

### Extension Agronomy

Hyde S. Jacobs, Head of Department  
Frank G. Bieberly, Section Leader

Professors Bieberly, Jacobs, and Jones; Associate Professors Dicken, Edelblute, Nilson, Peterson, and Whitney; Assistant Professors Kilgore, Nuttelman, and Reinhardt. Emeritus: Professors Cleavinger and Lind; Associate Professor Harper.

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.

### Extension Animal Science and Industry

Don L. Good, Head of Department  
Wendell A. Moyer, Section Leader

Professors Good and Moyer; Associate Professors Francis, Westmeyer, and Zoellner; Assistant Professors Corah, Orwig, Schafer, Schwartz, and Spaeth; Extension Assistant Neal. Emeritus: Professor 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 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.** Extension dairy specialists provide information which enables Kansas families to maintain efficient dairy operations. A dividend of this educational input is the participation of Kansas dairymen in community, state and national affairs. The leadership and direction of specialists has resulted in constructive and dynamic dairy programs in all areas of the state where dairying is a viable enterprise. An undergirding force to progress is the specialists' supervision of 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; Associate Professor Brooks, Assistant Professor Mock.

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

Professor Morrison; Assistant Professors Leuthold, Marr, and vander Hoeven.

Programs in Extension Horticulture and Landscaping 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 or family gardens.

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 located 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

Lindsey Faulkner, Head of Department

Professor Faulkner; Associate Professor Willis; Assistant Professor Claflin; Emeritus: Professor King.

The purpose of the work by Extension specialists in plant pathology is to keep the people of Kansas informed about the occurrence and nature of plant diseases and economic means for their control. This includes diseases of field crops, vegetables, fruits, trees, flowers, lawngresses and shrubs.

The specialists, working with the county Extension agents, furnish plant disease information to rural and urban 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 com-



mercial 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.

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 Johnson and Wendling; Associate Professors Holmes and Schindler; Assistant Professors Hay, Jepsen, Murphy and Pope; Extension Assistant Schrock. 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 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.

### **EXTENSION COMMUNITY RESOURCE DEVELOPMENT AND ECONOMIC PROGRAMS**

Oscar W. Norby, Assistant Director, Professor

#### **Extension Community Resource Development**

Oscar W. Norby, Assistant Director, Professor  
Assistant Professors Baker, Eberle, Frazier

The Community Resource Development Program consists of four major thrusts in Kansas. The first of these is people building including improved education, health, cultural and intellectual satisfactions, recreation and leadership development. The second is the improvement of quality of life facilities including such things as water systems, fire protection, police protection, recreational facilities, health facilities, and waste disposal. Environmental protection and improvement is third. It involves clean air and water, maintenance of our forests and range lands and conservation of land and water resources. Economic development to attract industry and laborers to rural areas with emphasis on agri-business and closely related industries is fourth. The Community Resource Development staff works with Area Specialists, County Extension Agents, local leaders, civic and governmental agencies and lay organizations to strengthen communities, promote nonfarm employment and improve agriculture.

#### **Extension Agricultural Economics**

Paul L. Kelley, Head of Department, Professor  
Norman V. Whitehair, Assistant Head, Professor

#### **Farm Management**

Associate Professors Bogle, Figurski, Langemeier, McReynolds, and Schlender; Assistant Professors Overley, Pretzer, and Treat; Instructors Allen, Appleby, Bratcher, Collins, DeLano, Dickson, Everson, Faidley, Frederick, Germann, Green, Greene, Guy, Hackler, Herod, Janssen, Mullen, Nelson, Parker, Reimer, Smith, Stielow, and Urban. Emeritus: Professors Coolidge and Thomas.

The Extension educational program in farm management is divided into two sections: Kansas Farm



Management Association Programs and Area Farm Management Programs.

In the Kansas Farm Management Association Program, the 23 area 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 fieldman 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 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 Marketing

Associate Professors Jackson and Walker; Assistant Professors Fenwick, Frederick, and Kropf.

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 activities. 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.

Educational work also is conducted in (1) grain marketing in the areas of grain quality and transportation and (2) processing and utilization through milling and baking.

### EXTENSION HOME ECONOMICS

Betty Jean Brannan, Assistant Director

Professors Brannan and Ellithorpe; Associate Professors Anderson, Johnson and Redeker; Assistant Professors Atkinson, Brill, Carlson, Howe, Meyer, Miller, Slinkman, Spoon and Zimmerman; Extension Associate Clarke. Emeritus: Professors Allen, Koenig, and Smurthwaite; Associate Professors Dickinson, Self, and Wiggins; Assistant Professors Briggs, Guthrie and Starkey.

Educational programs designed to improve the quality of living are carried on in each Kansas County under the direction of Extension Home Economics.

Program emphases are in the areas of: development of children and youth; adjustments in everyday living; adjustments in marital and parental roles; preparation for retirement years; changing roles of women; management in allocation of family resources; family financial security; money management; consumer performance in the market; nutrition and health; food safety and sanitation; health hazards in the home; community health hazards; home selection, building, buying, and remodeling (design, materials, finishes, lighting, etc); housing costs and finance; community factors in housing decisions; furnishing and equipping the home; and developing community economic, social, cultural, human resources including understanding public concerns affecting families, expansion and improvement of cultural opportunities 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 Professors Clonts and Wells; Instructor Penner.

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 designated counties throughout Kansas.

### 4-H AND OTHER YOUTH PROGRAMS

Glenn M. Busset, Head of Department

Professors Apel and Busset; Associate Professors Bates, Eystone, and Hanna. 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 agricultural, homemaking, community service, health, music, education, safety, conservation, 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 agricultural production, home living and personal development.

Each local 4-H club elects its own officers who conduct club meetings with guidance of volunteer adult leaders. The 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 35,000 boys and girls enrolled in 1,050 4-H Clubs, another 16,000 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, pig and poultry clubs were among the first educational groups that had affiliation with the University.



It soon became evident that the educational development of boys and girls was of greater importance than the spread of improved farm and home practices. 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 all young people and to provide opportunities for them to participate with their parents and friends in the adoption of better farm, home and personal practices.

A later development, extending 4-H work around the world, is the International 4-H 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 FIELD OPERATIONS

**Area Extension Offices.** Five Area Extension Offices are located in different parts of the state 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.

### **Southwest Area Extension Office, Garden City**

Ray H. Mann, Area Extension Director

Associate Professors Bogle, Edelblute, Francis, Hendrix, Mann, Neufeld, and Whipps; Assistant Professors Mock and Pope; Instructors Baughman, Germann, Herod, Janssen, and Trayer.

### **Northwest Area Extension Office, Colby**

Philip B. Finley, Area Extension Director

Associate Professor Finley; Assistant Professors Atchison, Goertz, Overlay, Reinhardt, Schroeder, Schwartz, and Sisk; Instructors Faidley, Reimer, and Urban.

### **South Central Area Extension Office, Hutchinson**

Lawrence J. Cox, Area Extension Director

Professor Cox; Assistant Professors Deutsch, Goetting, Lindsey, McReynolds, Nuttelman, and Orwig; Instructors Albright, Allen, Collins, Frederick, Whitson, and Wiggins.

### **Northeast Area Extension Office, Manhattan**

Richard F. King Jr., Area Extension Director

Associate Professors Borst, Delano, Dicken, Figurski, King, and Utermohlen; Assistant Professor Crist; Instructors Biles, Dickson, Everson, Geisler, Greene, Hackler, Parker, Smith, and Stielow.

### **Southeast Area Extension Office, Chanute**

Ray M. Hoss, Area Extension Director

Associate Professors Hoss and Westmeyer; Assistant Professors Appleby, Bittel, Kilgore, Robbins, Rowland, Spalding, and Treat; Instructors Appleby, Bratton, Guy, Mullen, and Nelson.

**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.



# KSU faculty and administration

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, 1975. 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.
- ARHEART, KRISTOPHER L. Instr. and Mgr. of Information Services, Computing Center (1973). BS 1970, MS 1973, Kan. St. Univ.
- AYRES, JANET SPRANG, Asst. Dir. of Alumni Relations (1970, 1973). BS 1970, Kan. St. Univ.
- BEATTY, DANIEL D., Vice Pres. for Business Affairs, Prof. of Business Administration (1956, 1959, 1972). AB 1947, Hope Col.; MBA 1949, Univ. of Mich.
- 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)
- CONROW, KENNETH, Asst. Dir. and Mgr. of User Services, Computing Center (1974). Assoc. Prof. of Computer Science (1961, 1964). BA 1954, Swarthmore Col.; PhD 1957, Univ. of Ill. (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, Assoc. Dir. of Records, Instr. (1968). BS 1959, Northwest Mo. St. Col.; MS 1964, Okla. St. Univ.
- DEVORE, JOHN J., Instr., Mgr. of Programming Services, Computing Center (1973). BS 1970, MS 1973, Kan. St. Univ.
- DODGE, THEODORE O., Dir., Budget Office, Asst. Prof. (1946, 1957). BS 1940, Kan. St. Univ.; CPA 1954, Kansas.
- ELKINS, RICHARD NELSON, Dir. of Admissions, Instr. (1966, 1968). BS 1956, MS 1963, Kan. St. Univ.
- ERNST, SANDRA, Univ. Publications Editor (1974). BJ 1965, Univ. of Mo.; MS 1970, 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)
- IRVIN, H. HUGH, Instr., Computing Center (1973). BS 1972, Kan. St. Univ.
- KEPPLE, MELVIN T., Dir., Instr., 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.
- LIPP, MARK E., Instr., Computing Center (1972). BS 1969, Kan. St. Univ.
- McCAIN, JAMES ALLEN, President Emeritus (1950). AB 1926, LLD 1951, Wofford Col.; MA 1929, Duke Univ.; EdD 1948, Stanford Univ.; LLD 1964, Univ. of Mont.; DSc 1967, Andhra Pradesh St. Univ. (India), 1967; LLD 1965, Colo. St. Univ.
- MILBOURN, MAX W., Asst. to the Pres., Assoc. Prof. of Journalism (1957, 1949). 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, MS 1960, Iowa St. Univ.
- MURRY, JOHN P., Asst. Dean of the Grad. School, Asst. Prof. (1957, 1973). BS 1955, Rockhurst Col.; MS 1960, PhD 1971, 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)
- PERRY, RALPH H., Comptroller, Asst. Prof. (1946, 1953, 1962). BS 1946, Kan. St. Univ.
- RASCH, CARLA R., Asst. Dir. of Admissions, Instr. (1974). BSC 1967, Kan. St. Teach. Col. MS 1971, 1972, 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.
- RUGGLES, BERTRAM L., Dir., Employee Relations, Asst. Prof. (1972). BS 1942, Iowa St. Univ.; MS 1950, American Univ.
- SCHWAB, MERLE E., Instr., 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.
- STONE, R. GLEN, Dir., Office of Sports Information, Instr. (1973). BS 1967, Univ. of Okla.
- SWITZER, VERYL A., Assoc. Dean for Univ. Minority Affairs, Asst. Prof. (1969, 1973). BS 1954, Kan. St. Univ.
- 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.
- THOMAS, KENNETH EUGENE, Dir., Division of Univ. Communications, Prof. (1951, 1962). BA 1951, Southwestern Col.; MS 1952, Kan. St. Univ.; PhD 1961, Univ. of Wis. (GF)
- THOMPSON, DOROTHY, Dir. of Affirmative Action for Women, Instr. (1972). BS 1959, Wis. St. Univ.; MA 1965, Univ. of Wyo.
- WEBER, ARTHUR D., Vice Pres. Emeritus (1924, 1963). BS 1922, MS 1926, Kan. St. Univ.; PhD 1940, DSc 1950, Purdue Univ.
- YOUNG, PAUL M., Vice Pres., Univ. Development, Prof. of Mathematics (1947, 1970). AB 1937, Miami Univ.; MA 1939, PhD 1941, Ohio St. Univ. (GF)



## Library Faculty

BATSON, CONNIE HINES, Instr., Univ. Library (1973). BME 1965, Univ. of Kan.; MLS 1973, Kan. St. Teach. Col.

BLANDING, SYLVIA J., Instr., Univ. Library (1972). BA 1970, Kan. Wesleyan; MLS 1971, Kan. St. Teach. Col.

BOTHE, JEANE K., Instr., Univ. Library (1974). BS 1971, Marquette Univ.; MLS 1972, Univ. of Md.

DOBBYN, MARGARET L., Instr., Univ. Library (1970). BS 1942, Okla. St. Univ.; MSLS 1966, Univ. of Okla.

ELDER, NELDA J., Instr., Univ. Library (1972). BA 1963, Wichita St. Univ.; MLS 1970, Kan. St. Teach. Col.

ERICKSON, VALERA L., Instr., Univ. Library (1974). BS 1972, MLS 1974, Univ. of Me.

FINNERAN, DIANA M., Instr., Univ. Library (1972). BA 1971, MLS 1972, Kan. St. Teach. Col.

FRANCO, CAROLE A., Instr., Univ. Library (1971). AB 1968, Baker Univ.; MLS 1969, Kan. St. Teach. Col.

FRIESNER, VIRGINIA G., Instr., Univ. Library (1972). BA 1971, Kan. Wesleyan; MLS 1972, Univ. of Ill.

HOLTZ, JEROME E., Instr., Univ. Library (1974). BA 1972, Penn. St. Univ.; MLS 1974, Univ. of Pittsburgh.

JOHNSON, JOHN L., Instr., Univ. Library (1969). BA 1967, MA 1973, Kan. St. Univ.

LEVINSON, MARILYN I., Instr., Univ. Library (1972). BA 1971, Indiana Univ.; MA 1972, Univ. of Wis.

LEWIS, ALVIN, Instr., Univ. Library (1973). BS 1969, MS 1970, Kan. St. Univ.

LITCHFIELD, MEREDITH C., Asst. Prof., Univ. Library (1967, 1970). BS 1950, MS 1967, Kan. St. Teach. Col.

LU, JAMES Y., Instr., Univ. Library (1969). BA 1960, Tamkang Col.; MLS 1965, MS 1970, Kan. St. Teach. Col.

MORELAND, RACHEL S., Instr., Univ. Library (1971). BS 1955, Univ. of Ariz.; MS 1970, Kan. St. Univ.

OWSLEY, CAROL L., Instr., Univ. Library (1932, 1947). BS 1932; MS 1947, Kan. St. Univ.

QUIRING, VIRGINIA M., Instr., Univ. Library (1971). BA 1943, Ottawa Univ.; MLS 1971, Kan. St. Teach. Col.

RAUSCH, G. JAY, Prof., Dean, Univ. Libraries (1973). BA 1955, North Central Col.; MA 1958, PhD 1960, MLS 1961, Univ. of Ill.

RICHARDS, ARNE H., Asst. Prof., Univ. Library (1965). BA 1954, Yankton Col.; MSLS 1960, Univ. of Ill.

ROHRER, RICHARD L., Asst. Prof., Univ. Library (1968). BS 1960, MLS 1968, Kan. St. Teach. Col.

SCOTT, ANN, Instr., Univ. Library (1973). BA 1964, MA 1970, Kan. St. Univ.

SODERHOLM, DOROTHY J., Asst. Prof., Univ. Library (1966, 1972). BA 1946, Kearney St. Teach. Col.; MA 1956, Wheaton Col.; MS 1959, Univ. of Ill.

TAYLOR, ELLYN M., Asst. Prof., Univ. Library (1957, 1958). BS 1938, Kan. St. Teach. Col.

VANDER VELDE, JOHN J., Asst. Prof., Univ. Library (1968). BA 1967, ML 1968, Kan. St. Teach. Col.

VOTH, SALLY J., Instr., Univ. Library (1974). BA 1962, Kan. St. Univ.; MS 1973, Kan. St. Teach. Col.

WANCURA, ELTON 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., Asst. Prof., Univ. Library (1967). BA 1965, Avila Col.; MLS 1967, Rosary Col.

WILLIAMS, EVAN W., Asst. Prof., Univ. Library (1964, 1971). AB 1955, Washington Univ.; MLS 1956, Univ. of Ill.

## Student Personnel Services Faculty

AKIN, JAMES N., Assoc. Dir., Career Planning and Placement Center (1966). BS 1960, MS 1964, Kan. St. Univ.

BEATY, JAMES R., Assoc. Prof., Student Health Center (1974). BS 1953, Va. Poly. Inst.; MD 1960, Univ. of Va.; Pediatric Residency 1963, Univ. of Okla.

BERGEN, GERALD R., Dir., Aids, Awards and Veterans Service (1965, 1969). BS 1958, MS 1967, Kan. St. Univ.

BRADSHAW, MICHAEL H., Asst. Dir., Health Education Section, Student Health Center, Instr. (1971). BS 1968, MHEd 1971, Brigham Young Univ.

BRETTELL, J. ALLAN, Foreign Student Adviser, Asst. Prof., Center for Student Development (1966). BA 1949, MS 1951, Westminster Col.

BROWN, ROBERT M., Assoc. Prof., Student Health Center (1972). BS 1954, Kan. St. Univ.; BA 1959, MD 1963, Univ. of Kan.

CANADA, RICHARD M., Asst. Prof., Center for Student Development (1973). BA 1964, Ottawa Univ.; MS 1967, Kan. St. Teaches Col.; EdD 1972, Ind. Univ.

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, Director Emeritus of Housing (1974). Assoc. Prof. of Psychology (1945, 1949). BS 1941, MS 1946, Kan. St. Univ.

FRITH, THOMAS J., Dir. of Housing, Asst. Prof. (1965). BA 1960, MA 1963, EdS 1965, Univ. of Iowa.

GAUTHIER, EVELYN J., Asst. Prof., Student Health Center (1974). BA 1967, Occidental Col.; MA 1969, Ohio St. Univ.

GEISSLER, VERNON V., Assoc. Dir., Career Planning and Placement Center (1966). BS 1942, MS 1966, Kan. St. Univ.

HARMS, WILLIAM B., Intramurals Coordinator (1974). BA 1968, Kearney St. Col.; MA 1971, Colo. St. Univ.

HAWKINS, BEVERLEY O., Instr., Center for Student Development (1974). BA 1971, Kan. St. Univ.; MA 1973, Univ. of Minn.

HERMES, STEVEN E., Asst. Dir., K-State Union (1973). BA 1969, MS 1971, Kan. St. Univ.

HILL, CYNTHIA J., Dietitian, Instr., Housing and Food Service (1968, 1971). BS 1965, Ohio Univ.; MS 1973, Kan. St. Univ.

INGALSBE, NOALEEN G., Dietitian, Instr. (1972). BS 1969, Iowa St. Univ.

KERR, WENDELL ROBERT, Asst. Dir., Housing and Food Service, Asst. Prof. of Education (1947, 1957). BS 1947, MS 1951, Kan. St. Univ.

LACY, BURRITT S., JR., 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, MS 1972, Kan. St. Univ.

MITCHELL, SHARLENE K., Residence Hall Dir., Instr. (1969). BS 1968, MS 1971, Kan. St. Univ.

MOLT, MARY, Dietitian, Instr. (1973). BS 1971, Kearney St. Col.; MS 1973, Okla. Univ.

NELSON, LESLIE B., Assoc. Prof., Student Health Center (1974). AB 1950, MD 1955, Univ. of Kan.

NOLTING, EARL, JR., Director, Center for Student Development, Dean of Students, Assoc. Prof. (1974). BS 1959, MS 1961, Ind. Univ.; PhD 1967, Univ. of Minn.

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., Dir., Recreational Services (1970, 1973). BS 1965, MS 1970, Kan. St. Univ.

ROOF, DONALD B., Residence Hall Dir., Instr. (1964). BS 1964, Kan. St. Univ.

SCHULZ, MILLARD E., Assoc. Prof., Lafene Student Health Center (1975). BS 1939, MD 1945, Univ. of Kan.

SHERRARD, PETER A. D., Asst. Prof., Center for Student Development (1973). AB 1961, Wheaton Col.; MDiv 1967, ThM 1971, Princeton Univ., EdD 1973, Univ. of Mass.

SILLS, JACK L., Asst. Dir., K-State Union (1973). AB 1958, Kan. Wesleyan 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 Complex Coord., Instr. (1968). BS 1964, MS 1970, 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., Assoc. Dean for Univ. Minority Affairs, Asst. Prof. (1969, 1973). BS 1954, MS 1974, Kan. St. Univ.

TIEMANN, WILLIAM H., Assoc. Prof., Lafene Student Health Center (1973). BS 1963, MD 1967, Univ. of Neb.; MPH 1971, Univ. of Okla.

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.

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., Assoc. Prof. of Animal Science and Industry (1970, 1973). 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., Assoc. Prof. of Animal Science and Industry; Research Environmental Physiologist and Sheep 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.
- ARMBRUST, DEAN V., Instr. of Agronomy; Research Soil Scientist, Wind Erosion Laboratory, U.S.D.A., Agricultural Research Service (1968). BS 1960, MS 1961, PhD 1973, 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 1951, Pa. St. Univ.; MS 1917, Kan. St. Univ.; PhD 1931, Univ. of Minn.
- AXELTON, MILBURN 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.
- 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.
- BECK, GLENN H., Prof. of International Agriculture (1936, 1975). BS 1936, Univ. of Idaho; MS 1938, Kan. St. Univ.; PhD 1950, Cornell Univ. (GF)
- 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, Assoc. Prof. of Agricultural Economics; Research Agr. Econ. Natural Resources; Regional and Community Dev., Agr. Exp. Sta. (1968, 1973). BS 1963, Univ. of Neb.; MA 1967, PhD 1968, Univ. of Calif. (GF)
- BILDERBACK, THEODORE E., Instr. of Horticulture and Forestry (1974). BS 1970, MS 1973, Kan. St. Teachers Col.
- 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.
- BOROVSKY, DAVID G., Asst. Prof.; Irrigation Research Scientist, Colby Branch Agr. Exp. Sta. (1971). BS 1970, MS 1972, Tex. A and M Univ.
- BORN, 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)
- 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, Okla. 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; Crop Scientist, Kansas Crop Improvement Association; Agr. Exp. Sta. (1965, 1973). 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.
- 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.
- CLAYBERG, CARL D., Assoc. Prof. of Horticulture and Forestry, Research Horticulturist, Vegetable Crop Geneticist, Agr. Exp. Sta. (1974). BS 1954, Univ. of Wash.; PhD 1958, Univ. of Calif.
- CLAYDON, THOMAS J., Prof. of Dairy and Poultry Science Emeritus (1946, 1975). BSA 1934, Univ. of Saskatchewan (Canada); MS 1936, PhD 1939, Iowa St. Univ.
- 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.
- 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.
- DENEKE, FREDERICK J., Asst. Prof. of Horticulture and Forestry; Research Forester, Tree Improvement, Agr. Exp. Sta. (1973). BS 1967, Colo. St. Univ.; MS 1969, PhD 1972, Kan. St. Univ.
- 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.
- DETWILER, MILTON D., Instr. of Dairy and Poultry Science, Kansas Artificial Breeding Service Unit (KABSU), Agr. Exp. Sta. (1973). BS 1973, Kan. St. Univ.
- DEYOE, CHARLES W., Prof. of Grain Science and Industry; Feed Technology Research Scientist, Agr. Exp. Sta. (1962, 1968). BS 1955, Kan. St. 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)
- EHLE, STANLEY W., Asst. Prof. of Agronomy; Weed Control Research Scientist, Agr. Exp. Sta. (1972). BS 1962, MS 1964, Univ. of Southern Ill.; PhD 1974, 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)
- ELZINGA, RICHARD J., Prof. of Entomology; Research Entomologist, Medical Insects and Mites, Agr. Exp. Sta. (1961, 1973). 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.
- ESHBAGH, ELBERT L., Asst. Prof. of Entomology; Research Entomologist, Alfalfa Weevil; Crop Pests, Agr. Exp. Sta. (1945, 1952). BS 1936, MS 1951, Kan. St. Univ.
- EUSTACE, WALTER D., Assoc. Prof. of Grain Science and Industry; Milling Technology Research Scientist, Agr. Exp. Sta. (1973). BS 1959, MS 1962, PhD 1967, Kan. St. Univ.
- EVERSMAYER, MERLE G., Asst. Prof. of Plant Pathology; Research Cereal Rust Plant Pathologist, U.S.D.A., Agricultural Research Service (1965). BS 1966, MS 1969, PhD 1971, Kan. St. Univ. (GF) (Courtesy Appointment)
- 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)
- FAULKNER, LINDSEY R., Prof.; Head of Department of Plant Pathology; Research Plant Nematologist, Agr. Exp. Sta. (1973). BSA 1952, MS 1954, Colo. St. Univ.; PhD 1959, Univ. of Wis. (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, Kansas Wesleyan Univ.; BS 1936, MS 1937, Kan. St. Univ. (GF) (Courtesy Appointment)
- 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 (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.
- 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.
- HAGEN, 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)
- 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, Okla. St. 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.**, Asst. Prof. of Animal Science and Industry (1966, 1973). 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, Radioisotope 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, Host-plant 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, Newton Experiment Field (PO Newton), Agr. Exp. Sta. (1970). BS 1955, MS 1965, Colo. St. Univ.; PhD 1970, Univ. of Wis.
- 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., 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)
- KADOUM, AHMED M.**, Asst. Prof. of Entomology; Research Entomologist in charge Pesticide Residue Analysis Laboratory, Toxicology, 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; Animal Research Physiologist, Agr. Exp. Sta. (1966, 1969). BS 1958, MS 1960, Va. Polytechnic Inst.; PhD 1965, Kan. St. Univ. (GF)
- KNIGHT, CHARLES W.**, Instr. of Agronomy; Research Agronomist in charge, East Central Experimental Field (P.O. Ottawa), Agr. Exp. Sta. (1973). BS 1970, MS 1971, Kan. St. Univ.
- 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, 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 1956, Univ. of Calif. (GF)
- KOUDELE, JOSEPH WENDELL**, Assoc. Prof. of Agricultural Economics; Research Agr. Econ., Consumption Economics and Marketing, Agr. Exp. Sta. (1947, 1958). BS 1943, Univ. of Neb.; MS 1947, Univ. of Minn.; PhD 1956, Mich. St. Univ. (GF)
- KROPP, 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 Fla.; 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. (GF)
- LUNDQUIST, MARVIN C.**, Asst. Prof. of Agronomy; Research Agronomist, Sandlyand 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 Mass.
- 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)
- MAHAFFEY, BEN D.**, Asst. Prof. of Horticulture and Forestry (1972). BS 1963, Colo. St. Univ.; MS 1969, PhD 1972, Tex. A & M Univ. (GF)
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- MARTIN, TERRY J.**, Res. Assoc.; Research Plant Pathologist, Host-Parasite Geneticist Fort Hays Branch Agr. Exp. Sta. (1974). BS 1970, KSC of Pittsburg; MS 1971, Kan. St. Univ.; PhD 1974, Mich. St. Univ.
- 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)
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- 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)
- MCGAUGHEY, WILLIAM H.**, Asst. Prof. of Entomology; Research Entomologist, U.S.D.A. Agricultural Research Service (1973). BS 1963, Tex. Tech. Col.; MS 1965, PhD 1967, Iowa St. Univ. (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.
- 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.
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- 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 1964, Kan. St. Univ. (GF)
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- 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., Assoc. Prof., Asst. Dean, Col. of Agriculture (1965). BS 1959, Kan. St. Univ.; MS 1962, Univ. of Wis.; PhD 1969, Kan. St. Univ. (GF)
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- 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. of Agronomy (1947, 1974). AB 1939, N.D. School of Forestry; BS 1941, N.D. St. Col.; MS 1942, PhD 1947, Univ. of Wis. (GF)
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- 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.
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- 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)
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- POWERS, WILLIAM L., Assoc. Prof. of Agronomy; Dir., Kan. Water Resources Research Institute; 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., Assoc. Prof. of Agronomy; Research Agronomist in charge, Irrigation Experimental Field (P.O. Scandia), Agr. Exp. Sta. (1953, 1974). BS 1952, MS 1954, Kan. St. Univ.
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- 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)
- RILEY, JOHN B., Asst. Prof. of Agricultural Economics; Research Agr. Econ., Agribusiness Management, Agr. Exp. Sta. (1973). BS 1969, MS 1971, Va. Polytechnic Inst. and St. Univ.; PhD 1974, Okla. St. Univ.
- 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.; BA 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)
- 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; Animal Breeding Research Scientist, Agr. Exp. Sta. (1966, 1970). BS 1963, Colo. St. Univ.; MS 1966, PhD 1966, Va. Polytechnic Inst. (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 Mo.; MS 1967, PhD 1972, Okla. St. Univ. (Courtesy Appointment)
- SCHRUBEN, LEONARD WILLIAM, Prof. of Agricultural Economics; Research Agr. Econ. Grain Marketing; Associate Dir., Food and Feed Grain Institute, Agr. Exp. Sta. (1949, 1951). BS 1939, Kan. St. Univ.; MS 1940, Univ. of Illinois; MPA 1948, MA 1949, PhD 1949, Harvard Univ. (GF)
- SCHWENK, FRED W., Assoc. Prof. of Plant Pathology; Research Soybean Pathologist, Agr. Exp. Sta. (1969, 1974). 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 Wash.; MS 1930, Kan. St. Univ.; PhD 1933, Univ. of Minn.
- 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 (P.O. Powhattan), Agr. Exp. Sta. (1936, 1967). BS 1938, MS 1941, Kan. St. Univ.
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- SMITH, ROGER CLETUS, Prof. of Entomology Emeritus (1920, 1958). AB 1911, Miami Univ.; AM 1915, Ohio State Univ.; PhD 1917, Cornell Univ.
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- 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.
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- 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, Wash. St. Univ.; PhD 1963, Purdue Univ. (GF)
- THIEN, STEPHEN J., Asst. Prof. of Agronomy; Research Soil Scientist, Agr. Exp. Sta. (1970). BS 1966, Iowa St. 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 1947, Univ. of R.I.; PhD 1953, Cornell Univ. (GF)



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**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)

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**BURTON, CHARLES L.**, Asst. Prof. of Construction Science (1970). BS in CE 1963, Kan. St. Univ. Registered Professional Engineer.

**CHANG, AMOS I. T.**, Prof. of Architecture (1966). BS Civil Engg. 1939, National Chung Kung 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.**, Assoc. Prof. of Landscape Architecture (1966, 1973). 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). Dir. of the Center for Community Planning (1966). BS 1952, MRP 1961, Kan. St. Univ. Registered Professional Engineer, 1952. (GF)

**DESMARIS, PAUL A.**, Asst. Prof. of Architecture (1973). BArch 1969, Univ. Virginia; MArch 1974, Univ. Calif.

**DEVILBISS, EDWARD A.**, Visiting Assoc. Prof. of Architecture (1975). BArch Eng. 1953, Univ. of Colo.

**DUNBAR, THOMAS R.**, Asst. Prof. of Landscape Architecture (1973). BSLA 1969, Iowa St. Univ.; MSLA 1974, Univ. Wisc.

**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. (GF)

**EALY, ROBERT P.**, Prof. of Landscape Architecture; Dir. of the Curriculum in Landscape Architecture (1961). Head, Department of Landscape Architecture (1969). BS 1941, Okla. St. Univ.; MS 1946, Kan. St. Univ.; PhD 1955, La. St. Univ. Registered Landscape Architect. (GF)

**ERNST, F. GENE**, Assoc. Prof. of Architecture (1967, 1972). BArch 1953, Kan. St. Univ.; MArch (Urban Design) 1971, Univ. of Wash. Registered Architect. (GF)

**EVANS, ELINOR L.**, Visiting Prof. of Pre-Design Professions (1974). BA 1938, Okla. St. Univ.; MFA 1954, Yale Univ.

**FISCHER, EMIL C.**, Prof. of Architecture (1955, 1963). AB 1930, Columbia Col.; BS in Arch. 1932, MS in Arch. 1933, Columbia Univ. Registered Architect. (GF)

**FOERSTER, BERND**, Prof., Dean, Col. of Architecture and Design (1971). BS in Arch. 1954, Univ. of Cincinnati; MArch 1957, Rensselaer Polytechnic Institute. (GF)

**FRIEDBERG, LAWRENCE P.**, Asst. Prof. of Architecture (1974). BArch 1965, Univ. of Okla.; MS Arch 1975, Cornell Univ.

**GODDARD, JAMES F.**, Asst. Prof., Building Construction (1972). BSBC 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. (GF)

**HASTINGS, ALLAN J.**, Asst. Prof. (temporary) of Interior Architecture (1973). BArch 1958, Kan. St. Univ.; BPA 1963, L.A. Art Center School.

**HEINTZELMAN, JOHN CRANSTON**, Prof. of Architecture (1947, 1954); Assoc. Institute for Environmental Research. BArch 1938, Mass. Institute of Technology; MArch 1941, Columbia Univ. Registered Architect. (GF)

**JAHNKE, WILLIAM R.**, Prof. of Construction Science (1968, 1974). Asst. Dean, Col. of Architecture and Design (1970). BSME 1948, Duke Univ. Registered Prof. Engineer. (GF)

**KEITHLEY, CLAUDE A.**, Asst. Prof. in Planning (1970, 1973). BArch 1965, MRCP 1973, MArch 1974, Kan. St. Univ.

**KELLER, JOHN W.**, Asst. Prof., Regional & Community Planning (1972). BA 1967, St. Benedict's; MA 1968, Kan. St. Univ.; MS 1971, PhD 1974, Rutgers Univ.

**KREMER, EUGENE R.**, Assoc. Prof. (1973); Head, Department of Architecture (1974). BArch 1960, Rensselaer Polytechnic Institute; MArch 1967, Univ. of Calif. Registered Architect. (GF)

**KRIDER, ALDEN**, Prof. of Pre-Design Professions (1949, 1962). BS Arch. 1933, MS 1955, Kan. St. Univ. Registered Architect. (GF)

**LAW, DENNIS L.**, Asst. Instr. (temporary) of Pre-Design Professions (1974). BS 1967, Texas Tech. Univ.

**LIPPENBERGER, RAY E.**, Asst. Prof. of Architecture (1964). BS 1936, Kan. St. Univ. Registered Architect.

**MARSHALL, THOMAS R.**, Asst. Prof. of Pre-Design Professions (1972). BA 1970, MArch 1972, Syracuse Univ.

**MARTIN, WILLIAM MICHAEL**, Asst. Prof. and Head, Pre-Design Professions (1971). BArch 1969, Univ. of Colo.; MArch 1971, Univ. of Wash.

**MCCORMICK, HUGH T.**, Asst. Instr. (temporary) of Architecture (1974). BArch 1971, Texas Tech. Univ.

**MCDONALD, CHARLES R.**, Instr. of Construction Science (1974). BS 1960, Kan. St. Univ. Registered Professional Engineer.

**MCGRAW, EUGENE THOMAS**, Assoc. Prof. of Architecture & Planning (1958, 1964, 1968). BArch 1957, Okla. St. Univ.; MRP 1963, Kan. St. Univ. (GF)

**MELNICK, ROBERT**, Instr. of Pre-Design Professions (1974). BA 1970, Bard Col.; MLA 1975, State Univ. of N.Y., Col. of Environmental Science and Forestry.

**MURPHY, STEPHEN M.**, Instr. in Interior Architecture (1968). BS 1968, Kan. St. Univ.

**OBLINGER, 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. (GF)

**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. (GF)

**REID, RONALD L.**, Assoc. Prof. of Architecture and Planning (1969). BArch 1962, Kan. St. Univ.; MArch 1968, Univ. of Calif. Registered Architect. (GF)

**SANNER, ALBERT E.**, Assoc. Prof. of Architecture (1963). BSArch 1947, BSArch Engg. 1948, Univ. of Ill.; MArch 1966, Univ. of Neb. Registered Architect. (GF)

**SELFIDGE, O. JOHN**, Asst. Prof. in Architecture and Planning (1969). BA 1959, Kan. Univ.; MCP 1964, Yale Univ. (GF)

**SHEPARD, JIM B.**, Asst. Prof. (1967). BA 1959, Kan. St. Univ. Registered Architect.

**SLACK, EARL REX**, Assoc. Prof. of Architecture (1965, 1969). BArch 1952, Univ. of Okla. Registered Architect.

**SPURGEON, BETTY K.**, Asst. Prof. of Architecture. (1972). BBldgSci 1970, Rensselaer Polytechnic Institute; BArch 1970, Rensselaer Polytechnic Institute; MArch 1972, Columbia Univ.

**STOTESBURY, SIDNEY D.**, Assoc. Prof. of Architecture (1972). BS 1957, Fla. St. Univ.; MA 1969, Univ. of Calif. at Berkeley. (GF)

**THORSON, INGOLF EUGENE**, Prof. of Construction Science (1948, 1951, 1966). Head, Department of Construction Science (1969). BS 1940, Univ. of Wash. Prof. Engineer. (GF)

**TORTI, T. UFERE**, Asst. Prof. of Regional & Community Planning (1973). BA 1967, Macalester Col.; MS 1969, PhD 1974, Univ. of Wis. Registered Planning Consultant. (GF)

**WEIGEL, PAUL**, Prof. of Architecture Emeritus (1921, 1924, 1959). DArch 1912, Cornell Univ. Registered Architect. (GF)

**WEISENBURGER, RAY B.**, Assoc. Prof. of Planning (1964, 1970). BArch 1959, Univ. of Ill.; MRP 1971, Cornell Univ. Registered Architect. Registered Landscape Architect.

**WELLS, WARD V.**, Instr. (temporary) of Interior Architecture (1973). BArch 1973, Kan. St. Univ.

**WENDT, EUGENE G.**, Asst. Prof. of Pre-Design Professions (1962, 1969). BArch 1959, MArch 1970, Kan. St. Univ.

**WINDLEY, PAUL G.**, Asst. Prof. of Architecture (1972). BS 1967, Idaho St. Univ.; BArch 1969, Univ. of Colo.; MArch 1970, Univ. of Mich.; DArch 1972, Univ. of Mich.



## College of Arts and Sciences

- ABERLE, NELLIE**, Prof. of English Emerita (1921, 1959). BS 1912, MS 1914, Kan. St. Univ. (GF)
- ABRAHAM, JUDITH L.**, Asst. Prof. of Art (1970, 1973). A of A 1961, Cottey Col.; BFA 1964, Kansas City Art Institute; MFA 1969, Univ. of Neb.
- ADAMS, MARJORIE**, Asst. Dean; Assoc. Prof. of English (1954, 1961). BA 1941, La. Polytechnic; MA 1948, PhD 1951, Univ. of Tex. (GF)
- ADAMS, MARVIN E.**, Asst. Basketball Coach (1973). BS 1963, Southeastern Okla. St.; MA, 1967, Southeast Mo. St. Univ.
- AHEARN, KERRY**, Asst. Prof. of English (1974). BA 1967, Stanford Univ.; MA 1968, PhD 1974, Ohio Univ.
- 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**, Dir. Women's Athletics. 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. (GF)
- ALEXANDER, LOREN R.**, Asst. Prof. of Modern Languages and Education (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.
- ALSOP, 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, SDC 1933, Univ. of Mich. (GF)
- ANDERSON, BERRY**, Women's Track Coach. BS 1973, Kan. St. Univ.
- 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)
- ANSDELL, ORA JOYE**, Assoc. Prof. of English (1946, 1966). BS 1932, Kan. St. Univ.; MA 1939, Univ. of Mich.; BLS 1946, Univ. of Chicago; PhD 1956, Univ. of Colo. (GF)
- APPLEGATE, ROBERTA G.**, Assoc. Prof. of Journalism and Mass Communications (1964, 1973). AB 1940, Mich. St. Univ.; MS 1942, Northwestern Univ.
- ARMAGOST, JAMES L.**, Asst. Prof. of Speech (1973). BA 1963, Univ. of Calif., Santa Barbara; MA 1972, PhD 1973, Univ. of Wash., Seattle. (GF)
- ASENETA, LYDIA**, Asst. Prof. of Speech (1967, 1973). BS 1949, MA 1958, The National Teachers' Col. of the Philippines; MA 1968, Kan. St. Univ.
- ATKINS, MARTHA A.**, Instr. of Speech (1973). BA 1960, MA 1972, Kan. St. Univ.
- AVERY, MADALYN**, Assoc. Prof. of Physics Emerita (1924, 1946). BS 1924, MS 1932, Kan. St. Univ.
- BABCOCK, MICHAEL W.**, Asst. Prof. of Economics (1972). BSBA 1967, Drake Univ.; MA 1969, PhD 1973, Univ. of Ill.
- BABCOCK, RODNEY WHITTEMORE**, 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)
- BARNES, VERNON L.**, Instr. of Speech (1969). BA 1957, Ottawa Univ.; MA 1964, Kan. St. Univ.
- BARRETT, ERNIE D.**, Men's Athletic Dir. (1969). BS 1951, MS 1956, Kan. St. Univ.
- BASHAM, EDWIN W.**, Prof. & Head of Military Science (1973). BS 1946, US Military Acad.; MS 1958, Ga. Inst. of Tech.; 1962 Command and Gen. Staff Col.
- BATES, JAMES**, Asst. Football Coach. BS Phys. Ed. 1969, Univ. of Tenn.
- BECK, HENRY VOORHEES**, Prof. of Geology (1946, 1961). BS 1946, MS 1949, Kan. St. Univ.; PhD 1955, 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)
- BEITZ, DENNIS E.**, Asst. Prof. of Health, Phys. Ed. and Recreation (1973). BS 1964, Univ. of N.M.; MA 1968, Adams St. Col.; PhD 1968, Univ. of Utah.
- BENSON, JANET**, Asst. Prof. of Anthropology (1972). BA 1964, Ariz. St.; MA 1969, PhD 1974, Brandeis.
- BHALLA, CHANDER P.**, Prof. of Physics (1966, 1972). BS 1952, BSc 1954, MS 1955, Punjab Univ.; PhD 1960, Univ. of Tenn. (GF)
- BODE, VERNON C.**, Prof. of Biology (1970). BS 1955, Univ. of Mo.; PhD 1962, Univ. of Ill. (GF)
- BOLAN, JOHN ELDON**, Instr. in Health, Phys. Ed. and Recreation (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. (GF)
- BREDE, RICHARD M.**, Asst. Prof. of Sociology (1971). BA 1962, Univ. of Ore.; MS 1964, Univ. of Ore.; PhD 1971, Univ. of Ill.
- BRONDELL, 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, WILBUR E.**, Asst. Prof. of Journalism (1970). BS 1949, Kan. St. Univ.
- BULMAHN, HEINZ**, Asst. Prof. of Modern Languages (1972). BSE 1966, Drake Univ.; MA 1969, PhD 1974, Univ. of Wis.
- BUDA, SANTO**, Asst. Football Coach. BS Ed. 1967, MS Ed. 1974, Kan. Univ.
- BUNCH, WILLIAM A.**, Asst. Prof. of Modern Languages (1972). BA 1965, Hanover Col.; MA 1966, Univ. of Wis.; PhD 1972, Univ. of Tex. (GF)
- BUNGE, WALTER**, Prof. and Head of Journalism and Mass Communications (1973). BS 1956, MS 1961, Univ. of Wis.; PhD 1972, Univ. of Minn. (GF)
- BUNTON, NORMA D.**, Prof.; Head, Department of Speech (1954, 1960). BS 1939, Southwest Tex. St. Col.; MED 1947, Univ. of Tex.; 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. of Biology (1973). BA 1961, MS 1965, MD 1966, Univ. of Iowa; PhD 1970, The Rockefeller Univ. (GF)
- BURNS, KENNETH R.**, Asst. Prof. of Military Science (1971). BS 1966, Univ. of Houston.
- BUSSING, CHARLES EARL**, Asst. Prof. of Geography (1964, 1966). BA 1959, Colo. St. Col.; MA 1961, Univ. of Colo.; PhD 1968, Univ. of Neb. (GF)
- BUSSING, SANDRA I.**, Instr. of English (1974). BA 1957, Univ. of Colo.
- 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 1974, Univ. of Neb. (GF)
- CARDWELL, ALVIN BOYD**, Prof. of Physics Emeritus (1936, 1955, 1973). 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)
- CARPENTER, WILLIAM E.**, Assoc. Dean and Assoc. Prof. of English (1973, 1974). BA 1960, Centenary Col.; PhD 1967, Univ. of Kan. (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**, Assoc. 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, MA 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, JANE C.**, Instr. of English (1974). BS 1951, 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, MA 1970, Univ. of Northern Colo.
- COCKE, CHARLES L.**, Assoc. Prof. of Physics (1969, 1974). AB 1962, Haverford Col.; PhD 1967, Calif. Institute of Technology. (GF)
- COHEN, PETER Z.**, Asst. Prof. of English (1961, 1973). BS 1953, MA 1961, Univ. of Wyo.
- COMPAN, ALVIN**, Asst. Prof. of Physics (1973). AB 1965, Calvin Col.; MS 1966, PhD 1971, Univ. of Chicago. (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 and Asst. Dir. Computing Center (1961, 1964). BA 1954, Swarthmore Col.; PhD 1957, Univ. of Ill. (GF)
- CONROW, MARGARET E.**, Asst. Prof. of English (1964, 1969). BA, Swarthmore Col.; MA 1955, PhD 1962, Univ. of Ill. (GF)
- 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.**, Prof. of Chemistry (1962, 1974). BS 1952, Univ. of Ill.; PhD 1962, Ind. Univ. (GF)
- CORBIN, CHARLES B.**, Prof. and Head of Health, Phys. Ed. and Recreation (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, DAVID J.**, Prof. and Head of Biochemistry, Biochemist, Agr. Exp. Sta. (1973). BA 1956, Wesleyan Univ.; PhD 1960, Univ. of Penn. (GF)
- COX, RICHARD H.**, Asst. Prof. of Health, Phys. Ed. and Recreation (1974). BS 1967, MS 1968, Brigham Young Univ.; PhD 1973, Univ. of Ore. (GF)
- 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.



- CROSS, STANLEY A., Asst. Prof. of Sociology and Anthropology (1973). BA 1968, Univ. of Calif., Berkeley; MA 1968, PhD 1973, Univ. of Ill.
- CULLEN, PETER, Asst. Prof. of Military Science (1975). BA 1965, MA 1975, Kan. St. Univ.
- CULLERS, ROBERT L., Asst. Prof. of Geology (1971). BS 1959, MA in Chemistry 1962, Ind. Univ.; PhD 1971, Univ. of Wis. (GF)
- CULLEY, LOUANN F., Asst. Prof. of Art (1971). BFA 1957, MA 1967, Univ. of N.M.; PhD 1971, Stanford Univ.
- CUNNINGHAM, BRYCE A., Assoc. Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1963, 1972). BA 1955, BS 1958, PhD 1963, Univ. of Minn. (GF)
- CURNUTTE, JR., BASIL, Prof. of Physics; Assoc. Physicist, Agr. Exp. Sta. (1954, 1964). BS 1945, U.S. Naval Academy; PhD 1953, Ohio State Univ. (GF)
- CURTIS, 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, BETTIE M., Instr., Dean of Arts and Sciences (1964). BS 1946, Baylor; MS 1951, PhD 1954, Ohio St. Univ.
- DALE, E. BROCK, Prof. of Physics (1957, 1967). BS 1940, MS 1944, Univ. of Okla.; PhD 1953, Ohio St. Univ. (GF)
- DALY, ROBERT K., Instr. of Journalism and Mass Communications (1973). AB 1967, Marquette Univ.; MA 1973, Sangamon St. Univ.
- DANEN, WAYNE C., Assoc. Prof. of Chemistry (1967, 1972). BA 1964, St. Norbert Col.; PhD 1967, Iowa St. Univ. (GF)
- DAVIS, EARLE ROSCO, Prof. of English (1949). AB 1927, BM 1929, Monmouth Col.; MA 1928, Univ. of Ill.; PhD 1935, Princeton Univ. (GF)
- DAVIS, GEORGE LEE, Asst. Prof. in Art (1971, 1973). BFA 1966, Atlanta School of Arts; MFA 1971, Ind. Univ.
- DAVIS, MARJORIE M., Instr. of Biology (1971). BS 1959, Panhandle A & M Col.; MA 1962, Kan. Univ.; PhD 1970, Kan. St. Univ.
- DAYTON, ARTHUR D., Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1966). BS 1960, Berea Col.; MS 1964, PhD 1967, Mich. St. Univ. (GF)
- DeCOU, DONALD FRANK, Assoc. Prof. of Economics Emeritus (1947, 1973). BS 1929, Kan. St. Teachers Col. of Pittsburg; MBA 1934, Northwestern Univ.; 1966, Univ. of Wisconsin.
- 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.; PhD 1973, Univ. of Kan. (GF)
- 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, Ind. Univ.
- DENELL, ROBIN, Asst. Prof. of Biology (1972). BA 1965, Univ. of Calif.; MA 1968, PhD 1969, Univ. of Tex. (GF)
- DESMARTEAU, DARRYL D., Assoc. Prof. of Chemistry (1971, 1973). 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.
- DONNELLY, MICHAEL L., Asst. Prof. of English (1972). AB 1963 Harvard Col.; 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 Col.; 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., Assoc. Prof. of Mathematics (1970, 1973). BA 1965, Univ. of Rochester; MS 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.
- DUSHKIN, LELAH, Asst. Prof. of Sociology (1968). AB 1953, Smith Col.; MS 1956, PhD 1974, Univ. of Pa. (GF)
- EADS, JOHN W., Instr. of Biology (1974). BA 1967, MA 1969, Adams St. Col.
- EATON, GEORGE R., Dir. of KSU Printing Service, Asst. Prof. of Journalism and Mass Communications (1955). BS 1947, S.D. St. Col.
- EBBERTS, GEORGE ORVAL, Asst. Prof. Emeritus (1946, 1956, 1974). BS 1949, MS 1951, Kan. St. Univ.
- ECK, JOHN S., Assoc. Prof. of Physics (1969, 1974). BS 1962, PhD 1967, The Johns Hopkins Univ. (GF)
- EDELMAN, SHELDON, Assoc. Prof. (1970). BA 1952, Univ. of Ill.; MA 1956, Roosevelt Univ.; PhD 1960, Purdue Univ.
- 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 (1962, 1969). BA 1957, Luther Col.; MA 1960, PhD 1963, Univ. of Iowa. (GF)
- EVANS, JOHN C., Assoc. Prof. of Physics (1966, 1973). 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 Emeritus (1942, 1950). BS 1930, Kan. St. Univ.; MS 1942, Univ. of Mich.; PEd 1958, Ind. Univ. (GF)
- EVANS, WILLIAM E., Asst. Prof. of English (1969). BA 1963, Wayne St. Univ.; MA 1965, Univ. of Mich.; PhD 1973, Ohio Univ.
- EXDELL, JOHN B., Asst. Prof. in Philosophy (1972). BA 1967 Dickinson College; PhD 1973, Univ. of Tex. at Austin.
- FATELEY, WILLIAM G., Prof. and Head of Chemistry Department (1972). AB 1951, Franklin Col.; PhD 1955, Kan. St. Univ. (GF)
- FEBRES, ELEODORO J., Asst. Prof. of Modern Languages (1974). BA 1959, Santo Toribio, Peru; MA 1969, Notre Dame Univ.; PhD 1974, Univ. of Mass. (GF)
- 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)
- 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 Col.; 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)
- FINNEGAN, MICHAEL, Asst. Prof. of Anthropology (1973). BA 1967, MA 1970, PhD 1972, Univ. of Colo.
- FIRLING, JANICE D., Instr. of Speech (1974). BS 1967, MA 1970, Kan. St. Univ.
- FISHER, PAUL S., Assoc. Prof. and Head of Computer Science; Consultant, Agr. Exp. Sta. (1967, 1973). 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)
- FOZZARD, FRED E., Head Wrestling Coach (1973). BS 1969, Okla. St. Univ.
- FRANKLIN, ALBERT B., Dir., 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)
- FREY, MARSHALL, Asst. Prof. of History (1973). BA and BSc in Educ. 1967, MA 1968, PhD 1971, Ohio St. Univ. (GF)
- FRIEDMANN, EUGENE ALVIN, Prof., Head of Department of Sociology and Anthropology (1965). AB 1947, MA 1949, PhD 1953, Univ. of Chicago. (GF)
- FRIEMAN, JEROME, Assoc. Prof. of Psychology (1968). BA 1963, MS 1965, Western Reserve Univ.; PhD 1969, 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). BS 1941, Univ. of Wyo.; MS 1947, PhD 1950, Univ. of Wis. (GF)
- GALLAGHER, TOM L., Dir., 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 Profilo, 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.; EdD 1974, Univ. of Northern Colo.
- GEYER, KATHERINE, Prof. of Physical Education Emeritus (1927, 1945, 1974). BS 1927, Ohio St. Univ.; MA 1934, Columbia Univ. (GF)
- 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 Col.; 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)
- GLENN, KATHLEEN M., Asst. Prof. of Modern Languages (1973). AB 1957, AM 1958, PhD 1964, Stanford Univ. (GF)
- GONAZALEZ-DEL-VALLE, LUIS T., Asst. Prof. in Modern Languages (1972). BA 1968, Wilmington Col.; 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)
- GRANROSE, CHERLYN S., Instr. of Biology (1974). BS 1964, MS 1966, Univ. of Mich.
- GRAY, JR., MARION WILSON, Asst. Prof. of History (1969). BA 1964, Tex. Christian Univ.; MA 1966, PhD 1971, Univ. of Wis. (GF)
- GRAY, THOMAS F., Asst. Prof. of Speech (1974). BA 1962, MA 1967, Univ. of Northern Iowa; PhD 1975, Univ. of Minn.
- 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.
- GRIFFITT, WILLIAM B., Assoc. Prof. of Psychology (1968). BA 1964, Kan. St. Univ.; PhD 1967, Univ. Tex. (GF)
- GRINDELL, ROBERT M., Asst. Prof. in English (1972). AB 1956, Harvard Univ.; MA 1964, N.Y. Univ.; PhD 1972, Univ. of Ariz. (GF)
- GROOP, RICHARD E., Instr. of Geography (1974). BS 1965, MA 1967, Bowling Green St. Univ.
- GUHL, ALPHAEUS MATTHEW, Prof. of Biology Emeritus (1943, 1968). AB 1922, North Central Col.; MS 1939, PhD 1943, Univ. of Chicago. (GF)
- GUSTAFSON, MERLIN DeWAYNE, Assoc. Prof. of Political Science (1960, 1968). BS 1943, MS 1947, Kan. St. Univ.; PhD 1956, Univ. of Neb. (GF)
- HAGAN, PATRICIA W., Asst. Instr. of Art (1974). BS 1970, Kan. St. Univ.



- HAGGART, EDMOND Q., Asst. Prof. of Economics (1973). BA 1967, Kan. Univ.; PhD 1973, Univ. of Minn.
- HAJDA, JOSEPH, Dir. of International Activities (1965). Assoc. Prof. of Political Science (1957, 1960). BA 1951, Miami Univ.; MA, PhD 1955, Ind. Univ. (GF)
- HAMILTON, JAMES R., Asst. Prof. of Philosophy (1974). BA 1964, Pfeiffer Col.; MA 1967, Emory Univ.; MDiv 1968, Union Theological Seminary; PhD 1974, Univ. of Tex. at Austin
- HAMMAKER, ROBERT M., Prof. of Chemistry (1961, 1974). BS 1956, Trinity Col.; PhD 1960, Northwestern Univ. (GF)
- HAMSCHER, III, ALBERT N., Asst. Prof. of History (1972, 1973). BA 1968, Pa. St. Univ.; MA 1970, PhD 1973, Emory Univ. (GF)
- HAMSHER, ROSS M., Asst. Prof. of Mathematics (1972). AB 1966, Rutgers Univ.; SM 1967, PhD 1973, Univ. of Chicago. (GF)
- HANKLEY, WILLIAM JOHN, Assoc. Prof. of Computer Science (1972). BSEE 1962, MS 1964, Northwestern Univ.; PhD 1967, Ohio St. Univ. (GF)
- HANSEN, MERLE FREDRICK, Prof. and Assoc. Dir. of Biology; Parasitologist, Agr. Exp. Sta. (1950, 1963). AB 1939, MA 1941, Univ. of Minn.; PhD 1948, Univ. of Neb. (GF)
- HARDWICK, JOHN, Asst. Track Coach
- HARRIS, JOHN ORVILLE, Prof. of Biology, Microbiologist, Agr. Exp. Sta. (1942, 1952). BS 1939, Kan. St. Univ.; MS 1941, Univ. of Hawaii; PhD 1943, Kan. St. Univ. (GF)
- HARRIS, RICHARD J., Asst. Prof. of Psychology (1974). BA 1968, College of Wooster, MA 1971, PhD 1974, Univ. of Ill. (GF)
- HARRIS, T. ROBERT, Asst. Prof. of Sociology and Anthropology (1973). BA 1965, Reed Col.; PhD 1972, The Johns Hopkins 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. and Head of History (1971, 1973). 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)
- HAYDEN, TERESA, Asst. Prof. of Psychology (1973). BA 1968, PhD 1972, Stanford Univ. (GF)
- HAZLETT, EMERSON L., Asst. Prof., Continuing Ed. (1969). BS 1949, MS 1964, Univ. of Kan.; PhD 1973, Kan. St. Univ.
- HEBRANK, KENNETH E., Asst. Prof. of Military Science (1972). BS 1955, Kan. St. Univ.; 1967, Command and General Staff Col.; 1972, Univ. of Mo., KC.
- HEDGCOCK, JR., CHARLES, Assoc. Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1965, 1968). BS 1961, PhD 1965, Univ. of Tex. (GF)
- HEGGIE, JAMES, Asst. Track Coach
- HERMAN, LOUIS M., Asst. Prof. of Mathematics (1970). BS 1963, MS 1965, Univ. of Fla.; PhD 1970, Univ. of Mass. (GF)
- HEWETT, PHILLIP W., Asst. Prof. of Music (1969, 1971). BME 1959, Tex. Christian Univ.; MS 1970, Kan. St. Univ.
- HIGGINSON, FRED H., Prof. of English (1950, 1969). AB 1942, MA 1947, Univ. of Wichita; PhD 1953, Univ. of Minn. (GF)
- HIGHAM, ROBIN, Prof. of History (1963, 1966). AB 1950, Harvard Col.; MA 1953, 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)
- HINRICH, CARL, Asst. Prof. of Speech (1964). AB 1959, MA 1960, Univ. of N.C. (GF)
- HOFFMAN, MICHAEL K., Asst. Prof. of Chemistry (1971). BS 1963, Univ. of Pa.; PhD 1968, Bryn Mawr Col. (GF)
- HOLT, DONALD N., Assoc. Prof. of Journalism and Mass Communications (1974). BA 1950, Univ. of Colo.; MS 1970, Univ. of Wis.
- HOOK, PATRICIA W., Instr. of Biology (1970). BA 1963, MS 1965, Kan. St. Univ.; PhD 1970, Ore. 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)
- HOWE, F. VIRGINIA, Prof. of Journalism and Mass Communications (1947, 1959). AB 1935, Elmira Col.; MS 1949, EdD 1958, Boston Univ. (GF)
- HSU, CHEN-JUNG, Prof. of Mathematics (1965). BS 1941, DS 1961, Tohoku Univ. (Japan). (GF)
- HUBBARD, SAMUEL, Instr. of Aerospace Studies (1973).
- HUFF, GEORGE A., Asst. Prof. of Mathematics (1971). BA 1966, Kenyon Col.; MA 1968, Lehigh Univ.; PhD 1973, 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., Assoc. Prof. of Biology, Microbiologist, Agr. Exp. Sta. (1967, 1973). 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. (GF)
- JACK, HULAN E., JR., Asst. Prof. of Physics (1971). BS 1960, MS 1964, N.Y. Univ.; PhD 1971, N.Y. Univ. (GF)
- 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. (GF)
- 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.
- 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, CHARLES W., Asst. Prof. of Military Science (1973). BS 1968, US Military Academy.
- JONES, DALE VINCENT, Assoc. Prof. of English Emeritus (1946, 1951). BS 1931, MS 1941, Kan. St. Univ. (GF)
- JONES, DONALD E., Assoc. Prof. of Aerospace Studies (1974). BS 1959, Memphis St. Univ.; MS 1969, Univ. of Calif.
- JONES, KENNETH W., Assoc. Prof. of History (1965, 1970). AB 1958, MA 1959, PhD 1966, Univ. of Calif. (GF)
- KAMMER, ANN E., Assoc. Prof. of Biology; Neural Biologist (1972). BS 1956, N.Y. St. Col. for Teachers; MS 1958, Univ. of N.H., Durham; PhD 1966, Univ. of Calif., Berkeley. (GF)
- KAUFMAN, BURTON I., Assoc. Prof. of History (1973). BA 1962, Brandeis Univ.; MA 1964, PhD 1966, Rice Univ. (GF)
- KAY, KENNETH G., Asst. Prof. of Chemistry (1971). BS 1965, MS 1965, Polytechnic Institute of Brooklyn; PhD 1970, The Johns Hopkins Univ. (GF)
- KEISER, GEORGE R., Asst. Prof. of English (1973). BA 1962, MA 1964, PhD 1971, Lehigh Univ. (GF)
- KEMP, KENNETH E., Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1968). BS 1963, MS 1965, PhD 1967, Mich. St. Univ. (GF)
- KENNEDY, THOMAS E., Instr. of Economics (1973). BA 1969, Univ. of Calif., Santa Barbara; MA 1974, The Johns Hopkins Univ.
- KIPP, JACOB W., Asst. Prof. of History (1971). BS 1964, Shippensburg State Col.; MA 1967, 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., Assoc. Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1964, 1972). BS 1958, MS 1961, PhD 1964, Pa. St. Univ. (GF)
- KOCH, WILLIAM E., Assoc. Prof. of English (1946, 1947, 1973). BS 1938, N.D. St. Teachers Col.; MS 1949, Kan. St. Univ. (GF)
- KOLONOSKY, WALTER F., Asst. Prof. of Modern Languages (1973). BA 1963, Lycoming Col.; MA 1965, Univ. of Pa.; PhD 1972, Univ. of Kan.
- KRAMER, CHARLES LAWRENCE, Prof. of Biology, Mycologist, Agr. Exp. Sta., Adjunct Prof. of Plant Pathology (1958, 1966). AB 1950, MA 1953, PhD 1957, Univ. of Kan. (GF)
- KRAMER, KARL J., Asst. Prof. of Biochemistry; Research Chemist, Grain Marketing Research Center (1973). BS 1964, Purdue Univ.; PhD 1971, Univ. of Ariz. (GF) (Courtesy Appointment)
- KREITNER, GERALD L., Instr. of Biology (1974). BS 1963, MS 1966, PhD 1970, Univ. of Ill.
- KREN, GEORGE M., Assoc. Prof. of History (1965). BA 1948, Colby Col.; MA 1949, PhD 1960, Univ. of Wis. (GF)
- KROMM, DAVID, Assoc. Prof. of Geography (1967, 1971). BS 1960, Eastern Mich. Univ.; MA 1964, PhD 1967, Mich. St. Univ. (GF)
- LAMAN, 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.; DMA 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., Asst. Prof. in Health, Phys. Ed. and Recreation (1968). BS 1963, MS 1966, Kan. St. Univ.; EdD 1974, Okla. St. Univ.
- LEAVENGOOD, LUTHER OMAR, Prof. of Music. BM 1929, Univ. of Kan.; MM 1936, Univ. of Mich. (GF)
- LEE, RONALD S., Assoc. Prof. of Physics (1967, 1974). 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., Prof. of Physics and Dir., Nuclear Science Lab. (1967, 1973). 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.
- 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., Prof. of History (1965, 1973). BS 1956, Kan. St. Teachers Col.; MDiv, MRE 1958, Central Baptist Theological Seminary; MA 1960, PhD 1963, Univ. of Iowa. (GF)
- LINDLEY, DONALD D., Assoc. Prof. of Health, Phys. Ed. and Recreation (1973). BA 1949, Wichita St. Univ.; MEd 1952, Univ. of Minn.; DEd 1970, Univ. of Ore. (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, Asst. Prof. of Biology (1940, 1947). BS 1934, MS 1938, Kan. St. Univ. (GF)
- LOGAN, JOHN D., Asst. Prof. of Mathematics (1973). BS 1966, MS 1968, PhD 1970, Ohio 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. Prof. of Military Science (1973). BS 1961, North Ga. Col.; MS 1974, Kan. St. 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 Wis.
- MADDOX, JERROLD, Prof. and Head of Art (1974). BS 1954, MFA 1959, Ind. Univ. (GF)
- MAHLER, RONNIE J., Asst. Prof. of Health, Phys. Ed. and Recreation (1974). Ballet Russe de Monte Carlo 1960-62, National Ballet 1963-67, American Ballet Theatre 1969-72.
- 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)
- MARKS, DONALD M., Prof. of Aerospace Studies (1974). BS 1950, Univ. of Kan.; MA 1954, Ind. Univ.; MS 1973, American Univ.
- MARR, JOHN MAURICE, Prof. of Mathematics (1953, 1958, 1962). BS 1941, Central Mo. St. Col.; MA 1948, Univ. of Mo.; PhD 1953, Univ. of Tenn. (GF)
- MARYANSKI, FRED, Asst. Prof. of Computer Science (1974). BS 1968, Providence Col.; MS 1972, Stevens Inst. of Tech.; PhD 1974, Univ. of Conn.
- MARZOLF, G. RICHARD, Assoc. Prof. of Biology (1962, 1973). AB 1957, Wittenberg Univ.; PhD 1962, Univ. of Mich. (GF)
- MASONI, ELIZABETH, Instr. of English (1974). BA 1970, Linfield Col.; MA 1972, Univ. of Pacific.
- 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)
- MCCULLOH, JOHN M., Asst. Prof. of History (1973). BA 1965, Kan. Univ.; MA 1966, PhD 1971, Univ. of Calif., Berkeley. (GF)
- MCDONALD, RICHARD N., Prof. of Chemistry (1960, 1968). BS 1954, MS 1955, Wayne St. Univ.; PhD 1957, Univ. of Wash. (GF)
- MCDOWELL, EPHRIAM E., Asst. Football Coach (1970). BS 1963, Fla. St. Univ.
- McGHEE, RICHARD D., Assoc. Prof. and Head of English (1967). BA 1962, Univ. of Mo. at KC; MA 1964, PhD 1967, Univ. of Okla. (GF)
- McGRAW, BETTY R., Asst. Prof. of Modern Languages (1963, 1970). Licence es Lettres 1961, Université de Paris.
- McGUIRE, JAMES H., Asst. Prof. of Physics (1972). BS 1964, Rensselaer Polytechnic Institute; MS 1966, PhD 1969, Northeastern Univ. (GF)
- McILVAIN, ROBERT J., Asst. Prof. of Art (1971, 1973). BSE 1966, Kan. St. Teach. Col.; 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)
- MENDENHALL, BURNEY L., Asst. Prof. of Modern Languages (1965). BA 1950, Washburn Univ.; MS 1953, Kan. St. Teachers Col.; PhD 1964, Univ. of Kan. (GF)
- MERCER, JAMES A., Asst. Prof. of Aerospace Studies (1974). BA 1964, Univ. of Mont.; MS 1973, Univ. of Southern Calif.
- MERRIMAN, JANICE E., Asst. Prof. of Health, Phys. Ed. and Recreation (1972). BS 1964, Douglas Col.; MS 1967, PED 1973, Ind. Univ.
- MERRIMAN, JOHN W., Asst. Prof. of 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 1967, Univ. of Mass. (GF)
- MILLER, MICHAEL H., Asst. Prof. of Computer Science, Asst. Dir., Computing Center (1960, 1964). BS 1958, MS 1960, Iowa St. Univ.
- MILLERET, MIRIAM H., Instr., Dean of Arts and Sciences (1967). BS 1947, Kan. St. Univ.
- MILLIKEN, GEORGE A., Assoc. Prof. of Statistics; Consultant, Agr. Exp. Sta. (1969). BS 1965, MS 1968, PhD 1969, Colo. St. Univ. (GF)
- 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., 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)
- MORGAN, LAURENCE, Instr. in Athletics, Athletic Trainer (1951, 1957). BS 1949, St. Ambrose Col.
- MORRIS, JIM R., Assoc. Prof. of Journalism and Mass Communications (1968). AA 1957, Kilgore Col.; BJourn. 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 ADELINE, 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, 1973). BA 1966 Georgetown Univ.; MA 1968, PhD 1972, Rutgers Univ. (GF)
- MUELLER, DELBERT D., Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1968). BS 1962, PhD 1966, Univ. of Okla. (GF)
- MUNCE, JAMES C., Asst. Prof. of Art (1972). BFA 1966, Minneapolis School of Art; MFA 1971, Indiana Univ. (GF)
- 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, Assoc. Prof. of Economics (1966, 1973). BA 1960, Goshen Col.; MA 1962, Univ. of Mich.; PhD 1967, Univ. of Ill. (GF)
- NASSAR, RAJA F., 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)
- NEIMAN, GARY S., Asst. Prof. of Speech (1973). BS 1969, MA 1971, PhD 1973, Univ. of Ill.
- NELSON, DEVERE V., Asst. Prof. of Athletics, Dir. of Sports Information (1966). BS 1949, Kan. St. Univ.
- NELSON, RANDALL R., Gymnastics Coach (1973). BS 1972, MS 1973, S.D. St.
- 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, PhD 1971, Ind. St. Univ.
- NIEMAN, DONALD G., Instr. of History (1974). BA 1970, Drake Univ.
- NOBLE, M. LARRY, Asst. Prof. of Health, Phys. Ed. and Recreation (1972). BS 1966, Eastern Ky. Univ.; MA 1968, Univ. of Md.; PhD 1970, Univ. of Tex. (GF)
- NOBLETT, DUANE P., Asst. Prof. of Art (1973). BFA 1966, Minneapolis Col. of Art and Design; MA 1970, MFA 1972, Univ. of Iowa
- 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)
- 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, BMA 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.
- OLMSTEAD, DONALD R., Instr. of Military Science (1973).
- OLSON, EDWIN G., Asst. Prof. of Economics (1969). BA 1956, MA 1960, Univ. of Calif.; PhD 1971, Univ. of Wash. (GF)
- O'NEIL, MICHAEL P., Asst. Prof. of Philosophy (1973). BA 1965, MA 1966, Miami Univ.; PhD 1972, Univ. of Edinburgh, Scotland.
- ORBACH, HAROLD L., Lecturer in Sociology (1969). BSS 1959, The City Col. of N.Y.; PhD 1970, The Univ. of Minn. (GF)
- O'SHEA, JOHN WILLIAM, Asst. Prof. of Art (1956, 1968). BFA 1954, Denver Univ.; MFA 1956, St. Univ. of Iowa. (GF)
- OSSAR, MICHAEL, Asst. Prof. of Modern Languages (1971). AB 1961, Cornell Univ.; MS 1963, MA 1967, PhD 1973, Univ. of Pa. (GF)
- OTTENHEIMER, HARRIET J., Asst. Prof. of Anthropology (1969). BA 1962, Bennington Col.; PhD 1973, Tulane Univ. (GF)
- OTTENHEIMER, MARTIN, Asst. Prof. of Anthropology (1969). BS 1962, Rensselaer Polytechnic Institute; MA 1965, 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 Emeritus; Mycologist, Agr. Exp. Sta. (1945, 1952, 1973). 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, 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., Assoc. Prof. of Chemistry (1966, 1974). BS 1960, Univ. of Wis.; PhD 1964, Univ. of Ill. (GF)
- PAULSEN, AVELINA Q., Instr. of Biology (1974). BS 1959, MS 1962, Univ. of Philippines; PhD 1967, Univ. of Wis.
- 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)
- PENDRY, JOSEPH, Asst. Football Coach. BS Phys. Ed. 1969, Univ. of W.Va.
- 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., Assoc. Prof. of Sociology; Assoc., Institute for Environmental Research (1967, 1970). BA 1962, MA 1964, PhD 1968, Univ. of Neb. (GF)



- PETTIS, 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, Assoc. Prof. of Mathematics (1969, 1973). 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 Health, Phys. Ed. and Recreation (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, PhD 1972, Clark Univ. (GF)
- PRYOR, RICHARD D., Adm. Asst. in Athletics (1973). BS 1953, MS 1954, Univ. of Ark.
- PSILOS, PAUL D., Asst. Prof. of English (1970). BA 1966, Boston Univ.; MA 1967, PhD 1970, Northwestern Univ.
- PUJOL, ELLIOTT, Asst. Prof. of Art (1973). BA 1968, MFA 1971, Southern Ill. 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)
- RAINSBERGER, ELLIS, Head Football Coach. BS Phys. Ed. 1958, Kan. St. Univ.
- RAPPOPORT, LEON H., Prof. of Psychology (1964). BA 1953, N.Y. Univ.; MA 1962, PhD 1963, Univ. of Colo. (GF)
- RATCLIFFE, LAMAR CECIL, Instr. in Mathematics Emeritus (1964, 1974). BS 1933, U.S. 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., Assoc. Prof. of Philosophy (1967, 1973). AB 1964, Holy Cross Col.; MA 1966, PhD 1967, Univ. of Kan. (GF)
- REECK, GERALD R., Asst. Prof. of Biochemistry, Asst. Biochemist, Agr. Exp. Sta. (1974). BA 1967, Seattle Pacific Col.; PhD 1971, Univ. of Wash. (GF)
- REES, JOHN O., Assoc. Prof. of English (1965, 1972). BA 1947, Amherst Col.; PhD 1965, St. Univ. of Iowa. (GF)
- REPLOGLE, RENATA J., Instr. of Art (1966). BA 1963, MA 1964, Northern Colo. Univ.
- REPLOGLE, REX, Asst. Prof. of Art (1966, 1971). BFA 1964, MFA 1967, Univ. of Kan. (GF)
- REEDER, JAMES E. III, Asst. Prof. of Speech (1974). BA 1967, Morningside Col.; MA 1969, Univ. of Wash.
- RICHARD, PATRICK, Prof. of Physics (1972). BS 1961, Univ. of Southwestern La.; PhD 1964, Fla. St. Univ. (GF)
- RICHTER, WILLIAM LOUIS, Assoc. Prof. of Political Science (1966, 1973). BA 1961, Willamette Univ.; MA 1963, 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 Univ. (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)
- ROBERTS, CAROLYN V., Instr. of Biology (1968). BS 1965, Univ. of Colo.
- ROBY, PAUL E., Assoc. Prof. of Music (1966, 1974). BM 1958, Oberlin Conservatory; MM 1961, Catholic Univ. of America; DMA 1974, Univ. of Colo. (GF)
- ROCHAT, ELEANOR S., Instr. of English (1974). BS 1947, Eastern Ill. Univ.
- ROCHE, THOMAS E., Asst. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1974). BS 1966, Regis Col. (Denver); PhD 1970, Wash. St. Univ. (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 Dir. of the Division of Biology (1967). AB 1950, Ind. Univ.; MS 1955, Northwestern Univ.; PhD 1957, Univ. of Chicago. (GF)
- ROTHERMEL, BRADLEY L., Asst. Athletic Dir. for Men (1974). BS 1960, Northern Ill. Univ.; MS 1961, PhD 1965, Univ. of Ill.
- RULIFFSON, WILLARD S., Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1953, 1968). BS 1940, Buena Vista Col.; PhD 1953, Univ. of Iowa. (GF)
- SAGESER, ADELBERT BOWER, Prof. of History Emeritus (1938, 1941, 1973). AB 1925, Neb. St. Teachers Col. (Wayne); MA 1930, PhD 1934, Univ. of Neb. (GF)
- SAMELSON, FRANZ, Prof. of Psychology (1957). Diploma in Psychology 1952, Univ. of Munich (Germany); PhD 1956, Univ. of Mich. (GF)
- SAMELSON, PHOEBE, Instr., Dean of Arts and Sciences (1968). BA 1950, Bates; MN 1953, Yale.
- SCHER, 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 WILLIS, Asst. Prof. of English (1964, 1968). 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; PhM 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)
- SCHROEDER, JANE, Asst. Women's Athletic Dir. BS 1971, Kan. St. Univ.
- 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)
- SELCER, RICHARD, Asst. Football Coach. BA Pol. Sci. 1959, Notre Dame.
- 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.
- SHANLINE, RIX D., Asst. Prof. of Sociology (1969). BS 1951, MSW 1953, Univ. of Kan.
- SHANTEAU, JAMES C., Asst. Prof. of Psychology (1971). BA 1966, San Jose St. Col.; PhD 1970, Univ. of Calif., San Diego. (GF)
- SHAPIRO, LINDA G., Asst. Prof. of Computer Science (1974). BS 1970, Univ. of Ill. at Urbana-Champaign; MS 1972, PhD 1974, Univ. of Iowa.
- SHAVER, HAROLD C., Asst. Prof. of Journalism (1972). BA 1960, Muskingum Col.; MS 1963, Syracuse Univ.
- SHAW, BRADLEY A., Asst. Prof. of Modern Languages (1974). BA 1968, Lewis & Clark Col.; MA 1969, Northwestern Univ.; PhD 1974, Univ. of N.M.
- SHELTON, LEWIS E., Asst. Prof. of Speech (1973). BA 1963, Taylor Univ.; MA 1965, Ind. Univ.; MA 1968, PhD 1971, Univ. of Wis.
- SHELTON, LYNN M., Asst. Prof. of Speech and Health, Phys. Ed. and Recreation (1973). BS 1966, N.Y. Univ.; MA 1968, PhD 1973, Univ. of Wis.
- SHENKEL, JR., CLAUDE WESLEY, Prof. of Geology (1949, 1958). BS 1941, Kan. St. Univ.; MS 1947, PhD 1952, Univ. of Colo. (GF)
- SHULL, PAUL, Assoc. Prof. of Music (1960). BME 1950, MME 1951, Univ. of Colo.; DMA 1966, Eastman School of Music (Univ. of Rochester). (GF)
- SHULT, ERNEST E., Distinguished Regents Prof. (1974). BA 1958, MA 1961, Southern Ill. Univ.; PhD 1964, Univ. of Ill. (GF)
- SIDDALL, WILLIAM R., Prof. of Geography; Head, Department of Geography (1962, 1965, 1972). AB 1950, Harvard Univ.; MA 1955, PhD 1959, Univ. of Wash. (GF)
- SIDORFSKY, FRANK M., Assoc. Prof. of Music (1965, 1974). BME 1952, Kan. St. Teachers Col. of Emporia; MM 1957, Eastman Conservatory of Music (Univ. of Rochester); DMA 1974, Eastman. (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., Assoc. Prof. of Computer Science (1970, 1974). BS 1964, Univ. of Colo.; MS 1967, PhD 1968, Iowa St. Univ. (GF)
- SIOTANI, MINORU, Prof. of Statistics (1971). BA 1950, Univ. of Tokyo; DSc 1962, Kyushu Univ. (GF)
- SLESINSKI, RONALD S., Asst. Prof. of Biology; Cell Biologist, Agr. Exp. Sta.; Adjunct Prof. of Plant Pathology (1971). BS 1965, PhD 1969, Mich. St. Univ. (GF)
- SLOAT, FLOYD B., Assoc. Prof. of Mathematics (1946, 1966). BA 1938, Ouachita Col.; MA 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); DMA 1974, Eastman. (GF)
- SMITH, ANN S., Instr. of Biology (1970). BS 1958, Augustana Col.; MS 1960, Univ. of Colo.
- SMITH, CHRISTOPHER C., Assoc. Prof. of Biology (1970). BA 1960, Univ. of Colo.; MA 1963, PhD 1965, Univ. of Wash. (GF)
- SMITH, PETER M., Asst. Prof. of Speech (1973). BA 1963, Univ. of Hartford; MA 1966, Catholic Univ. of America; PhD 1971, Univ. of Denver.
- SMITH, ROBIN, Asst. Prof. of Philosophy (1974). BA 1968, Univ. of Tenn. at Chattanooga; PhD 1974, Claremont.
- SNYDER, VERYLE 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)
- SPOONER, BRIAN S., Asst. Prof. of Biology (1971). BS 1963, Quincy Col.; PhD 1969, Temple Univ. (GF)
- STAMEY, WILLIAM L., Dean; Prof. of Mathematics (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 Emeritus (1947, 1974). 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)
- STONE, ROYAL G., Sports Publicity Dir. (1973). BA 1967, Univ. of Okla.
- 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)
- STRECKER, GEORGE E., Assoc. Prof. of Mathematics (1972). BS 1961, Univ. of Colo.; PhD 1966, Tulane Univ. (GF)
- STROMBERG, KARL ROBERT, Prof. of Mathematics (1968). BA 1953, MA 1954, Univ. of Ore.; PhD 1959, Univ. of Wash. (GF)
- STURR, EDWARD R., Asst. Prof. of Art (1974). BA 1959, St. Ambrose Col.; MS 1964, Ill. Inst. of Tech.; EdD 1973, Ill. St. Univ.
- SULEIMAN, MICHAEL WADIE, Prof. and Head of Political Science (1965, 1975). BA 1960, Bradley Univ.; MS 1962, PhD 1965, Univ. of Wis. (GF)
- SUMMERHILL, R. RICHARD, Asst. Prof. of Mathematics (1972). BA 1966, Monmouth Col.; MS 1967, PhD 1969, Univ. of Iowa. (GF)
- SUTTON, MARY ELLEN, Instr. of Music (1974). AA 1960, Graceland Col.; BM 1963, MM 1968, Univ. of Mo. at Kansas City.
- SWEEDLUN, VERNE SEBASTIAN, Prof. of History Emeritus (1941, 1970). AB 1923, Bethany Col.; MA 1928, Univ. of Kan.; PhD 1940, Univ. of Neb. (GF)
- SWILER, JAMES P., Asst. Prof. of Art (1970, 1973). BSE 1966, Kan. St. Teachers Col.; MFA 1970, Wichita St. Univ.



TAYLOR, ROBERT BARTLEY, Assoc. Prof. of Anthropology (1957, 1969). BS 1949, Wheaton Col.; MA 1956, PhD 1960, Univ. of Ore. (GF)

TEMPERO, TERESA O., Instr. of Art (1972). BA 1969, MA 1971, Central Wash. St. Col.; MFA 1972, Wash. St. Univ.

THOMAS, LLOYD B., JR., Assoc. Prof. of Economics (1968). BA 1963, MA 1964, Univ. of Mo.; PhD 1970, 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, DONNA J., Asst. Prof. of Health, Phys. Ed. and Recreation (1974). BA 1961, Western Wash. Col.; MA 1966, Wheaton Col.; PhD 1974, Ohio St. Univ.

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.

TILGHMAN, BENJAMIN R., Prof. of Philosophy and Head of Department of Philosophy (1967). AB 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)

TOMB, A. SPENCER, Assoc. Prof. of Biology; Biosystematics Agr. Exp. Sta. (1974). BS 1966, Univ. of the South; PhD 1970, Univ. of Tex., Austin. (GF)

TUNSTALL, GEORGE C., Asst. Prof. of Modern Languages (1973). BA 1964, Hamilton Col.; MA 1966, PhD 1968, Princeton Univ.

TWISS, NANCY, Instr., Dean of Arts and Sciences (1969). BA 1954, Colo. Col.; MS 1974, Kan. St. Univ.

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, PhD 1970, Univ. of Wash. (GF)

UNGER, ELIZABETH A., Asst. Prof. of Computer Science (1966). 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)

VOGT, JOHN L., Assoc. Prof. of Art (1963, 1971). BFA 1960, Kan. City Art Institute; MFA 1963, Univ. of Ill. (GF)

VOVK, FRANK, Instr. of Military Science (1973).

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)

WALLENTINE, VIRGIL E., Asst. Prof. of Computer Science (1972). BS 1965, MS 1970, PhD 1972, Iowa St. Univ. (GF)

WALSTAD, GEORGE, Asst. Football Coach. BS Phys. Ed. 1963, Okla. St. Univ.; MA Admin. 1968, Wichita St. Univ.

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. 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. Assoc. Prof. of Geology (1969, 1974). AA 1955, Centralia Junior Col.; BS 1958, Univ. of Mo. at Rolla; MS 1962, Univ. of Kan.; PhD 1970, Univ. of Okla. (GF)

WEYERTS, ALFRED C., Instr. of Chemistry (1963). BS 1948, Denver Univ.

WHITE, ALFRED EVERETT, Prof. of Mathematics Emeritus (1909, 1950). BS 1904, MS 1909, Purdue Univ. (GF)

WHITE, CHAPPELL, Prof. of Music (1974). BA 1940, Emory Univ.; BM 1947, Westminster Choir Col.; PhD 1957, Princeton Univ. (GF)

WHITE, MARY FRANCES, Assoc. Prof. of English (1947, 1966). BS 1928, MS 1930, Kan. St. Univ.; PhD 1955, Denver Univ. (GF)

WHITTEMORE, DONALD O., Asst. Prof. of Geology (1972). BS 1966, Univ. of N.H.; PhD 1972, Pa. St. Univ.

WILCOX, R. STIMSON, Visiting Asst. Prof. of Biology (1974). BS 1962, Univ. of Okla.; MS 1965, PhD 1969, Univ. of Mich.

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, HELEN, Asst. Prof. of English (1974). AB 1961, Bard Col.; MA 1965, Ohio St. Univ.; PhD 1973, Univ. of Denver.

WILLIAMS, IVERSON, Asst. Football Coach. BS Phys. Ed. 1971, Xavier Univ.

WILLIAMS, LARRY G., Asst. Prof. of Biology (1970). BS 1961, MS 1963, Univ. of Neb.; PhD 1968, Calif. Institute of Technology. (GF)

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, MS 1971, 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. of Art (1966, 1972). BFA 1960, Kan. City Art Institute; MFA 1963, Univ. of Okla.

WOLDT, GRACE S., Instr. of Mathematics Emerita (1946). AB 1927, Ohio Wesleyan Univ.

WOODWARD, GARY L., Asst. Prof. of Art (1971, 1972). AB 1961, Northern Colo. Univ.; MA 1964, Univ. of Iowa; MFA 1969, Univ. of Wash.

YEE, KANE, Prof. of Mathematics (1968, 1973). 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, PhD 1941, Ohio St. Univ. (GF)

ZIEGER, ROBERT H., Assoc. Prof. of History (1973). BA 1960, Montclair N.J. St. Col.; MA 1961, Univ. of Wyo.; PhD 1965, Univ. of Md. (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 Md. (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

BARTON-DOHENIN, 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, MBA 1968, PhD 1972, Okla. St. Univ. (GF)

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. Teachers 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., Assoc. Dean; Assoc. Prof. of Business Administration (1972). BBA 1963, MA 1966, PhD 1970, Univ. of Iowa. (GF)

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, PhD 1974, Univ. of Okla.

FOX, KENNETH L., 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)

GENTRY, JAMES, Asst. Prof. of Business Administration (1973). BS 1969, Kan. St. Univ.; MBA 1971, DBA 1973, Ind. Univ. (GF)

GINN, MARY LEA, Instr. in Business Administration (1973). BS 1969, MED 1972, Univ. of Ark.

GRAHAM, JOHN, Assoc. Prof. of Business Administration (1970). BA 1967, Kan. St. Univ.; MBA 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. Teachers Col. (Emporia); MS 1948, Kan. St. Univ.; CPA 1956, Kansas. (GF)

HOLLINGER, ROBERT D., Asst. Prof. of Business Administration (1966). BS 1964, MS 1968, PhD 1973, Kan. St. Univ.

JAUCH, LAWRENCE, Asst. Prof. of Business Administration (1973). BS 1965, MS 1967, Southern Ill. Univ.; PhD 1973, Univ. of Mo. (GF)

JONES, C. CLYDE, Prof. of Business Administration (1960). AB 1944, Marshall Univ.; MA 1950, PhD 1954, Northwestern Univ. (GF)

KING, ALBERT S., Assoc. Prof. of Business Administration (1969, 1973). BBA 1962, MBA 1966, West Tex. St. Univ.; DBA 1970, Tex. Tech. Univ. (GF)

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)

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.

MIN, HAN KI., Asst. Prof. of Business Administration (1974). BS 1960, Yonsei Univ.; BBA 1968, Univ. of Ore.; MBA 1970, Calif. St. Univ.; PhD 1974, Univ. of Okla.

MULANAX, ALVIN E., Assoc. Prof. of Business Administration (1947, 1966). BS 1946, MS 1951, Kan. St. Univ. (GF)

NEZZER, MILDRED, Asst. Prof. of Business Administration (1974). BS 1965, Univ. of Minn.

NORVELL, WAYNE, Asst. Prof. of Business Administration (1974). BS 1964, Ark. Polytechnic Col.; MBA 1965, Univ. of Ark.; DBA 1973, Miss. St. Univ. (GF)

RAPP, CHARLES W., Asst. Prof. of Business Administration Emeritus (1955, 1968). BS 1931, MS 1946, Kan. St. Teachers Col. (Emporia).

REUTZEL, EDWARD, Asst. Prof. of Business Administration (1974). BS 1967, Carnegie-Mellon Univ.; MBA 1973, Pa. St. Univ.

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, Kansas.

STREIT, IRVA KAY, Instr. in Business Administration (1973). BS 1969, MS 1973, Kan. St. Univ.

THIESSEN, EMIL A., Assoc. Prof. of Business Administration (1968). AB 1948, Tabor Col.; MS 1951, Kan. St. Teachers Col. (Emporia); EdD 1959, Colo. St. Col.

VADEN, RICHARD E., Assoc. Prof. of Business Administration (1969, 1973). 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, 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. (GF)
- 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 Field Experiences (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., Fla.; 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. (GF)
- 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., Asst. Prof. (1972). BS 1968, Georgetown Univ.; MS 1970, Univ. of Bridgeport (Conn.); PhD 1973, Southern Ill. Univ. (GF)
- 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. (GF)
- CHANG, THERESA S., Asst. Prof. (1973). BA 1958, Nazareth Col., Ky.; MA 1959, Columbia Univ.; MLS 1966, PhD 1970, Univ. of Md. (GF)
- CRAIG, M. DOROTHY, Asst. Prof. of Education Emeritus (1959, 1973). BS 1931, Bethany Col.; BS 1941, Kan. St. Teachers Col. (Emporia); MA 1944, Columbia Univ.
- 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)
- 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. (GF)
- GARCIA, RICARDO L., Asst. Prof., 1973. BA 1963, N.M. Highlands Univ.; MA 1971, EdD 1973, Denver Univ. (GF)
- GOODENOW, PHILIP E., Asst. Instr. in Education (1967). BA 1953, Kan. Wesleyan (Sallina).
- GREEN, FINIS McGRADY, Prof. of Education Emeritus (1948, 1967). BS 1922, Kan. St. Teachers 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. (GF)
- HARRIS, MARY M., Asst. Prof. (1974). AB 1967, Goucher Col., Md.; EdM 1969, Shippensburg St. Col., Pa.; PhD 1975, Univ. of Pittsburgh.
- 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., Asst. Prof. of Economics and Commerce (1969). BS 1948, MS 1964, Univ. of Kan.; PhD 1973, Kan. St. Univ.
- HEWITT, THOMAS W., Asst. Prof. (1974). BA 1960, MA 1966, W. Mich. Univ.; EdD 1971, Univ. of Houston.
- HOLEN, MICHAEL C., Asst. Prof. of Education (1971). BA 1967, Stanford Univ.; MA 1968, PhD 1971, Univ. of Ore. (GF)
- HOYT, DONALD P., Prof. and Dir. of Office of Educational Research (1968). BS 1948, Univ. of Ill.; MA 1950, PhD 1954, Univ. of Minn. (GF)
- JAMES, ROBERT K., Assoc. Prof. (1969, 1972). BS 1959, Northwest Mo. St.; MA 1962, Univ. of Northern Iowa; PhD 1969, Univ. of Iowa. (GF)
- JOHNSON, ROBERT L., Prof. and State Leader, Extension Staff and Program Development (1965). BS 1951, Univ. of Neb.; MS 1956, PhD 1958, Univ. of Wls. (GF)
- JONES, EDWARD E., Asst. Prof. (1974). BA 1969, MS 1970, Wichita St. Univ.; EdD 1974, Okla. St. Univ.
- JORNS, WILLIAM J., Asst. Prof. and Coordinator, Extension Staff Development (1971). BS 1954, MS 1960, Kan. St. Univ.; EdD 1971, N.C. St. Univ. (GF)
- 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)
- 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)
- KURTZ, VERNON RAY, Assoc. Prof. of Education (1970, 1971). BS 1955, MS 1959, Ft. Hays Kan. St. Col.; EdD 1967, Univ. of Neb. (GF)
- LITTELL, 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, 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)
- LYNCH, MICHAEL L., Asst. Prof., Center for Student Development (1972). BS 1967, MS 1968, EdD 1972, Ind. Univ.
- MAERTENS, NORBERT W., Prof. of Education and Head, Department of Curriculum and Instruction (1974). BS 1958, Mankato St. Col.; MA 1960, PhD 1967, Univ. of Minn. (GF)
- MARTIN, LARRY LEE, Asst. Prof. (1973). BPE 1964, MS 1965, PhD 1971, Purdue Univ.
- MCANARNEY, HARRY EDWARD, Assoc. Prof. of Education (1957, 1966). BS 1943, Kan. St. Teachers Col. (Emporia); MS 1947, EdD 1958, Univ. of Kan. (GF)
- MCCAIN, JAMES ALLEN, President Emeritus (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)
- MCLVAIN, JOSEPH, Asst. Prof. (1970). BS 1961, Pa. St. Univ.; MSH 1967, Central Mo. St. Col.; PhD 1970, Ohio Univ. (GF)
- McKINNEY, KATHERYN ANN, Assoc. Prof. of Health, Phys. Ed. and Recreation (1946, 1972). BS 1934, Kan. St. Univ.; MA 1935, George Peabody Col. for Teachers.
- MEISNER, ROBERT G., Prof. and Head, Department of Adult and Occupational Education (1969, 1972). BS 1948, Okla. A & M Col.; MS 1957, Okla. St. Univ.; EdD 1967, Univ. of Calif., Berkeley. (GF)
- MERRELL, JERRY L., Asst. Prof. (1972, 1973). BS 1962, MA 1964, Northeast Mo. St. Col.; EdS 1971, Central Mo. St. Col.; PhD 1973, Fla. St. Univ.
- MOGGIE, MAURICE CHARLES, Prof. of Education Emeritus (1930, 1945, 1973). BS 1929, MS 1931, Kan. St. Univ.; PhD 1941, Ohio St. Univ. (GF)
- NEELY, MARGERY A., Assoc. Prof. of Education (1974). AB 1955, Southern Mo. St. Univ.; MEd 1968, PhD 1971, Univ. of Mo.-Columbia. (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. (GF)
- NOLTING, EARL, Assoc. Prof. of Education (1974). BS 1959, MS 1961, Ind. Univ.; PhD 1967, Univ. of Minn. (GF)
- OAKLIEF, CHARLES R., Assoc. Prof. (1974). BS 1959, MS 1962, Ohio St. Univ.; PhD 1970, Wls. St. Univ. and Ohio St. Univ. (GF)
- 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. (GF)
- PRAWL, WARREN L., Prof.; Extension Specialist, Staff Development (1952, 1969). BS 1954, Kan. St. Univ.; MS 1958, EdD 1962, Cornell Univ. (GF)
- 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 Okla. (GF)
- RUST, LUCILE OSBORN, Prof. of Education Emerita (1924, 1960). BS 1921, Kan. St. Teachers Col. (Pittsburg); MS 1922, Kan. St. Univ. (GF)
- SATTERFIELD, JAMES W., Asst. Prof. (1973). BS 1963, Norfolk St. Col.; MA 1970, Eastern Mich. Univ.; PhD 1973, Univ. of Mich. (GF)
- SCHILL, LEO M., Prof. of Education (1966, 1969, 1973). AB 1955, Bethany Col.; MS 1962, Univ. of Kan.; PhD 1964, Univ. of Iowa. (GF)
- SCOTT, ROBERT, Prof. of Education (1970, 1973). AA 1951, Independence, Kan., Junior Col.; BS 1953, MS 1956, Kan. St. Teachers Col.; EdD 1965, Univ. of Mo. (GF)
- SHERRARD, PETER, Asst. Prof., Counseling Center (1973). BA 1961, Wheaton College; MDiv 1967, THM 1971, Princeton Theological Seminary; ED 1973, Univ. of Mass.
- SMETHERS, HOWARD DEWIGHT, Asst. Prof. of Education Emeritus (1947, 1972). BS 1927, Kan. St. Teachers 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. (GF)
- STEWART, G. KENT, Asst. Prof. (1973). BS 1955, Ind. St. Univ.; MEd 1958, Univ. of Ill.; EdD 1964, Ind. Univ. (GF)
- SULLIVAN, RITA J., Asst. Prof. (1966, 1974). BS 1956, Kan. St. Teachers Col. (Pittsburg); MS 1964, EdD 1974, 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)
- TERRASS, JOYCE J., Assoc. Prof. (1973). BS 1942, Kan. St. Univ.; MS 1957, Colo. St. Univ.; PhD 1969, Purdue Univ. (GF)
- TRENNEPOHL, HARLAN JEAN, Assoc. Prof. of Education (1956, 1963). BS 1947, MS 1951, Kan. St. Teachers Col. (Emporia); EdD 1956, Univ. of Colo. (GF)
- UTSEY, JORDAN, Assoc. Dean and Prof. of Education (1969, 1973, 1974). BA 1952, Col. of Idaho; MEd 1958, EdD 1963, Univ. of Ore. (GF)
- VAN METER, EDDY J., Assoc. Prof. of Education (1971). BA 1968, Univ. of N.M.; MA 1969, EdD 1971, N.M. St. Univ. (GF)
- WAUTHIER, RAYMOND AUGUST, Assoc. Prof. of Physical Education (1949). BS 1945, Albion Col.; MS 1947, Drake Univ.
- WILSON, ALFRED P., Assoc. Prof. of Education and Head, Dept. of Administration and Foundations of Education (1972). BS 1961, MEd 1965, EdD 1969, Utah St. Univ. (GF)
- WILSON, LAVISA K., Asst. Prof. (1972). BA 1959, Augustana Col.; MS 1961, Univ. of Neb., Omaha; PhD 1972, Univ. of Iowa. (GF)
- WILSON, RUSSELL C., Asst. Prof. (1972). BS 1959, Univ. of S.D.; MEd 1962, Univ. of Neb.; STM 1964, Wesley Theological Seminary, Washington, D.C.; PhD 1973, Univ. of Iowa.
- WISSMAN, JANICE R., Instr. in Education (1968). BS 1963, MS 1968, Kan. St. Univ.
- ZELENAK, MELCHIOR J., Asst. Prof. (1974). BA 1968, MA 1970, Trenton St. Col.; PhD 1973, Univ. of Iowa. (GF)



## 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**, Prof. of Chemical Engineering (1963, 1973). BS 1957, MS 1958, Univ. of Louisville; PhD 1962, Northwestern Univ. (GF)
- ANNIS, JASON CARL**, Assoc. Prof. of Mechanical Engineering; Staff Assoc., Institute for Environmental Research (1959, 1969). BS 1953, Univ. of Minn.; MS 1956, Mich. Tech. Univ.; PhD 1969, Kan. St. Univ. (GF)
- APPL, FREDERIC CARL**, Prof. of Mechanical Engineering (1960, 1964). BS 1954, MS 1955, PhD 1958, Carnegie Institute of Tech. (GF)
- AXTHELM, LARRY SPENCER**, Asst. Prof. of 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.; Certified Psychologist, N.Y. (GF)
- BEST, CECIL HAMILTON**, Prof. of Civil Engineering (1961, 1964). 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**, Prof. of Electrical Engineering (1970, 1973). 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 (1955, 1969). BS 1954, 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)
- 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. Grain Marketing Research Center.
- COOPER, PETER B.**, Prof. of Civil Engineering (1966, 1974). 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 Civil Engineering (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.
- 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.
- ECKHOFF, N. DEAN**, Assoc. Prof. of Nuclear Engineering; Director of Neutron Activation Analysis Laboratory; Director of Center for Energy Studies (1961, 1968, 1972, 1973). BS 1961, MS 1963, PhD 1964, 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; Assoc., Institute for Environmental Research (1958, 1967, 1968). BS 1951, National Taiwan Univ.; MS 1954, Kan. St. Univ.; MS in Math. 1958, PhD 1957, West Va. Univ. (GF)
- FAW, RICHARD EARL**, Prof.; Head, Department of Nuclear Engineering; Dir. of Shielding Facility (1962, 1966, 1968, 1972). BS 1959, Univ. of Cincinnati; PhD 1962, Univ. of Minn. Professional Engineer, 1970. (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 Emeritus (1929, 1973). 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.
- GALLAGHER, RICHARD RAY**, Assoc. Prof. of Electrical Engineering; Assoc., Institute for Environmental Research (1968, 1973). 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**, Prof. of Mechanical Engineering; Assoc., Institute for Environmental Research (1960, 1974). 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 Electrical Engineering (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.
- HIGHTOWER, RAY E.**, Asst. Prof. of Nuclear Engineering (1961, 1969). BS 1964, Kan. St. Univ.
- HOBSON, 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.; Assoc. Dean of Engineering; Dir., Engineering Experiment Station (1959, 1974). BS 1950, Tex. A & M; MS 1951, Iowa St. Univ.; PhD 1959, Mich. St. Univ. Professional Engineer in Iowa, 1952; Professional Engineer, 1974. (GF)
- HOLMES, ELWYN SPRUIELL**, Assoc. Prof. of Extension Agricultural Engineering (1966). BS 1943, MS 1953, Tex. A & M Univ.
- HONSTEAD, WILLIAM HENRY**, Prof. of Chemical Engineering; Dir., Kansas Industrial Extension Service; Executive Vice Pres. Kan. St. Univ. Research Foundation (1943, 1970, 1972). 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 Civil Engineering (1968, 1969). Graduation, 1956, Taiwan Provincial Taipei Institute of Technology; MS 1966, PhD 1969, Kan. St. Univ. (GF)
- HUANG, CHI-LUNG**, Prof. of Mechanical Engineering (1964, 1974). BS 1954, National Taiwan Univ.; MS 1960, Univ. of Ill.; Doctor of Engineering 1964, Yale Univ. (GF)
- HUMMELS, DONALD RAY**, Assoc. Prof. of Electrical Engineering (1970, 1974). BS 1967, MS 1968, 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**, Prof. of Industrial Engineering; Assoc., Institute for Environmental Research (1964, 1968, 1973). 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.; PhD 1974, N.C. St.
- JOHNSON, GARY LEE**, Assoc. Prof. of Electrical Engineering (1966, 1973). BS 1961, MS 1963, Kan. St. Univ.; PhD 1966, Okla. St. Univ. Professional Engineer, 1973. (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 Mechanical Engineering; Assoc., Institute for Environmental Research (1959, 1969). BS 1951, MS 1955, Univ. of Kan.; PhD 1968, Okla. St. Univ. Professional Engineer, 1960. (GF)
- KIRMSEY, PHILIP GEORGE**, Prof. of Mathematics; Prof. of Engineering (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.
- KNOTSMAN, HARRY DANIEL**, Assoc. Prof. of Civil Engineering (1957, 1973). BS 1951, MS 1961, Kan. St. Univ.; PhD 1965, Univ. of Colo. Professional Engineer, 1959. (GF)
- KOELLIKER, JAMES K.**, Asst. Prof. of Agricultural Engineering (1973). BS 1967, Kan. St. Univ.; MS 1969, PhD 1973, Iowa St. Univ. (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. Professional Engineer in Kan., 1974. (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.**, Assoc. Prof. of Nuclear Engineering, Dir. of Nuclear Reactor Facility (1970, 1974). 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)
- LENHART, DONALD HOWARD**, Assoc. Prof. of Electrical Engineering (1964, 1969). BS 1956, Kan. St. Univ.; MS 1958, Syracuse Univ.; PhD 1966, Univ. of N.M.; Professional Engineer, 1973 (GF)
- LESTER, THOMAS W.**, Asst. Prof. of Nuclear Engineering (1974). BS 1970, MS 1972, PhD 1974, Purdue Univ.
- LINDHOLM, JOHN C.**, Prof. of Mechanical Engineering (1960, 1974). BS 1949, Kan. St. Univ.; MS 1957, Univ. of Kan.; PhD 1961, Purdue Univ. Professional Engineer, 1954. (GF)
- LINDLY, EDWIN CURGUS**, Assoc. Prof. of Civil Engineering (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. (1944, 1971). 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)
- MCCORMICK, FRANK JAMES**, Prof. of Civil Engineering (1939, 1947). BS 1927, MS 1931, Iowa St. Univ. Professional Engineer, 1944. (GF)
- McGINITY, 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.; Acting Head, Department of Mechanical Engineering; Assoc., Institute for Environmental Research (1958, 1972, 1974). 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; Black and Veatch Professor (1956, 1965, 1974). 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 Coop Program (1948, 1958, 1974). 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.
- RATHBONE, DONALD E.**, Dean; Prof. of Electrical Engineering (1973). BS 1951, Purdue Univ.; MS 1956, Northwestern Univ.; PhD 1962, Univ. of Pittsburgh. (GF)
- ROHLES, JR., FREDERICK HENRY**, Prof. of Psychology; Prof. of Mechanical Engineering; Dir., Institute for Environmental Research (1963, 1973). BS 1942, Roosevelt Univ., Chicago; MA 1949, PhD 1956, Univ. of Tex. (GF)
- ROSEBRAUGH, VERNON HART**, Prof. of Civil Engineering (1953, 1973). 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.**, Assoc. Prof. of Industrial Engineering (1965, 1973). BS 1960, MS 1961, PhD 1967, Univ. of Wis. (GF)
- RUSSELL, EUGENE R.**, Assoc. Prof. of Civil Engineering (1974). BSCE 1958, Univ. of Mo.-Rolla; MS 1965, Iowa St. Univ.; PhD 1974, Purdue Univ. Professional Engineer, 1962. (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)
- SCHROCK, MARK DAVID**, Ext. Asst. of Extension Agricultural Engineering (1973). BS 1969, Kan. St. Univ.; MS 1971, Univ. of Ill.
- SHULTIS, J. KENNETH**, Assoc. Prof. of Nuclear Engineering (1970, 1974). 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, 1940. Certified Safety Professional, 1973. (GF)
- SMITH, BOB LEE**, Prof. of Civil Engineering (1948, 1965). BS 1948, MS 1953, Kan. St. Univ.; PhD 1963, 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**, Assoc. Prof. of Agricultural Engineering; Ag. Exp. Sta. (1969, 1973). AS 1958, Vincennes Univ.; BS 1960, MS 1963, Univ. of Ill.; PhD 1968, Purdue Univ. (GF)
- STEPHENS, LYLE EUGENE**, Asst. Prof. of Agricultural Engineering (1973). BS 1966, MS 1968, PhD 1971, Kan. St. Univ. U.S.D.A. Grain Marketing Research Center.
- STERMER, RAYMOND A.**, Assoc. Prof. of Agricultural Engineering (1974). BS 1950, MS 1958, PhD 1971, Tex. A & M 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 ENDSLEY**, Assoc. Prof. of Civil Engineering (1968, 1972). BS 1959, MS 1962, PhD 1968, Ill. Institute of Technology. Professional Engineer, 1970. (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. 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)
- 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 ELTON**, Instr. in Electrical Engineering (1970). BS 1961, MS 1962, Kan. St. Univ.
- WALKER, HUGH SANDERS**, Assoc. Prof. of Mechanical Engineering; Assoc. Dir., Institute for Computational Research in Engineering (1964, 1968). BS 1957, MS 1960, La. St. Univ.; PhD 1965, Kan. St. Univ. (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, St. 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)
- 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)
- ANNIS, PATTY SMITH**, Asst. Prof. of Family Economics; Agr. Exp. Sta. (1958, 1961). BS 1955, Miss. St. Col. for Women; MS 1957, Univ. of Tenn. (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)
- BERGEN, BETSY**, Asst. Prof. of Family and Child Development (1966, 1972). AB 1949, Ottawa Univ.; MS 1964, PhD 1972, Kan. St. Univ. (GF)
- BOLLMAN, STEPHAN 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**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1966, 1974). BS 1962, MS 1963, PhD 1967, Kan. St. Univ. (GF)
- BROCKMAN, HELEN L.**, Prof. of Clothing, Textiles and Interior Design Emerita (1967, 1973). 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)
- CARTER, ELOISE**, Instr. of Foods and Nutrition (1973). BS 1967, Southern Univ.; MS 1969, Tuskegee Institute.
- 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)
- CLARK, JOYCE M.**, Instr. of Foods and Nutrition (1973). BS 1949, Kan. St. Univ.; Med 1972, Wichita St. Univ.
- CORMANY, ESTHER MARGARET**, Assoc. Prof. of Clothing, Textiles and Interior Design Emerita; Agr. Exp. Sta. (1936, 1941, 1975). BS 1926, MS 1932, Kan. St. Univ. (GF)
- CRAIGIE, BARBARA**, Asst. Prof. of Clothing, Textiles and Interior Design Emerita (1954, 1963, 1975). BA 1932, Univ. of Minn.; MA 1942, Univ. of Mo. (GF)



- CROSS, MIRIAM H., Instr. of Clothing, Textiles and Interior Design (1973). BS 1964, Wash. St. Univ.; MS 1971, Ore. St. Univ.
- DAVIS, ALBERT J., Assoc. Prof. of Family and Child Development (1974). BS 1963, Fordham Univ.; MA 1964, Univ. of Conn.; PhD 1969, Pa. St. (GF)
- FINKELSTEIN, BEATRICE, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1967). BA 1933, Hunter Col.; MS 1939, Columbia Univ. (GF)
- FRYER, E. BETH, Assoc. Prof. of Foods and Nutrition; Agr. Exp. Sta. (1959). BS 1945, Univ. of N.M.; MS 1949, Ohio St. Univ.; PhD 1959, Mich. St. Univ. (GF)
- 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, 1969). BS 1944, MS 1950, Kan. St. Univ. (GF)
- HOEFLIN, RUTH, Acting Dean; Prof. of Home Economics (1957, 1960, 1974). BS 1940, Iowa St. Univ.; MA 1945, Univ. of Mich.; PhD 1950, Ohio St. Univ. (GF)
- HOFFMAN, DORETTA, Prof. of Home Economics; 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. (GF)
- KELL, LEONE BOWER, 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)
- KRAMER, MARTHA MORRISON, Prof. of Home Economics Emerita (1922, 1960). BS 1916, Univ. of Chicago; MS 1919, PhD 1922, Columbia Univ. (GF)
- LARSON, SUSAN S., Asst. Prof. of Family and Child Development (1955, 1956, 1962, 1974). BS 1940, Univ. of Iowa; MS 1942, Univ. of Wis.
- LATZKE, ALPHA CORRINE, 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.; MS 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)
- McNEIL, JOAN N., Instr. of Family and Child Development (1970). BS 1951, Kan. St. Univ.; MS 1956, Univ. of Minn.
- MILLER, JUDITH L., Instr. of Institutional Management (1973). BS 1967, Ouachita Baptist Univ.; MS 1972, Univ. of Mo.
- 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; MArch 1970, Kan. St. Univ.
- NEWELL, KATHLEEN, Asst. Prof. of Foods and Nutrition (1962). BS 1944, Kan. St. Univ.; MS 1951, Univ. of Wis.; PhD 1973, Univ. of Tenn.
- 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.
- PERENICH, THERESA A., Assoc. Prof.; Head, Department of Clothing, Textiles and Interior Design (1974). BS 1959, Fordham Univ.; MS 1972, PhD 1973, Fla. St. Univ. (GF)
- PETERSON, MARY D., Instr. of Clothing, Textiles and Interior Design (1968). BS 1958, MS 1959, Univ. of Tenn.
- PIERCE, GERARD J., Asst. Prof. of Clothing, Textiles and Interior Design (1974). BA 1957, Los Angeles St.; MA 1969, Calif. St. Col.
- PORESKY, ROBERT H., Asst. Prof. of Family and Child Development (1972). AB 1963, MS 1967, PhD 1969, Cornell Univ. (GF)
- PRICE, FAYE A., Instr. of Family and Child Development (1973). BS 1966, MS 1973, Okla. St. Univ.
- QUARTON, CAROL A., Asst. Prof. of Family and Child Development (1974). BA 1969, Univ. of Iowa; MS 1972, Pa. St. Univ.; PhD 1974, Pa. St. Univ.
- 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 1962, 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.
- ROACH, FAITH RUSSELL, Asst. Prof. of Institutional Management (1965, 1973). BS 1947, MS 1966, PhD 1973, Kan. St. Univ. (GF)
- RUSSELL, CANDYCE S., Asst. Prof. of Family and Child Development (1974). BS 1968, Cornell Univ.; MA 1972, Univ. of Minn.
- 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)
- SCHROCK, JANET M., Instr. of Clothing, Textiles and Interior Design (1974). BS 1964, Indiana Univ. Of Pa.; MS 1973, Okla. St. Univ.
- 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. of Institutional Management Emerita; Agr. Exp. Sta. (1951, 1961, 1975). BS 1931, Wash. St. Univ.; MS 1938, Iowa St. Univ. (GF)
- SPEARS, MARIAN C., Prof.; Head, Department of Institutional Management (1975). BS 1942, MS 1947, Western Reserve Univ.; PhD 1971, Univ. of Mo.
- 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)
- STREIT, LES D., Instr. of Institutional Management (1974). BS 1970, MS 1973, Kan. St. Univ.
- SWEATT, SUSAN C., Instr. of Clothing, Textiles and Interior Design. (1974). BA 1972, Univ. of Calif. at Davis; BS 1972, Univ. of Calif. at Davis; MA 1974, Mich. St. Univ.
- TINKLIN, GWENDOLYN Laverne, Prof. of Foods and Nutrition Emerita; Agr. Exp. Sta. (1943, 1956, 1975). BS 1940, MS 1944, Kan. St. Univ. (GF)
- TRAUTMAN, PATRICIA A., Instr. of Clothing, Textiles and Interior Design (1973). BA 1970, MA 1973, Mich. St. Univ.
- VADEN, ALLENE G., Asst. Prof. of Institutional Management (1971, 1973). BS 1960, Univ. of Tex.; MS 1967, Tex. Technological Col.; PhD 1973, Kan. St. Univ. (GF)
- WAKEFIELD, LUCILLE MARION, Prof.; Head, Department of Foods and Nutrition; Agr. Exp. Sta. (1966). BS 1949, MS 1956, Univ. of Conn.; PhD 1965, Ohio St. Univ. (GF)
- WARREN, CAROLYN C., Instr. of Family and Child Development (1974). AA 1966, Freed-Hardeman Col.; BS 1968, Florence St. Univ.; MS 1973, Univ. of Tenn.
- WEST, BESSIE BROOKS, Prof. of Institutional Management Emerita (1928, 1960). 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)
- WOODS, R. BRUCE, Instr. of Family and Child Development (1972). BA 1959, Wichita St. Univ.; MDiv 1962, Central Baptist Seminary.

## College of Veterinary Medicine

- ANDERSON, NEIL V., Assoc. Prof. of Comparative Gastroenterology (1967, 1970). Clinical Research Scientist. Diplomate, American Col. of Veterinary Internal Medicine, 1972. 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). BS 1962, DVM 1965, Kan. St. Univ.
- BLAUCH, BRUCE S., Asst. Prof. of Small Animal Medicine (1965, 1972). BS 1949, Pa. St. Univ.; VMD 1956, Univ. of Pa.; MS 1969, Kan. St. Univ. (GF)
- BRADLEY, WILLIAM M., Instr. of Equine Medicine (1972). BS 1970, DVM 1972, Colo. St. Univ.
- BRANDT, GARY W., Asst. Prof. of Equine Medicine (1969). BS 1964, DVM 1966, MS 1971, Univ. of Ill.
- BURROUGHS, ALBERT L., Assoc. Prof. of Virology (1960). Research Virologist. BS 1938, Univ. of Wyo.; DVM 1958, Tex. A & M Col.; MS 1941, Mont. St. Col.; PhD 1946, Univ. of Calif. (GF)
- BUTLER, HUGH C., Prof. of Surgery (1968). Diplomate, American Col. of Veterinary Surgeons, 1965. BS 1950, DVM 1954, MS 1968, Wash. St. Univ. (GF)
- CARNAHAN, DAVID L., Asst. Prof. of Obstetrics and Gynecology (1961, 1972). BS 1959, DVM 1959, MS 1964, Kan. St. Univ.
- CHAPMAN, THOMAS E., Assoc. Prof. of Physiological Chemistry (1969, 1974). Research Nutritional Physiologist. BS 1962, DVM 1964, PhD 1969, Univ. of Calif. (GF)
- CHEN, CHAO L., Assoc. Prof. of Physiology (1969, 1974). 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)
- CLARENBURG, RUDOLF, Prof. of Physiological Chemistry (1966, 1974). 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 1946, Iowa St. Col. (GF)
- COOK, JAMES E., Prof. of Pathology (1969, 1972). Dir. of Animal Resource Facility. 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. Research Pathologist. (1966, 1968). FRCVS 1962, BVSc 1949, PhD 1961, Univ. of Sydney. MRC Path. 1974. (GF)
- DORN, ALBERT S., Asst. Prof. of Small Animal Surgery (1973). DVM 1965, Univ. of Ill.; MS 1968, Auburn Univ.
- ERICHSEN, DEBORAH, Instr. of Physiology and Pharmacology (1968). BS 1966, DVM 1968, Kan. St. Univ.
- ERICKSON, LARRY E., Assoc. Prof. of Chemical Engg. and Physiology (1964, 1968). BS 1960, PhD 1964, Kan. St. Univ. (GF)
- FEDDE, M. ROGER, Prof. of Physiology (1964, 1973). 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. and Head, Dept. of Physiological Sciences (1963, 1970, 1975). DVM 1952, PhD 1970, Kan. St. Univ. (GF)
- FRICK, EDWIN J., Prof. Emeritus of Surgery and Medicine. (1919, 1935, 1966). DVM 1918, Cornell Univ. (GF)
- GRAY, ANDREW P., Assoc. Prof. of Pathology (1964, 1971). Research Pathologist. DVM 1953, MS 1963, PhD 1966, Kan. St. Univ. (GF)
- 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). Diplomate, American Col. of Veterinary Radiology, 1968. DVM 1949, MS 1966, Colo. St. Univ. (GF)



- HARRIS, STANLEY G., Asst. Prof. of Comparative Cardiology (1964, 1969). Diplomate, American Col. of Veterinary Internal Medicine, 1974. BS 1958, DVM 1960, MS 1967, Kan. St. Univ.; PhD 1970, Ohio St. Univ. (GF)
- HARTKE, GLENN T., Asst. Prof. of Anatomy (1962, 1974). BS 1958, DVM 1960, MS 1965, PhD 1974, Kan. St. Univ.
- HOWARD, DENNIS R., Asst. Instr., Diagnostic Lab. (1972). BS 1972, Kan. St. Univ.
- HOWARD, JIMMY L., Asst. Prof. of Large Animal Medicine (1973). BS 1955, MS 1959, Tex. Tech. Univ.; DVM 1960, 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., Temp. Asst. Prof. of Medicine (1965). DVM 1945, Kan. St. Univ.
- JOHNSON, LINDA M., Asst. Instr. (1970). BS 1969, Ohio Univ.
- JULIUS, MARCIA F., Asst. Instr., Asst. 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)
- 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)
- 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., Assoc. Prof. of Pathology (1960, 1974). 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., Assoc. Prof. of Clinical Pathology (1968, 1973). Research Clinical Pathologist. Diplomate, American Col. of Veterinary Pathologists, 1972. 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). Diplomate, American Col. of Veterinary Internal Medicine, 1972. DVM 1945, MS 1948, 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., Prof. of Toxicology, Medicine and Physiology (1959, 1973). Research Toxicologist. Diplomate, American Board of Veterinary Toxicology, 1968. BS 1957, DVM 1958, Cornell Univ.; MS 1962, Kan. St. Univ.; Dr. Med. Vet. 1964, Justus Liebig 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 1972, Univ. of Minn. (GF)
- RAILSBACK, LEE T., Asst. Dean and Assoc. Prof. (1961, 1971). BS 1936, DVM 1937, Kan. St. Univ.
- 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. (GF)
- 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. Diplomate, American Col. of Veterinary Pathologists, 1972. BS 1959, DVM 1961, Tex. A & M Univ.; PhD 1964, Univ. of Calif. (GF)
- 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 1972-1976).
- 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., Prof. of Pharmacology and Asst. Dean (1959, 1974). DVM 1952, MS 1962, PhD 1969, Kan. St. Univ. (GF)
- VESTWEBER, JEROME G. E., Asst. Prof. of Food Animal Medicine (1967, 1973). BS 1962, DVM 1964, Univ. of Minn.; PhD 1973, Kan. St. Univ.
- WEINMAN, DONALD E., Assoc. Prof. of Anatomy (1974). Research Anatomist. DVM 1946, Kan. St. Univ.; MSc 1960, PhD 1967, Univ. of Ga.
- WEST, JOHN L., Prof. of Pathology (1974). Research Pathologist. DVM 1936, Kan. St. Univ.; MS 1948, PhD 1952, Univ. of Wis. (GF)
- WESTFALL, JANE A., Assoc. Prof. of Microanatomy (1957, 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.

## Division of Continuing Education

- AYRES, BETTY A., Temp. Instr. (1974). BA 1961, Univ. of Iowa; MA 1973, Kan. St. Univ.
- BILES, BERTRAM R., Temp. Instr. (1972). BA 1963, Kan. St. Univ.
- BILES, LINNEA C., Temp. Instr. (1974). BA 1964, Kan. St. Univ.; MS 1966, Kan. St. Teachers Col. at Emporia; PhD 1974, Kan. St. Univ.
- CARLIN, JOHN E., Instr. (1975). BS 1958, Univ. of Notre Dame; BA 1962, Immaculate Conception Sem.; STB 1965, Catholic Univ.; MA 1966, Immaculate Conception Sem.
- DIECKHOFF, KENNETH L., Temp. Instr. (1969). BA 1965, Ft. Hays St. Col.; MA 1969, Univ. of Kan.
- HAROLD, E. NORMAN, Dir., Instr. (1963). BA 1960, Kan. St. Teachers Col. at Emporia; MA 1962, Vanderbilt Univ.
- HAZLETT, EMERSON L., Asst. Prof. (1974). BS 1948, MS 1964, Univ. of Kan.; PhD 1973, Kan. St. Univ.
- HERBERT, JOSEPH P., JR., Temp. Instr. (1974). BS 1952, Univ. of South-west La.; MS 1959, St. Louis Univ.; MS 1969, Univ. of Southern Calif.; PhD 1974, Kan. St. Univ.
- LOCKHART, WILLIAM, Asst. Prof. (1970, 1973). BS 1957, Kan. St. Col. at Pittsburg; MA 1960, Ariz. St. Univ.; PhD 1972, Kan. St. Univ.
- MAES, SUE C., Instr. (1974). BS 1969, Kan. St. Univ.
- MARTIN, HENRY M., Temp. Instr. (1974). BS 1971, Univ. of Ark.
- MICHAEL, DAVID E., Temp. Instr. (1971). BA 1961, Kan. Wesleyan 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.
- QUINN, JAMES E., Temp. Instr. (1973). BA 1959, Wichita St. Univ.; MA 1967, Kan. St. Teachers Col., Emporia.
- REICHOW, RONALD W., Temp. Instr. (1964). AA 1961, Kan. City Junior Col.; BS 1963, MS 1967, MS 1971, Kan. St. Univ.; PhD 1974, Kan. St. Univ.
- STAMEY, ROBERT W., Instr. (1972). BS 1971, Kan. St. Univ.
- STEFFEN, JOHN D., Asst. Prof. of Education (1967). BA 1956, Hamline Univ.; PhD 1968, Univ. of Minn.
- TERRY, ARLYS J., Temp. Instr. (1974). BS 1971, Univ. of Kan.
- WILLIAMSON, MICHAEL M., Asst. Dir., Asst. Prof. (1962). BS 1956, MA 1962, Kan. St. Univ.

## Division of Cooperative Extension

- ALBRIGHT, KENNETH A., Instr.; Area Extension Specialist, Rural Development (1972). BS 1952, Kan. St. Univ.; MEd 1967, Colo. St. Univ.
- ALLEN, ERIC B., Instr.; Area Extension Economist, Farm Management (1973). BS 1971, MS 1972, Kan. 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.; Associate 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.
- 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 Ala.
- 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.
- BALLOU, RUSSELL S., Instr.; Extension Information, Motion Picture Production (1974). BS 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.
- BITTEL, STEVEN G., Asst. Prof.; Area Extension Specialist, Community Resource Development (1973). BA 1969, Ft. Hays St. Col.; MS 1973, Kan. St. Univ.
- BLANKENHAGEN, ELMER W., Asst. Prof. Emeritus; 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.
- BLEVINS, KENNETH M., Extension Specialist, TV Production (1974). BS 1951, Kan. St. Univ.
- BOGLE, T. ROY, Assoc. Prof.; Area Extension Specialist, Economics (1973). BS 1960, Pa. St. Univ.; PhD 1973, Univ. of Mo.
- 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.
- BRATCHER, STANLEY W., Area Extension Economist, Farm Management (1974). BS 1969, Okla. St. Univ.; MS 1974, Kan. 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; MS 1971, Kan. St. Univ.
- 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.
- BUSSET, GLENN M., Prof.; State Leader, 4-H and Youth (1941, 1966). BS 1941, Kan. St. Univ.; MS 1957, Cornell Univ.; PhD 1965, Univ. of Wls. (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.
- CLAFLIN, LARRY E., Asst. Prof.; Extension Spec. in Plant Pathology (1975). BS 1963, N.W. St. Col., Okla.; MS 1969, East Tex. St. Univ.; PhD 1972, Kan. St. Univ.
- CLARKE, MARY P., Extension Assoc.; Extension Specialist, Nutrition Education (1973). BS 1950, Ind. Univ.; MS 1970, Ind. St. Univ.; PhD 1973, Kan. St. Univ.
- CLEAVINGER, EUGENE A., Prof. Emeritus; Extension Specialist In Crops and Soils (1926, 1947). BS 1925, Kan. St. Univ.
- CLONTS, HALLIE L., Assoc. Prof.; Assoc. St. Leader, Limited Resources Program (1973). BS 1943, Univ. of Mo.; EdM 1964, Boston Univ.; EdD 1972, Ariz. St. Univ.
- COLLINS, BILL D., Instr.; Area Extension Economist, Farm Management (1954). BS 1951, Kan. St. Univ.; MS 1962, Univ. of Wls.
- COOLIDGE, JOHN H., Prof. Emeritus; Extension Economist In Farm Management (1926, 1948). BS 1925, MS 1932, Kan. St. Univ.
- CORAH, LARRY R., Extension Specialist, Beef Cattle Nutrition and Management (1974). BS 1964, N.D. St. Univ.; MS 1967, Mich. St. Univ.
- COX, LAWRENCE J., Prof.; Area Extension Dir. (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.
- DeLANO, FREDERICK D., Assoc. Prof.; Extension Economics, Livestock Marketing and Agricultural Firm Management (1974). BS 1961, Kan. St. Univ.; MS 1974, Univ. of Mo.
- DEUTSCH, HENRY A., Asst. Prof.; Area Extension Specialist, Resource Conservation and Development (1964, 1972). BS 1957, MS 1964, Univ. of Mo.
- DeWEESE, PAUL F., Asst. Prof.; Extension Specialist, Radio and TV (1948, 1966). BS 1947, Kan. St. Univ.
- DEXTER, MIRIAM L., Assoc. Prof. Emeritus; Asst. Extension Editor, Publications (1944). BS 1926, MS 1933, 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. St. 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.
- DIKING, 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.
- ELLITHORPE, VERA M., Prof.; Extension Specialist, Home Management (1938, 1947). BS 1935, MS 1939, Kan. St. Univ.; PhD 1963, Ohio St. Univ.
- EVERSON, EVERETT K., Farm Management Association Fieldman (1974). BS 1973, MS 1974, Kan. 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., Assoc. Prof.; Area Extension Dir. (1967, 1973). 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.
- FOLLETT, R. HUNTER, Assoc. Prof.; Extension Specialist, Soil Fertility and Management; BS 1957, MS 1963, PhD 1969, Colo. St. 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 Firm 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 (1955). BS 1964, Univ. of Mo.
- GERMANN, RALPH N., Instr.; Area Extension Economist, Farm Management (1956, 1971). BS 1951, MS 1957, Kan. St. Univ.
- GOETTING, MARSHA A., Asst. Prof.; Area Extension Home Economist (1974). BS 1973, MS 1974, Kan. St. Univ.
- GOULD, LEONARD K., Instr.; 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). BA 1948, Peru Neb. St. Teachers Col.; MA 1955, Univ. of Minn.
- GREEN, PARMAN R., Farm Management Association Fieldman (1974). BS 1971, MS 1972, Univ. of Mo.
- GREENE, LAURENZ 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. Dir. of Extension (1935, 1950). BS 1934, MS 1948, Kan. St. Univ.; PhD 1961, Univ. of Wls. (GF)
- GUTHRIE, GERSILDA, Asst. Prof. Emeritus; 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 Wls.
- HANNA, JOHN B., Assoc. Prof.; Extension Specialist In 4-H and Youth (1934, 1960). BS 1932, MS 1954, Kan. St. Univ.
- HARMES, DAVID L., Instr.; Extension Specialist in Visual Aids (1973). BFA 1968, Kan. City Art Institute.
- HARPER, HAROLD B., Assoc. Prof. Emeritus; 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.
- HENDRIX, LARRY D., Asst. Prof.; Area Extension Specialist, Community Resource Development (1974). BS 1963, MS 1974, Univ. of Neb.
- HEROD, JON C., Instr.; Area Extension Economist In Farm Management (1957). BS 1957, Kan. St. Univ.
- HOLMES, ELWYN S., Assoc. Prof.; Extension Agricultural Engineer (1966). BS 1943, MS 1953, Tex. A & M Univ.
- HOSS, RAY M., Assoc. Prof.; Area Extension Dir. (1935, 1958). BS 1930, Kan. St. Univ.
- HOWE, JERELDINE E., Instr.; Extension Specialist, Clothing and Textiles (1965). BS 1951, MS 1965, Kan. St. Univ.
- JACKSON, MARION E., Assoc. Prof.; Extension Economist, Poultry Marketing and Production (1945). BS 1941, Purdue Univ.; MS 1955, Kan. St. Univ.
- JANSSEN, JOHN R., Instr.; Area Extension Economist, Farm Management (1973). BS 1971, Purdue Univ.; MS 1973, 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 Wls. (GF)
- JONES, HAROLD E., Prof.; Extension Specialist, Soil and Water Conservation (1946, 1956). BS 1940, Kan. St. Univ.; MS 1942, PhD 1949, Purdue Univ. (GF)
- JORNS, WILLIAM J., Asst. Prof.; Coordinator, Extension Staff Development (1971). BS 1954, Kan. St. Univ.; DED 1971, N.C. St. Univ.
- KAHL, MARY L., Asst. Prof.; Asst. Extension Editor, Publications (1974). BS 1966, Southwest Mo. St.; MS 1974, Iowa 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. Emeritus; Extension Specialist In Plant Pathology (1934, 1954). BS 1932, MS 1953, Kan. St. Univ.
- KING, JR., RICHARD F., Assoc. Prof.; Area Extension Dir. (1938, 1962). BS 1938, MS 1957, Kan. St. Univ.
- KUEHN, LOWELL D., Instr.; Section Leader and Extension Television Producer (1962, 1971). BS 1950, Iowa St. Univ.
- KOENIG, MARGARET A., Prof. Emeritus; Assoc. Home Economics Leader (1929, 1959). BS 1928, Kan. St. Univ.; MS 1958, Univ. of Wls.
- 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.; Extension Forester, Environmental Forestry (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.
- MCREYNOLDS, KENNETH L., Asst. Prof.; Area Extension Economist (1949, 1960). BS 1950, MS 1954, Kan. St. Univ.
- MANN, RAY H., Assoc. Prof.; Area Extension Dir. (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 1970, 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., Asst. Prof.; 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.
- MOCK, DONALD E., Asst. Prof.; Area Extension Specialist, Crop Protection (1973). BA 1959, Colo. St. Univ.; PhD 1973, Cornell 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.; Extension Forester, Fire Control (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.
- MUSIL, E. LEE, Asst. Prof.; Asst. Extension Editor, Agriculture (1974). BS 1971, MS 1972, 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. St. Extension Forester (1966, 1969). BS 1959, Utah St. Univ.; MS 1968, Univ. of Mo.
- NEAL, MARCUS L., Extension Asst., Animal Science and Industry (1974). BS 1971, Kan. St. Univ.
- NEFF, LEONARD F., Assoc. Prof. Emeritus; Coordinator of Extension Personnel Training (1924, 1958). BS 1922, Purdue Univ.
- NELSON, DEVERE V., Asst. Prof.; Extension Specialist, Radio (1973). BS 1949, Kan. St. Univ.
- NELSON, VAUGHN L., Instr.; Area Extension Economist, Farm Management (1972). BS 1967, MS 1970, Kan. St. Univ.
- NEUFELD, DOROTHY H., Assoc. 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.; Area Extension 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.
- ORWIG, THOMAS W., Asst. Prof.; Area Extension Specialist, Livestock Production (1974). BS 1949, Okla. St. Univ.; MS 1974, 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.
- PECK, ERNEST G., Asst. Prof.; Extension Specialist, Visual Aids (1955, 1967). BS 1950, MS 1965, Kan. St. Univ.
- PENNER, KAREN P., Instr.; Extension Specialist, Expanded Food and Nutrition Educ. Program (1973). BS 1971, MS 1972, 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.; Extension Forester, Environmental Forestry (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. St. 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.
- REINHARDT, LESLIE R., Asst. Prof.; Area Extension Specialist, Crop Science (1972, 1973). BS 1963, Kan. St. Univ.; PhD 1969, Clemson Univ.
- RINGLER, WILBER E., Prof.; Asst. Dir. of Extension (1957). BS 1948, MS 1949, Univ. of Neb.; PhD 1958, Univ. of Wis. (GF)
- ROBBINS, BENNY S., Asst. Prof.; Area Extension Specialist, 4-H and Youth (1967, 1973). BS 1966, MS 1971, Okla. St. Univ.
- ROWLAND, JACK J., Asst. Prof.; Area Extension Forester (1969). BS 1968, MS 1970, Univ. of Mo.
- SAMPSON, MICHAEL W., Asst. Prof.; Extension Specialist, Area Communications (1974). BS 1968, Univ. of Mo.; MS 1974, Wash. St. Univ.
- SCHAFER, DAVID E., Asst. Prof.; Extension Specialist, Meats (1972). BS 1963, Univ. of Minn.; PhD 1972, Kan. St. Univ.
- SCHINDLER, DALE E., Assoc. Prof.; Extension Architect (1955, 1961). BArch 1953, MS 1960, Kan. St. Univ. Registered Architect.
- 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.
- SCHWARTZ, FRANKLIN L., Asst. Prof.; Area Extension Specialist, Livestock Production (1974). BS 1967, MS 1969, S.D. St. Univ.; PhD 1974, N.C. St. Univ.
- SELBY, WALTER E., Assoc. Prof. Emeritus, 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.; Extension Forester, Tree Improvement (1964, 1973). BS 1951, West Va. Univ.; MS 1967, PhD 1972, Kan. St. Univ.
- SISK, ENSLEY J., Asst. Prof.; Area Extension Specialist, Community Resource Development (1974). BS 1954, MS 1968, 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.
- SMITH, QUENTIN, Instr.; Area Extension Economist, Farm Management (1973). BS 1967, Ohio St. Univ.; MS 1972, 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.
- SPAETH, CLIFFORD W., Asst. Prof.; Extension Specialist, Animal Science (1974). BS 1965, MS 1967, Tex. A & M; PhD 1974, Kan. St. Univ.
- SPALDING, SUSAN S., Asst. Prof.; Area Extension Specialist, Human Development and Family Relations (1974). BS 1968, Univ. of Ill.; MS 1973, Univ. of Minn.
- 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.
- 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.
- SULLINS, WILLIAM S., Asst. Prof.; Asst. Extension Editor, Agriculture (1974). BS 1953, Univ. of Okla.; MS 1972, 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.
- TUCKER, MARY E., Assoc. Prof.; Extension Specialist, Environmental Family Housing (1974). BS 1953, Northeast St. Col., Okla.; MS 1959, Okla. St. Univ.; MS 1969, Iowa St. Univ.
- 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.
- UTERMOEHLEN, RALPH E., Assoc. Prof.; Area Extension Specialist, Community Resource Development (1974). BS 1949, Kan. St. Univ.; MS 1970, Kan. 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., Assoc. Prof.; Area Extension Specialist, Livestock Production (1936, 1961). BS 1936, Univ. of Mo.; MS 1965, Kan. St. Univ.
- WHIPPS, LOREN E., Assoc. 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)
- WHITSON, THOMAS D., Instr.; Area Extension Specialist, 4-H and Youth (1970, 1973). BS 1965, Tex. Tech. Col.; MS 1970, East Tex. St. Univ.



WIGGINS, HELEN B., Instr.; Area Extension Home Economist (1962, 1972). BA 1947, Univ. of Kan.; MS 1969, Kan. St. Univ.  
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

ADAMS, JAMES P., Atchison County (1971). Effingham.  
ADDISON, CONALL E., Stafford County (1974). St. John.  
BARNES, JOHN H., Harvey County (1953). Newton.  
BATES, GEORGE A., Clark County (1971). Ashland.  
BELL, WARREN W., Coffey County (1974). Burlington.  
BIBY, VIRGIL H., Butler County (1966). El Dorado.  
BLAIR, W. LAWRENCE, Linn County (1960). Mound City.  
BOZWORTH, ROBERT W., Franklin County (1960). Ottawa.  
BULK, HERBERT W., Shawnee County (1949). Topeka.  
BURKHART, PEYTON H., Nemaha County (1962). Seneca.  
BUSBY, W. DARREL, Sherman County (1971). Goodland.  
CARLSON, VIRGIL P., Ellsworth County (1954). Ellsworth.  
CARSON, JAMES D., Stevens County (1967). Hugoton.  
CHISAM, DONALD L., Saline County (1968). Salina.  
CONRAD, WILLIAM A., Gove County (1974). Gove.  
COX, WILLIAM E., Sedgwick County (1957). Wichita.  
DAUBER, DONALD C., Hodgeman County (1959). Jetmore.  
DUCKERS, JR., HARRY G., Wyandotte County (1943). Kansas City.  
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., Ness County (1971). Ness City.  
FORD, ROY D., Stanton County (1964). Johnson.  
FROMM, KENNETH W., Mitchell County (1953). Beloit.  
GEORGE, HERSCHEL C., Miami County (1970). Paola.  
GILBERT, ROBERT W., Republic County (1970). Belleville.  
GOLD, GARRETT L., Rawlins County (1973). Atwood.  
GOLLADAY, RICHARD E., Hamilton County (1957). Syracuse.  
GOTTSCH, A. HAROLD, Reno County (1954). Hutchinson.  
GRIDER, JAMES T., Sheridan County (1974). Hoxie.  
GRIFFITH, LESTER E., Marion County (1949). Marion.  
GRIGGS, OTIS R., Osborne County (1974). Osborne.  
HAGER, DARREL B., Cheyenne County (1974). St. Francis.  
HARDING, WARREN G., Rooks County (1955). Stockton.  
HARRINGTON, MAURICE C., Anderson County (1958). Garnett.  
HARRIS, A. EUGENE, Meade County (1938). Meade.  
HELLWIG, DONALD E., Lincoln County (1973). Lincoln.  
HENDERSHOT, ROGER L., Ellis County (1941). Hays.  
HENRY, LARRY G., Finney County (1956). Garden City.  
HOLDER, MICHAEL S., Chase County (1973). Cottonwood Falls.  
HOUBLER, JAMES A., Clay County (1974). Clay Center.  
HOSIE, DARREL D., Cloud County (1968). Concordia.  
HUNDLEY, JR., WILLIAM C., Rice County (1965). Lyons.  
HUTCHINS, GREGORY K., Elk County (1974). Howard.  
JEFFREY, F. DUANE, Chautauqua County (1965). Sedan.  
JEPSEN, DELBERT D., Russell County (1942). Russell.  
JOHNSON, ARTHUR R., Jefferson County (1958). Oskaloosa.  
KEELER, GARRY L., Washington County (1967). Washington.  
KELLEY, PAUL W., Neosho County (1971). Erie.  
KIVETT, HARRY L., Seward County (1957). Liberal.  
KRAISINGER, WILBUR S., Pratt County (1951). Pratt.  
KUBIK, RICHARD W., Thomas County (1949). Colby.  
LADD, DALE L., Morris County (1972). Council Grove.  
LANHAM, DALE L., Woodson County (1974). Yates Center.  
LEVALLEY, JR., GERALD E., Doniphan County (1967). Troy.  
LINE, MERLINE E., Kearney County (1946). Lakin.  
LINN, JACK A., Wilson County (1966). Fredonia.  
LOYD, DONALD G., Greeley County (1968). Tribune.  
MADDUX, ALBERT G., Scott County (1972). Scott City.  
MALEY, ALVIN E., Lyon County (1953). Emporia.  
MANRY, E. CLIFFORD, Pawnee County (1940). Larned.  
MARLOW, DAROLD D., Wabaunsee County (1950). Alma.  
MAXWELL, THOMAS R., Allen County (1954). Iola.  
McCULLY, WILLIAM B., Harper County (1974). Anthony.  
McGINNESS, KENNETH E., Johnson County (1954). Olathe.  
McMASTER, GERALD O., Brown County (1951). Hiawatha.  
McWILLIAMS, DONALD D., Wallace County (1956). Sharon Springs.  
MEIREIS, CLIFFORD L., Norton County (1955). Norton.  
MILLIGAN, JAMES A., Edwards County (1974). Kinsley.  
NELSON, ROSS M., Logan County (1959). Oakley.  
NEWCOMER, GLENN R., Bourbon County (1965). Fort Scott.  
NEWSOME, B. W., Riley County (1955). Manhattan.  
NYHART, SYLVESTER, Phillips County (1959). Phillipsburg.  
O'CONNOR, JOSEPH P., Geary County (1975). Junction City.  
OLTMANN, PAUL G., Marshall County (1964). Marysville.

PEVERLEY, BRUCE L., Greenwood County (1974). Eureka.  
PURDY, RAY E., Gray County (1971). Cimarron.  
RADKE, JOHN E., Haskell County (1971). Sublette.  
RECTOR, W. KIRBY, Lane County (1974). Dighton.  
REINHARDT, N. KENT, Decatur County (1972). Oberlin.  
RIAT, LARRY D., Dickinson County (1961). Abilene.  
ROBERTSON, JOHN F., Comanche County (1956). Coldwater.  
ROWE, JR., SAMUEL S., Sumner County (1965). Wellington.  
SCHLESNER, NORMAN E., Kingman County (1973). Kingman.  
SCHOENTHALER, TERRY R., Rush County (1973). LaCrosse.  
SEYFERT, RONALD J., Ottawa County (1969). Minneapolis.  
SHIVELY, OWEN D., Labette County (1972). Altamont.  
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.  
STAGG, BEVERLY R., McPherson County (1940). McPherson.  
STROUD, NELSON E., Geary County (1952). Junction City.  
TONN, STEVEN R., Graham County (1973). Hill City.  
VAN CLEVE, JOSEPH E., Kiowa County (1973). Greensburg.  
VAN METER, EARL L., Douglas County (1960). Lawrence.  
WALKER, MARSHALL F., Grant County (1951). Ulysses.  
WAREHAM, ROBERT E., Jackson County (1968). Holton.  
WARY, JR., RAYMOND E., Cherokee County (1958). Columbus.  
WESTFAHL, STEVEN A., Osage County (1971). Lyndon.  
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.  
WOOD, BILLY L., Jewell County (1974). Mankato.

## COUNTY EXTENSION AGRICULTURAL AGENTS

KUECK, DON L., Reno County (1968). Hutchinson.  
LINDQUIST, JAMES L., Riley County (1974). Manhattan.  
ORR, BRYCE, Sedgwick County (1952). Wichita.  
SPRINGER, KENTON B., Saline County (1974). Salina.  
TURNER, R. LYLE, Johnson County (1974). Olathe.

## COUNTY EXTENSION HOME ECONOMISTS

ADDISON, DEEMA J., Ellsworth County (1973). Ellsworth.  
BARNES, HELEN L., Linn County (1964). Mound City.  
BIEHL, FLORENCE F., Johnson County (1952). Olathe.  
BLENDER, SHARON K., Wilson County (1974). Fredonia.  
BLEVINS, OLETHA L., Douglas County (1959). Lawrence.  
BRANDEN, ELSIE P., Finney County (1955). Garden City.  
BUSSMAN, DERINDA G., Barton County (1971). Great Bend.  
CARLSON, LOIS O., Neosho County (1964). Erie.  
CARR, LINDA J., Montgomery County (1963). Independence.  
CASEY, LINDA M., Edwards County (1974). Kinsley.  
CLARKSON, JEAN K., Pratt County (1970). Pratt.  
CLINE, DIANN W., Saline County (1974). Salina.  
CLOUTIER, BRENDA B., Geary County (1974). Junction City.  
COFFMAN, CRYSTAL, Harper County (1972). Anthony.  
COLLINS, GEORGINA L., Woodson County (1973). Yates Center.  
CONLEY, JOSEPHINE, Johnson County (1955). Olathe.  
CRESS, JEANICE A., Allen County (1955). Iola.  
CURRIE, TRELLA, Cloud County (1955). Concordia.  
DALBEY, CAROL A., Barber County (1974). Medicine Lodge.  
DAVISON, ALVERA M., Ness County (1973). Ness City.  
DAWSON, RITA T., Coffey County (1971). Burlington.  
DeGEER, KATHERINE A., Comanche County (1966). Coldwater.  
DOMSCH, L. ANN, Rawlins County (1959). Atwood.  
DUGGAN, MARGARET H., Butler County (1963). El Dorado.  
DUNNING, BEVERLY K., Sedgwick County (1964). Wichita.  
FELBUSH, LINDA K., Wabaunsee County (1971). Alma.  
FISHER, SHARON G., Meade County (1969). Meade.  
FRANKENBERY, JANET K., Greenwood County (1971). Eureka.  
FREY, ALICE L., Grant County (1968). Ulysses.  
GAFFORD, NANCY M., Nemaha County (1958). Seneca.  
GASTON, GLORIA J., Marshall County (1960). Marysville.  
GIBBS, MARY LOU, Pottawatomie County (1966). Westmoreland.  
GLENN, MARILYN S., Kingman County (1971). Kingman.  
GOETTEL, EVON W., Cherokee County (1969). Columbus.  
GOODHEART, CLARENE, Rooks County (1974). Stockton.  
GUERRERO, JANICE B., Stevens County (1972). Hugoton.  
GUTHRIE, JANET K., Hamilton County (1974). Syracuse.  
HAYES, MARY M., Smith County (1962). Smith Center.  
HEINLY, KAYANN, Riley County (1957). Manhattan.  
HELLAR, BERNICE S., Franklin County (1973). Ottawa.  
HERBSTER, MARGARET J., Brown County (1971). Hiawatha.  
HODGES, R. JEAN, Sedgwick County (1964). Wichita.  
HODSON, JANIS E., McPherson County (1974). McPherson.  
HOLDREN, MARY F., Jewell County (1964). Mankato.  
HOSKINS, JEANNE A., Barton County (1971). Great Bend.  
HOWARD, CHRISTINA M., Russell County (1971). Russell.  
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.  
 JOHNSON, JUANITA B., Crawford County (1948). Girard.  
 KENT, NANCY JO, Ford County (1958). Dodge City.  
 KERNS, GAIL A., Lyon County (1971). Ottawa.  
 KIEHL, BEVERLY J., Crawford County (1974). Girard.  
 KINDLER, BEVERLY L., Norton County (1951). Norton.  
 KOLARIK, DEBORAH A., Wichita County (1973). Leoti.  
 KOONS, PATRICIA G., Kearny County (1974). Lakin.  
 KROEMER, ELVINA R., Atchison County (1974). Effingham.  
 KURTENBACH, THERESA J., Phillips County (1974). Phillipsburg.  
 LAUBHAN, SUE P., Saline County (1967). Salina.  
 LEACH, GLINDA B., Shawnee County (1967). Topeka.  
 MACY, TRUDY M., Douglas County (1974). Lawrence.  
 MANN, MARY E., Trego County (1974). Wakeeney.  
 MANVILLE, ARLETA, Jefferson County (1970). Oskaloosa.  
 MARK, EMILY R., Leavenworth County (1964). Leavenworth.  
 MEIER, VIVIAN L., Lincoln County (1964). Lincoln.  
 MERRIMAN, SCHARON S., Reno County (1971). Hutchinson.  
 MOBLEY, GARLON R., Logan County (1974). Oakley.  
 MOLZ, DIXIE E., Stafford County (1953). St. John.  
 MOLZEN, SHARON B., Harvey County (1969). Newton.  
 MONTGOMERY, CONNIS N., Lane County (1973). Dighton.  
 MUCKLOW, BONNIE M., Haskell County (1973). Sublette.  
 NEUSCHWANDER, OCIE A., Greeley County (1957). Tribune.  
 NUSSER, KAREN C., Morton County (1972). Elkhart.  
 OLSON, CAROLYN D., Marion County (1970). Marion.  
 PALMER, RACHEL F., Sedgwick County (1941). Wichita.  
 PEARSON, GLENDA N., Washington County (1965). Washington.  
 PENNY, DONNA K., Doniphan County (1972). Troy.  
 PHILLIPS, SUSAN K., Mitchell County (1973). Beloit.  
 QUIRING, SUSAN M., Pawnee County (1973). Larned.  
 RAY, VICKIE D., Graham County (1972). Hill City.  
 REDIKER, JANET B., Morris County (1966). Council Grove.  
 RICHARDS, JEAN L., Thomas County (1974). Colby.  
 RICHARDSON, LINDY L., Chase County (1973). Cottonwood Falls.  
 ROBINSON, ELSIE C., Decatur County (1969). Oberlin.  
 ROLLINS, GAIL A., Wyandotte County (1972). Kansas City.  
 RUMMAGE, MARY A., Sedgwick County (1974). Wichita.  
 RUNFT, DONNA M., Elk County (1971). Howard.  
 SCHILLING, PATRICIA M., Dickinson County (1971). Abilene.  
 SCHROEDER, DOROTHEA A., Wyandotte County (1942). Kansas City.  
 SCHUSTER, NANCY D., Anderson County (1973). Garnett.  
 SCHWERTFEGER, JOLENE J., McPherson County (1971). McPherson.  
 SEBES, DOROTHY D., Hodgeman County (1971). Jetmore.  
 SHIELDS, SANDRA A., Cowley County (1966). Winfield.  
 SINIARD, JOYCE P., Stanton County (1971). Johnson.  
 STEFFENS, PATRICIA E., Crawford County (1971). Girard.  
 STUBBS, EUNICE F., Ottawa County (1974). Minneapolis.  
 SULLIVAN, CARLA M., Chautauqua County (1973). Sedan.  
 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.  
 TOOT, JANICE, Seward County (1966). Liberal.  
 TRUAX, RUBY C., Sedgwick County (1959). Wichita.  
 TUPPER, JANE S., Wallace County (1969). Sharon Springs.  
 UNDERHILL, DEANNA K., Scott County (1974). Scott City.  
 VICE, FAYE E., Labette County (1946). Altamont.  
 VIOLA, L. ANN, Shawnee County (1974). Topeka.  
 WASSERMAN, SUSAN L., Sherman County (1974). Goodland.

WATTS, TRANDA W., Gove County (1973). Gove.  
 WEAVER, JANET I., Clay County (1974). Clay Center.  
 WEAVER, MAE E., Barton County (1952). Great Bend.  
 WEAVER, MARSHA K., Republic County (1972). Belleville.  
 WILKEY, MARGARET M., Ottawa County (1968). Minneapolis.  
 WOLFE, FRANCES M., Wyandotte County (1971). Kansas City.  
 WRIGHT, BETTY L., Sheridan County (1974). Hoxie.  
 WUTKE, BETTY D., Bourbon County (1968). Fort Scott.  
 YOUNG, CAROL H., Sumner County (1966). Wellington.

## 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.  
 BROTHERS, MARY F., Cowley County (1974). Winfield.  
 CHARVAT, LEO D., Butler County (1971). El Dorado.  
 CLAWSON, ELDON L., Shawnee County (1965). Topeka.  
 DAVIS, ROBERT J., Reno County (1967). Hutchinson.  
 FULTZ, WILLIAM E., Sedgwick County (1962). Wichita.  
 KIEHL, BEVERLY J., Crawford County (1974). Girard.  
 KOHMAN, CAROL A., Ellis County (1974). Hays.  
 LANHAM, K. EUGENE, Wyandotte County (1971). Kansas City.  
 LOVEDAY, RITA T., Riley County (1974). Manhattan.  
 MALONE, ALTON R., Lyon County (1973). Emporia.  
 PRESTON, LINDA R., Saline County (1970). Salina.  
 RECTOR, RALPH B., Leavenworth County (1949). Leavenworth.  
 REED, JERRY D., Sumner County (1973). Wellington.  
 ROHS, FREDERICK, Harvey County (1973). Newton.  
 SCHNEIDER, LARRY R., Grant County (1974). Ulysses.  
 SHARP, JAMES M., Sedgwick County (1973). Wichita.  
 SHAY, PEGGY O., Stevens County (1974). Hugoton.  
 SMITH, JENELL M., Sedgwick County (1974). Wichita.  
 SMITH, T. NEIL, Seward County (1973). Liberal.  
 SNAPP, GERALD E., Montgomery County (1972). Independence.  
 STEPHENS, DONALD J., Rice County (1972). Lyons.  
 STRITZKE, ROBERT D., Dickinson County (1973). Abilene.  
 STUDER, RAYMOND L., McPherson County (1966). McPherson.  
 TITTEL, RONALD L., Miami County (1972). Paola.  
 TONEY, JULIAN G., Douglas County (1973). Lawrence.  
 VAN SKIKE, WILLIAM V., Barton County (1950). Great Bend.  
 VERDOORN, SUSAN M., Franklin County (1974). Ottawa.  
 WEAVER, ELDON R., Cowley County (1969). Winfield.  
 WILSON, MARGARET, Ford County (1973). Dodge City.  
 WINEINGER, PATRICK S., Kingman County (1974). Kingman.

## COUNTY EXTENSION HORTICULTURAL AGENTS

KIBBY, JIMMIE R., Wyandotte County (1966). Kansas City.  
 MORRIS, MAX, Shawnee County (1960). Topeka.  
 STOUSE, LAWRENCE D., Johnson County (1966). Olathe.  
 THOLE, H. THOMAS, Barton County (1966). Great Bend.  
 WARMINSKI, NORMAN C., Sedgwick County (1969). Wichita.



# Degrees Conferred in 1974

## Undergraduate

	Men	Women	Total
<b>College of Agriculture</b>			
Agriculture	290	21	311
Bakery Science & Mgmt.	8	0	8
Feed Science & Mgmt.	12	0	12
Biochemistry	1	0	1
Milling Science & Mgmt.	7	0	7

## College of Architecture & Design

Architecture	76	2	78
Interior Architecture	7	1	8
Landscape Architecture	13	1	14
B.S. in Building Const.	32	0	32

## College of Arts & Sciences

Bachelor of Arts	39	71	110
Bachelor of Fine Arts	10	10	20
Bachelor of Music	0	1	1
Bachelor of Science	544	253	797
B.S. in Music Ed.	8	5	13
B.S. in Physical Ed.	36	33	69

## College of Business Administration

B.S. in Bus. Adm.	270	39	309
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## College of Education

Bachelor of Science	52	62	114
B.S. in Elem. Ed.	10	154	164

## College of Engineering

Agricultural Engg.	11	0	11
Chemical Engg.	18	1	19
Civil Engg.	25	1	26
Electrical Engg.	43	1	44
Industrial Engg.	12	0	12
Mechanical Engg.	42	1	43
Nuclear Engg.	14	4	18

## College of Home Economics

Home Economics	1	385	386
Home Econ. & Jour.	0	2	2
Restaurant Mgmt.	6	0	6

## College of Veterinary Medicine

Veterinary Medicine	75	9	84
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## Graduate School

### Masters

## Agriculture and Natural Resources

Agronomy	15	0	15
Animal Science	15	1	16
Poultry Science	3	0	3
Horticulture	5	2	7
Agric. Economics	5	0	5
Food Science	7	0	7
Grain Science	9	1	10

## Architecture and Design

Master of Arch.	8	2	10
Regional & Comm. Planning	21	6	27

## Biological Sciences

Biology	3	1	4
Plant Pathology	1	0	1
Genetics	1	0	1
Pathology	1	0	1
Microbiology	2	1	3
Entomology	5	0	5
Parasitology	1	0	1
Physiology	5	0	5
Biochemistry	2	1	3

## Business and Management

Master of Business Adm.	21	3	24
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## Communications

Journ. & Mass Comm.	7	8	15
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## Computer and Information Science

Computer Science	10	1	11
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## Education

Elementary Ed.	4	28	32
Secondary Ed.	16	19	35
Guidance Ed.	20	29	49
Physical Ed.	14	8	22
Agricultural Ed.	20	1	21
Adult & Continuing Ed.	12	17	29
Ed. Administration	6	4	10
Home Ec. Ed.	0	2	2

## Engineering

Agricultural Engg.	5	0	5
Chemical Engg.	5	0	5
Civil Engg.	15	0	15
Electrical Engg.	3	2	5
Industrial Engg.	11	0	11
Mechanical Engg.	11	0	11
Nuclear Engg.	5	0	5

## Fine and Applied Arts

Art	2	2	4
Dramatic Arts	8	17	25
Master of Music	5	3	8

## Modern Languages

	15	22	37
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## Infectious Diseases and Surgery & Medicine

Vet. Med. Specialties	6	0	6
Horticulture Therapy	1	0	1

## Home Economics

Gen. Home Economics	0	28	28
Clothing & Textiles	0	11	11
Family Economics	2	8	10
Family & Child Dev.	15	32	47
Foods & Nutrition	1	20	21
Institutional Management	0	6	6

## Letters

English	6	3	9
Philosophy	1	0	1

## Mathematics

Mathematics	23	3	26
Statistics	1	1	2

## Physical Science

Physics	4	0	4
Chemistry	9	2	11
Geology	4	0	4

## Psychology

	6	3	9
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## Social Science

History	8	1	9
Geography	2	1	3
Political Science	19	1	20
Sociology	6	1	7

## Doctor of Philosophy

## Agriculture and Natural Resources

Agronomy	3	0	3
Animal Science	6	0	6
Horticulture	1	0	1
Food Science	5	2	7
Grain Science	4	0	4

## Biological Sciences

Biology	7	1	8
Plant Pathology	3	0	3
Pathology	6	0	6
Microbiology	1	1	2
Biochemistry	2	0	2
Entomology	4	0	4
Genetics	2	0	2
Parasitology	1	0	1

## Education

	42	5	47
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## Engineering

Chemical Engg.	2	0	2
Electrical Engg.	1	1	2
Mechanical Engg.	4	0	4
Industrial Engg.	1	0	1
Nuclear Engg.	3	0	3
Applied Mechanics	1	0	1

## Home Economics

Foods and Nutrition	1	3	4
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## Letters

English	3	0	3
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## Mathematics

Mathematics	3	0	3
Statistics	6	0	6

## Physical Science

Physics	6	0	6
Chemistry	8	0	8

## Psychology

	7	0	7
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## Social Science

Economics	6	0	6
History	6	0	6

## University Grand Total

	2,157	1,347	3,504
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## Enrollment Summary — Fall Semester 1974

### UNITED STATES

Alabama .....	11	Montana .....	6
Alaska .....	3	Nebraska .....	121
Arizona .....	7	Nevada .....	3
Arkansas .....	14	New Hampshire .....	0
California .....	88	New Jersey .....	74
Colorado .....	49	New Mexico .....	24
Connecticut .....	28	New York .....	104
Delaware .....	0	North Carolina .....	15
District of Columbia .....	2	North Dakota .....	13
Florida .....	25	Ohio .....	26
Georgia .....	27	Oklahoma .....	49
Hawaii .....	1	Oregon .....	9
Idaho .....	5	Pennsylvania .....	49
Illinois .....	134	Rhode Island .....	8
Indiana .....	28	South Carolina .....	5
Iowa .....	59	South Dakota .....	28
Kansas .....	13,245	Tennessee .....	9
Kentucky .....	10	Texas .....	37
Louisiana .....	30	Utah .....	9
Maine .....	7	Vermont .....	4
Maryland .....	27	Virginia .....	26
Massachusetts .....	40	Washington .....	5
Michigan .....	27	West Virginia .....	3
Minnesota .....	26	Wisconsin .....	43
Mississippi .....	14	Wyoming .....	8
Missouri .....	412	<b>TOTAL .....</b>	<b>14,997</b>

### INTERNATIONAL

Puerto Rico .....	8	Libya .....	3
Canal Zone .....	1	Malaysia .....	1
		Mexico .....	8
Afghanistan .....	2	Micronesia .....	2
Australia .....	1	Morocco .....	1
Bangladesh .....	5	Nepal .....	1
Bolivia .....	4	Netherlands .....	1
Brazil .....	4	New Zealand .....	1
Bulgaria .....	1	Nicaragua .....	1
Cambodia .....	1	Nigeria .....	23
Cameroon .....	1	Pakistan .....	12
Canada .....	2	Panama .....	2
Chile .....	1	Peru .....	1
China .....	91	Philippines .....	5
Colombia .....	5	Samoa .....	1
Costa Rica .....	1	Saudi Arabia .....	6
Egypt (U.A.R.) .....	5	South Africa .....	2
El Salvador .....	1	Sudan .....	2
Ethiopia .....	4	Sweden .....	2
Germany .....	6	Switzerland .....	3
Ghana .....	2	Syria .....	1
Guyana .....	1	Thailand .....	19
Hong Kong .....	12	Turkey .....	3
India .....	78	Uganda .....	3
Indonesia .....	2	United Kingdom	
Iran .....	22	(England) .....	2
Iraq .....	6	Uruguay .....	1
Ivory Coast .....	1	Venezuela .....	7
Japan .....	3	Vietnam .....	3
Jordan .....	1	West Indies	
Kenya .....	3	(Trinidad) .....	2
Korea .....	19	Yugoslavia .....	2
Kuwait .....	1	Zaire .....	2
Lebanon .....	3		
Liberia .....	1	<b>TOTAL .....</b>	<b>413</b>

## University Policy Regarding Student Records

Kansas State University recognizes the rights of students to have access to their records and will not make unauthorized disclosure of student records, all as required by the Family Educational Rights and Privacy Act of 1974.

Specifically, this act and the federal regulations adopted under it give students and former students the right to inspect, review, and copy educational records related to them. The only exceptions to this rule are for private notes of teachers and administrators, campus patrol records, medical treatment records, financial records of parents, confidential recommendations prior to January 1, 1975, records to which the student has waived the right of access in writing, and "directory information."

"Directory information" includes a student's name, address, telephone listing, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and the most recent previous educational agency or institution attended by the student.

Upon request, a record covered by the Act will be made available within a reasonable time, and in no event later than 45 days after the request. The student should direct his request to the official listed above in paragraph two who has charge of the record. Copies are available at the student's expense. A student may also request explanations and interpretations of the records from the official in charge. If he believes that a particular record or file contains inaccurate or misleading information or is otherwise inappropriate, the University will afford an opportunity for a hearing to

challenge the content of the record. Prior to any formal hearing, the official in charge of the record is authorized to attempt, through informal meetings and discussions with the student, to settle the dispute. If this is unsuccessful, the matter will be referred to the appropriate vice-president. If the student is still dissatisfied, he may request a hearing. It will be conducted by a hearing officer appointed by the President. The hearing will be held within two weeks. A decision will be rendered within two weeks after the hearing. The student will have the opportunity at the hearing to present any relevant evidence.

Education records and personally identifiable information from those records will not be released without the written consent of the student involved, except to other university personnel, officials of other schools in which the student intends to enroll, authorized state and federal government representatives, or unless it is "directory information" or is released in connection with the student's application for financial aid or in response to a judicial order or subpoena, or in a bona fide emergency.

The University maintains with education records of each student a record identifying all persons, except other university officials, who have requested or obtained access to the records and indicating the legitimate interest of those persons. This record of access is available to the student in question.

Finally, all personal information about a student released to a third party will be transferred on condition that no one else shall have access to it except with the student's consent.



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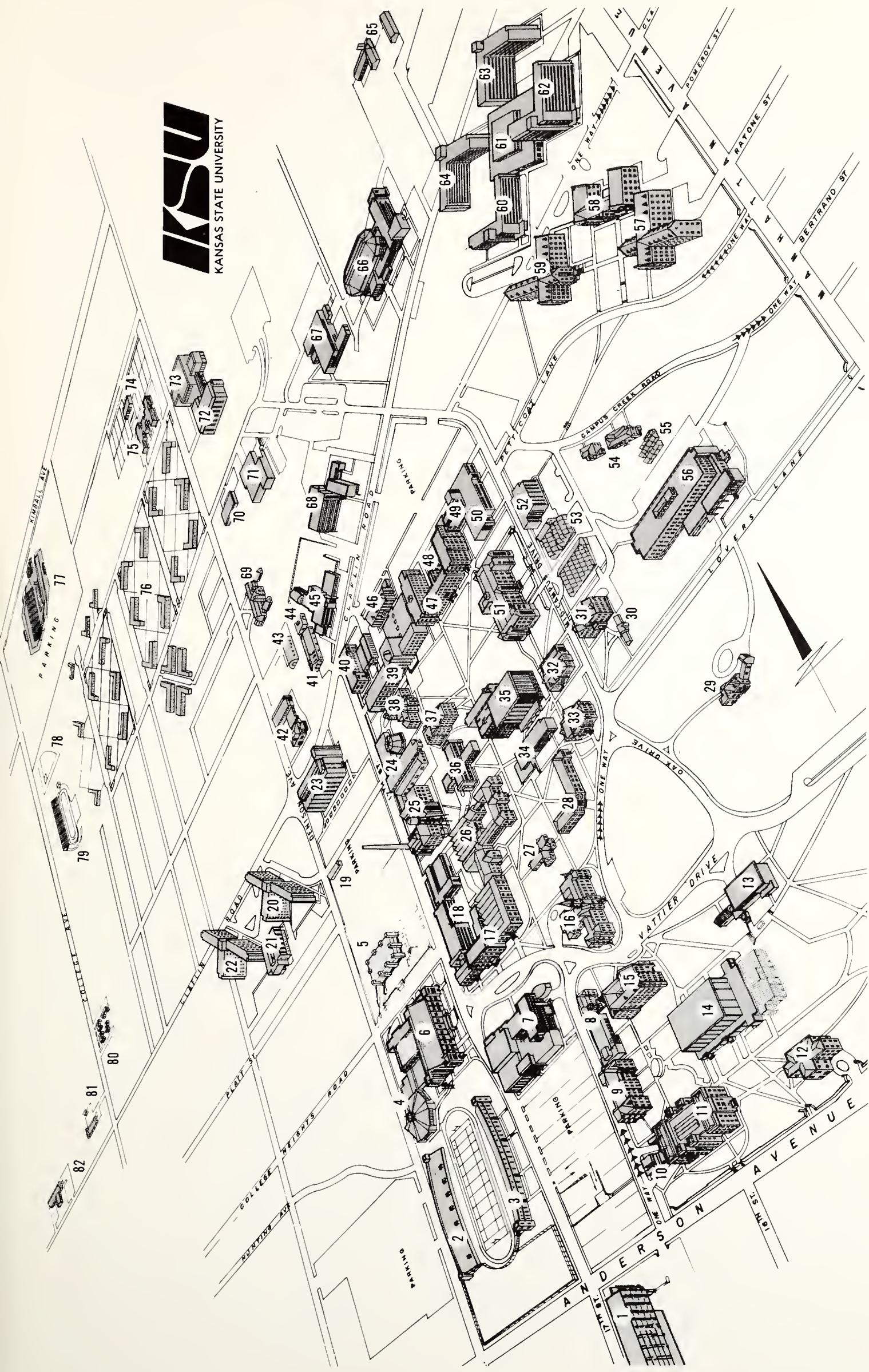
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## KANSAS STATE UNIVERSITY BULLETIN

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